iV2014 & cgiv2014 - DIGITAL ART GALLERY Online Exhibition
July 2014 - June 2015

VIRTUAL GALLERY VENUE
www.graphicslink.co.uk/DART.htm

Exhibiting Artists:
Alex Cruse
Andrew Liccardo
Anna Chupa
Anna Ursyn
Annelie Berner
Annette Weintraub
Arturo Bugarin Correa
Bogdan Soban
Cameron Grimes
Chiara Passa
Chris Kichener
Copper Gilloth
Corinne Whitacker
Dallas Soukup
Daniela Sirbu
David Oppenheim
Dena Elisabeth Eber
Divaa Helmy
Doug Craft
Eden Weinflash
Elizabeth Cornell

Emilio Vavarella
Emily Shapiro
Fred Bower
Gabe Garcia
Gabriel Rosenbrien
Gabriele Peters
Gloria Defilips Brush
Hervé Lehning
Jacob Epstein
Jason Boileau
Jean Constant
Jing Ziou
Joel Kahn
John Corbett
John Labadie
Joohyun Pyune
Lane Last
Lauren Arline
LiQin Tan
Margie Labadie
Meghan Barwick

Michiko Anderson
Mohammad Majid al-Rifaie
Monica Shell
Rubens and Joanna
Stephanie Snider

© Joohyun Jung Pyune ~ Before Me

© Monica Shell ~ Leaf Pattern
The Information Visualisation Conference (iV) is an international conference that aims to provide a foundation for integrating the human-centred, technological and strategic aspects of information visualisation in order to promote international exchange, cooperation and development. Building upon the reported success of last year’s workshop, IVS is pleased to announce the “7th Doctoral Research Workshop” which will run as part of the 17th International Conference on Information Visualisation (iV2014).

**Doctoral Research workshop**
This workshop focuses on the issues that doctoral students face during their studies and includes following interactive sessions:

- Introduction to “What is a PhD? “ from panel members
- A short tutorial on one of the key aspects that PhD issues
- **Case studies** - Presentation of number of case studies from PhD students candidates to the workshop with aim that highlights the issues that facing in the course of their studies.
- **Expert panel feedback** - Each presentation is followed by discussion and suggestion not only from panem members but from fellow researchers.
- **Expert tips on individual PhD student presentation and research.**
### Programme

**Tuesday 15 July 2014**

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<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Location</th>
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<tbody>
<tr>
<td>10:00</td>
<td><strong>Registration</strong>&lt;br&gt;10:30 - 13:00 Doctoral Research Workshop</td>
<td>University of Paris Descartes ● The hall of faculté de médecine building &gt;</td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch Break</td>
<td>University of Paris Descartes ● cloître des Cordeliers &gt;</td>
</tr>
<tr>
<td>14:00</td>
<td>Doctoral Research Workshop</td>
<td>University of Paris Descartes ● salle 108 &gt;</td>
</tr>
<tr>
<td>17:00</td>
<td>Close</td>
<td></td>
</tr>
</tbody>
</table>

**Chairs:** Banissi, Prof. Ebad, London South Bank University, UK

**Subject Liaising Committee chairs:**

- **10.00 Registration**
- **10.30 Opening & Welcome from discussion Panel members**
- **10:45 Panel member contribution on Doctoral issue**<br>Research Proposal & Research Questions>
- **11:00 Doctoral Researcher Contribution:** Ekaterina Ivanovna Galkina, Umass Lowell, USA
- **12:30 Panel member Discussion**<br>Literature Review>

- **13:00**<br>University of Paris Descartes ● cloître des Cordeliers>

- **14:00**<br>University of Paris Descartes ● salle 108>

- **17:00**<br>University of Paris Descartes ● salle 108>

**Panel Discussion**

- **15:10 Writing Research Thesis**
- **15:30 Break**
- **16:00 The assessment**
- **16:45 The assessment**
- **17:00 Close**
**Wednesday 16 July 2014**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00</td>
<td>Registration</td>
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</tbody>
</table>
| 10:15 | **Opening & Welcome**  
**Subject Liaison Committee chairs:**  
Prof. Gilles Venturini, University Francois Rabelais of Tours, France  
Dr Florence Cloppet, Paris Descartes University, France  
Prof. Nicole Vincent, Paris Descartes University, France  
Dr. Hanane Azzag, University of Paris 13, France  
Prof. Ebad Banissi, London South Bank University, UK |
| 10:30 | **Session iV2014_1.1: Information Visualisation**  
Chair: Prof. Frank T. Marchese, Pace University, USA  
**<keynote Lecture>**  
*Opportunistic Visualizations*  
Prof. Georges Grinstein, University of Massachusetts Lowell, USA |
| 11:35 | **Break**  
*University of Paris Descartes • The hall of factulty de médecine building* |

*University of Paris Descartes • Lecture Theatre - Pavillon 1*
# iV2014 PROGRAMME

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Location</th>
<th>Chair</th>
<th>Presentation</th>
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</thead>
<tbody>
<tr>
<td>12:00</td>
<td>iV2014_1.2: Information Visualisation</td>
<td>Lecture Theatre - Pavillon 1</td>
<td>Theodor Wyeld, Flinders University, Australia</td>
<td>histoGraph - A Visualization Tool for Collaborative Analysis of Historical Social Networks from Multimedia Collections&lt;br&gt;Jasminko Novak(^1), Lars Wieneke(^2), Marten Düring(^3), Isabel Micheil(^4), Mark Melenhorst(^5), Javier García Morón(^6), Chiara Pasini(^7), Marco Tagliasacchi(^8), Piero Fraternali(^9)&lt;br&gt;(^1)European Institute for Participatory Media, Germany; (^2)University of Applied Sciences Stalsund, Germany; (^3)Centre Virtuel de la Connaissance sur l’Europe, Luxemburg; (^4)University of North Carolina at Chapel Hill, NC, USA; (^5)TU Delft, Netherlands; (^6)Homeria Open Solutions, Spain; (^7)Politecnico di Milano, Italy&lt;br&gt;Directional aggregate visualization of large scale movement data&lt;br&gt;Yuuki Hyougo(^1), Kazuo Misue(^2), Jiro Tanaka(^3)&lt;br&gt;(^1)Department of Computer Science, University of Tsukuba, Japan; (^2)Faculty of Engineering, Information and Systems, University of Tsukuba, Japan&lt;br&gt;Towards the identification of consumer trajectories in geo-located search data&lt;br&gt;Xingkai Li(^1), Randy Goebel(^1), Jonas Sjobergh(^2)&lt;br&gt;(^1)University of Alberta, Canada; (^2)Meme Media Lab, Hokkaido University, Japan</td>
</tr>
<tr>
<td>13:00</td>
<td>Lunch Break</td>
<td>&lt; University of Paris Descartes ● cloître des Cordeliers &gt;</td>
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<tr>
<td>14:15</td>
<td>iV2014_1.3: Information Visualisation - Theory &amp; Techniques</td>
<td>Lecture Room: salle 108</td>
<td>Takayuki Itoh, Ochanomizu University, Japan</td>
<td>Narrative Visualization: A Case Study of How to Incorporate Narrative Elements in Existing Visualizations&lt;br&gt;Ana Raquel Figueiras&lt;br&gt;FCSH - Universidade Nova de Lisboa, Portugal&lt;br&gt;Graph Exploration by Multiple Linked Metric Views&lt;br&gt;Alexandros Panagiotidis(^1), Michael Burch(^1), Oliver Deussen(^2), Daniel Weiskopf(^1), Thomas Ertl(^1)&lt;br&gt;(^1)VISUS, Germany; (^2)University of Konstanz, Germany&lt;br&gt;The challenge of semantic symmetry in visualization&lt;br&gt;Randolph George Goebel(^1), Shi Wei(^2), Yuzuru Tanaka(^3)&lt;br&gt;(^1)University of Alberta, Canada; (^2)Hokkaido University, Japan&lt;br&gt;Interactive Similarity Links in Treemap Visualizations&lt;br&gt;Michael Burch&lt;br&gt;VISUS, Germany</td>
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<tr>
<td>15:30</td>
<td>Lunch Break</td>
<td>&lt; University of Paris Descartes ● Lecture Room: salle 110 &gt;</td>
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<tr>
<td>14:15</td>
<td>Session GMAI2014_1.4: Geometric Modeling &amp; Imaging</td>
<td>Lecture Room: salle 110</td>
<td>Malik Zawwar Hussain, University of the Punjab, Pakistan</td>
<td>Medical Image Segmentation using Particle Swarm Optimization&lt;br&gt;EL-Hachemi GUERROUT, Samy AIT-AOUDIA, Ramdane MAHIOU&lt;br&gt;ESI high school of computer, Algeria&lt;br&gt;Two Methods of Object Designing by Rational Splines&lt;br&gt;Muhammad Sarfraz(^1), Malik Zawwar Hussain(^2)&lt;br&gt;(^1)Kuwait University, Kuwait; (^2)Punjab University, Pakistan&lt;br&gt;Inpainting by an Inverse Problem Resolution&lt;br&gt;Fatma Zohra Nouri(^1), Djaafer Mezhoud(^1), Pierre Spiteri(^2)&lt;br&gt;(^1)Université Badji Mokhtar, Annaba, Algeria; (^2)ENSEEIT-Toulouse, France&lt;br&gt;Super-Resolution Using Edge Modification through Stationary Wavelet Transform&lt;br&gt;Tabinda Sarwar, Fahim Arif&lt;br&gt;National University of Sciences and Technology, Pakistan</td>
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<td>Time</td>
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<tr>
<td>14:15</td>
<td>BuiltViz2014_1.5</td>
<td>BuiltViz – Tempus Project</td>
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</table>
| 15:20 | EXECUTIVE MANAGEMENT DECISION SUPPORT TOOL - a hybrid visual model | Farzad Khosrowshahi, Michelle Wishardt, Chris Gorse, Parisa Ghodous, David Greenwood, and Talal A-Shihabi, 
Leeds Metropolitan University, UK; University Claude Bernard Lyon 1, France; Northumbria University, UK and Damascus University, Syria |
University Claude Bernard Lyon 1, France and Leeds Metropolitan University, UK |
| 15:20 | Enhanced Construction Planning Methodology with 4D Building Information Modeling | Modar Saad, Farzad Khosrowshahi, and Michelle Wishardt, and Shukri Baba. 
Damascus University, Syria and Leeds Metropolitan University, UK |

**Break**
15:50 - 17:00
Session IV2014_1.6: GVA GeoAnalytics
Chair: Dr. Hascoët Mountaz, LIRMM CNRS Univ. Montpellier II, France
Using Ontologies for Proposing Adequate Geovisual Analytics Solutions in the Analysis of Trajectories
Gabriel Vatin, Aldo Napoli
MINES ParisTech - CRC, France
Development of Adaptive Information Visualization Systems with Augmented Reality
Ezequiel R. Zorzal, Celso A. R. de Sousa, Alexandre Cardoso, Claudio Kirner, Edgard A. Lamounier Júnior, Marcos G. Quiles
1University of São Paulo, Brazil; 2Federal University of São Paulo, Brazil; 3Federal University of Itajubá, Brazil; 4Federal University of Uberlândia, Brazil
Using Visual Cues on DOITree for Visualizing Large Hierarchical Data
Quang Vinh Nguyen, Simeon Simoff, Mao Lin Huang
1University of Western Sydney, Australia; 2University of Technology, Sydney
Drawing Large Weighted Graphs using Clustered Force-Directed Algorithm
Jie Hua, Mao Lin Huang, Quang Vinh Nguyen
1UTS, Australia; 2Tianjin University; 3UWS, Australia

15:50 - 17:00
Session IV2014_1.7: MediVis14: BioMedical Visualisation
Chair: Dr. Urska Cvek, Louisiana State University Shreveport, USA
iSyn: WebGL-based interactive de novo drug design
Hongjian Li, Kwong-Sak Leung, Chun Ho Chan, Hei Lun Cheung, Man-Hon Wong
Chinese University of Hong Kong, Hong Kong S.A.R. (China)
MediMatrix: An Interface for Visualizing Learner-Generated Patient Case Collections in Postgraduate Medical Training
Svenja Schröder, Jasminko Novak
1Humboldt-Viadrina School of Government, Germany; 2European Institute for Participatory Media, Germany; Univ. of Appl. Sciences Stralsund, Germany
Visual Analysis with Dynamic Geometric Complementarity and Physicochemical Matching in Protein Docking
feng lin, LIU HUI, Lee Yong Tsui, Qian Kemao, Seah Hock Soon
Nanyang Technological University Singapore
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<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>15:50 - 17:00</td>
<td>BuiltViz_1.8: BuiltViz – Tempus Project</td>
<td>Quality Information Modeling for Construction Using BIM Autodesk 360 Field</td>
<td>Maya Rana¹, Omran Jamal¹, Hassan Bassam¹ and Parisa Ghodous²</td>
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<td>BSC Designer to Manage Construction Project Performance Information through Visual Analysis</td>
<td>Maya Rana¹, Omran Jamal¹, Hassan Bassam¹, Ahmad Layal¹, Parisa Ghodous², Farzad Khosrowshahi³, Michelle Wishardth³ and Chris Gorse³</td>
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<td>Transition of the Design Work from Traditional CAD to BIM - Economic Feasibility Study</td>
<td>Jamal Omran¹, George Haddad¹, Farzad Khosrowshahi³, Michelle Wishardth³ and Chris Gorse³ and Parisa Ghodous³</td>
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<td>Visualization of the Expected Damage for Seismic Disaster Planning In Developing Areas</td>
<td>Samer Bu Hamdan¹, Ghassan Al-Chaar², Farzad Khosrowshahi³, Talal Al-Shihabi¹ and Jad Juriedini¹</td>
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<td>Utilization of Fuzzy Logic and GIS in Selecting the Optimal Location for a Facility</td>
<td>Talal Al-Shihabi¹, Farzad Khosrowshahi³, Chris Gorse³ and Mazen Ibrahim¹</td>
</tr>
</tbody>
</table>

¹Tishreen University, Syria; ²Université de Lyon 1, France and ³Leeds Becket University, Leeds, UK
**Visualisation Social Networking Event**

*Evening Paris Cruise over on the Seine River*

*Dinner & cruise with Champagne*

A view from The River Seine, a leisurely cruise capturing a panoramic view of the Paris skyline, a unique blend of modernity interwoven seamlessly into forms and shades of history and culture of one of the world grand and romantic capital cities, which cannot be missed. An evening cruise on The River Seine has been organised for the conference delegates. Detail of this cruise is as follows:

Scheduled: July, 16, 2014  
Time: 20:00 (sharp)  
Embarking Pier: L’ESCALE DE GRENELLE, QUAI DE GRENELLE, 75015 PARIS  
Metro Station: Métro Ligne 6 Arrêt « Bir Hakeim » ou RER C Arrêt « Champs de Mars/Tour Eiffel »

Boat: Type of Function: Dinner & cruise with Champagne

COST:

Registered Delegates at subsidised rate of: £35 GBP per person  
Guest of delegates at subsidised rate of: £40 GBP per person

Please confirm your attendance for this social event by Wednesday 9th July 2014. Payment for this if possible should be settled with registration fee, otherwise tickets and payment can be finalised at the conference registration desk.
Thursday 17 July 2014

**09:00**
Registration

**09:30 - 11:15**
Session IV2014_2.1: Information Visualisation – Theory & Techniques
Chair: Prof. Feng Lin, Nanyang Technological University, Singapore

* A New Scheme for Trajectory Visualization
  Yuejun Guo\(^1\), Qing Xu\(^1\), Xiu Li\(^1\), Mateu Sbert\(^2\)
  \(^1\)Tianjin University, China, People's Republic of; \(^2\)Universitat de Girona

* Partial Link Drawings for Nodes, Links, and Regions of Interest
  Michael Burch, Alexandros Panagiotidis, Daniel Weiskopf
  VISUS, Germany

* Viewing Object-Oriented Software with MetricAttitude: an Empirical Evaluation
  Rita Francesc\(^1\), Michele Risi\(^2\), Giuseppe Scanniello\(^3\), Genoveffa Tortora\(^4\)
  \(^1\)University of Salerno, Italy; \(^2\)University of Salerno, Italy; \(^3\)University of Basilicata, Italy; \(^4\)University of Salerno, Italy

* Students in Transit: Understanding the Migration of Students between Disciplines and Disciplinary Groupings
  Dennis Groth\(^1\), Spencer Hayden\(^2\), Michael Sauer\(^1\)
  \(^1\)Indiana University, United States of America; \(^2\)Razorfish, LLC

* EVOLVE: A Visualization Tool for Multi-Objective Optimization Featuring Linked View of Explanatory Variables and Objective Functions
  Maki Kubota\(^1\), Takayuki Itoh\(^1\), Shigeru Obayashi\(^1\), Yuriko Takeshima\(^2\)
  \(^1\)Ochanomizu University, Japan; \(^2\)Tohoku University, Japan

**11:15**
Break
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<tr>
<th>Time</th>
<th>Session</th>
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<th>Speaker(s)</th>
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<tr>
<td>11:45</td>
<td>iV2013_2.3: Visualisation</td>
<td>&lt; University of Paris Descartes, Lecture Theatre - Pavillon 1&gt;</td>
<td>Chair: Prof. Georges Grinstein, University of Massachusetts Lowell, USA</td>
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<tr>
<td>11:45</td>
<td>&lt;keynote Lecture&gt;</td>
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<td>Medieval Visualization and the Art of Memory</td>
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<td>Francis T. Marchese</td>
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<td>11:45</td>
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<td></td>
<td>Pace University, NY, USA</td>
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<tr>
<td>11:45</td>
<td>&lt;keynote Lecture&gt;</td>
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<td>An Artisanal Approach to Interactive Heritage Visualization</td>
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<td>Alan Potkin</td>
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<td>Northern Illinois University, USA</td>
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<tr>
<td>13:00</td>
<td>Lunch Break</td>
<td>&lt; University of Paris Descartes, cloître des Cordeliers&gt;</td>
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</tbody>
</table>
### Session IV2014_2.4: Information Visualisation - Application

**Chair:** Prof. Gilles Venturini, University Francois Rabelais of Tours, France

**Opener**

**Collaborative Information Visualization Using a Multi-projection System and Mobile Devices**

Alessandro Campanhã Moraes, Danilo Medeiros Eler, José Remo Ferreira Brega
Universidade Estadual Paulista "Júlio de Mesquita Filho" - UNESP, Brazil

**Conferences, Coffee and Complexity. Supporting Cognition and Communication at Conventions**

Florian Windhager, Michael Smuc, Lukas Zenk
Danube University Krems, Austria

**A Heatmap-Based Time-Varying Multi-Variate Data Visualization Unifying Numeric and Categorical Variables**

Haruka Suematsu, Sayaka Yagi, Takayuki Itoh, Yosuke Motohashi, Kenji Aoki, Satoshi Morinaga
1Ochanomizu University, Japan; 2NEC Corporation

**GRAPE: A Gradation Based Portable Visual Playlist**

Tomomi Uota, Takayuki Itoh
Ochanomizu University, Japan

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### Session IV2014_2.5: MediVis14: BioMedical Visualisation

**Chair:** Dr. Marjan Trutschl, Louisiana State University Shreveport, USA

**Regional Differences in Diagnostic Conversion to Dementia**

Ekaterina I Galkina, Georges G Grinstein
Umass Lowell, United States of America

**Interactive Biosignal Analysis and Classification**

Harri Siirtola, Jorge Ávalos-Salguedo, Katriina Aalto-Setälä, Martti Juhola
University of Tampere, Finland

**Computer-Assisted Myocardial Perfusion Assessment**

Samuel Silva, Joaquim Madeira, Beatriz Sousa Santos
1IEETA - University of Aveiro, Portugal; 2DETI / IEETA - University of Aveiro, Portugal

**In-vitro validation of image guided surgery system with 3D pre-operative visualization for atrial transseptal puncture.**

Jeevan Mahadevu, Jebaraj Rathinasmamy, Krishnakumar Ramarathnam
1Indian Institute of Technology Madras, India; 2Sri Ramachandra University, Porur, Chennai, India

**Visualization of spiral drawing data of patients with Parkinson’s disease**

Ili Jusufi, Dag Nyholm, Mevludin Memedi
1University of California, Davis, United States of America; 2Neuroscience, Neurology, Uppsala University, Uppsala, Sweden; 3School of Technology and Business Studies, Dalarna University, Borlänge, Sweden
Session iV2014_2.6: Visualisation
Chair: Dr Ir Benoît Otjacques, Centre de Recherche Public - Gabriel Lippmann, Luxembourg

<Short Paper>
Visualizing the Evolution of Groups of Politicians Mentioned in the News
Carolina de Figueiredo Bento¹,², Daniel Jorge Viegas Gonçalves¹,², Bruno Emanuel da Graça Martins¹,²
¹Instituto Superior Técnico; ²INESC-ID, Lisbon

<Short Paper>
Augmented Reality and Holograms for the Visualization of Mechanical Engineering parts
Mauro Figueiredo, Pedro Cardoso, César Gonçalves, João Rodrigues
Instituto Superior Engenharia - Algarve University, Portugal

<Short Paper>
A Method for Text Detection and Rectification in Real-world Images
Satoshi Yonemoto
Graduate School of Information Science, Kyushu Sangyo University

<Short Paper>
Summarising variations of “Human Computer Interaction” syllabus in Computer Science area
Hascoët Mountaz¹, Nakayama Minoru²
¹LIRMM CNRS Univ. Montpellier 2, France; ²Human System Science / CRADLE, Tokyo Institute of Technology, Japan

164 - On the analysis of Wikipedia activity through time
Nuno Silva¹, Daniel Gonçalves¹,²
¹Instituto Superior Técnico, University of Lisbon Lisbon; ²INESC-ID / University of Lisbon Lisbon, Portugal

15:15
Break
<table>
<thead>
<tr>
<th>Time</th>
<th>Session IV2014_2.7: VA - Visual Analytics</th>
<th>Session IV2014_2.8: HCI - Interaction for Information Visualisation</th>
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</thead>
<tbody>
<tr>
<td>15:45</td>
<td><em>Chair:</em> Fatma Bouali, University of Lille 2, France</td>
<td><em>Chair:</em> Dr. Dennis Groth, Indiana University, USA</td>
</tr>
<tr>
<td>17:00</td>
<td><strong>A Visual Analytics of Geometric Distances Between Amino Acids and Surface Pockets of Proteins</strong>&lt;br&gt;<strong>Makiko Miyoshi, Ayaka Kaneko, Takayuki Itoh, Kei Yura</strong>&lt;br&gt;Ochanomizu University, Japan</td>
<td><strong>From Finger Gesture to Finger Choreography: Enabling 3D Live Performances on Smartphones</strong>&lt;br&gt;<strong>Hsin Hsin Lin</strong>&lt;br&gt;INFOTECH Research &amp; Consultancy, Singapore</td>
</tr>
<tr>
<td>15:45</td>
<td><strong>From Multiple Linked Views to Multiple Linked Analyses: the Meme Media Digital Dashboard</strong>&lt;br&gt;<strong>Jonas Sjobergh, Yuzuru Tanaka</strong>&lt;br&gt;Hokkaido University, Japan</td>
<td><strong>Flip Visualization for Web based Demographic Simulation System</strong>&lt;br&gt;<strong>Mariko Sasakura¹, Kenichi Iwata², NaokoMatsumoto³</strong>&lt;br&gt;¹Okayama University, Japan; ²Okayama Sozan Senior High School, Japan</td>
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<tr>
<td>15:45</td>
<td><strong>Parallel Box: Visually Comparable Representation for Multivariate Data Analysis</strong>&lt;br&gt;<strong>Hiroaki Kobayashi¹, Tadanobu Furukawa², Kazuo Misue³</strong>&lt;br&gt;¹Department of Computer Science, University of Tsukuba; ²Fujitsu Laboratories Ltd.; ³Faculty of Engineering, Information and Systems, University of Tsukuba</td>
<td><strong>Visualising the Code: empowering novice and beginner programmers using a HTML game editor.</strong>&lt;br&gt;<strong>Theodor Wyeld, Zak Barbuto</strong>&lt;br&gt;Flinders University, Australia</td>
</tr>
<tr>
<td>15:45</td>
<td><strong>Visual Comparison of Multilingual Documents and Lexical Matching</strong>&lt;br&gt;<strong>Hascoët Mountaz¹, Nakayama Minoru²</strong>&lt;br&gt;¹LIRMM CNRS Univ. Montpellier 2, France; ²Human System Science / CRADLE, Tokyo Institute of Technology, Japan</td>
<td><strong>&lt;Short Paper&gt;</strong>&lt;br&gt;<strong>A tool for visually exploring multi-objective mixed-integer optimization models</strong>&lt;br&gt;<strong>Rui Borges Lopes¹², Beatriz Sousa Santos¹³, Carlos Ferreira¹⁴</strong>&lt;br&gt;¹Department of Economics, Management and Industrial Engineering; ²Center for Research &amp; Development in Mathematics and Applications; ³Department of Electronics Telecommunications and Informatics; ⁴Institute of Electronics Engineering and Telematics of Aveiro, University of Aveiro, Portugal</td>
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<tr>
<td>Time</td>
<td>Session IV2014_2.9: Information Visualization</td>
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<td>15:45</td>
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| 17:00 | **Heat Maps for Aggregating Bioacoustic Annotations**  
Philip Eichinski, Paul Roe  
Queensland University of Technology, Australia  
**Facetscape: A Visualization for Exploring the Search Space**  
Christin Seifert, Johannes Jurgovsky, Michael Granitzer  
Passau University, Germany  
**Visualizing Large Quantities of Educational Datamining Information**  
Sandra Gama, Daniel Goncalves  
INESC-ID and Instituto Superior Técnico, Universidade de Lisboa, Portugal  
**RadCloud: Analyzing Texts with Merged Word Clouds**  
Michael Burch, Steffen Lohmann, Fabian Beck, Lorenzo Di Silvestro, Nils Rodriguez, Daniel Weiskopf  
VISUS, Germany |

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<tr>
<th>Time</th>
<th>Session IV2014_2.10: Animation, Special Effects and Multimedia Show</th>
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<td>17:00</td>
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| 17:30 | **Animation, Special Effects and Multimedia Show**  
Chair: Bannatyne, Prof. Mark, IUPUI, USA |

< University of Paris Descartes • Lecture Room: salle 128 >

< University of Paris Descartes • Lecture Theatre - Pavillon 1 >
**Friday 18 July 2014**

<p>| Time   | Location                                      | Session        | Title                                                                           | Chair                        |
|--------|-----------------------------------------------|----------------|                                                                                |                              |
| 09:00  | &lt; University of Paris Descartes ● The hall of faculty de médecine building &gt; | Registration   |                                                                                |                              |
| 09:30  | &lt; University of Paris Descartes ● Lecture Theatre - Pavillon 1 | Session IV2014_3.1: VA - Visual Analytics | Effects of visualizing missing data: an empirical evaluation | Dr. Harri Siirtola, University of Tampere, Finland |
| 11:15  | &lt; University of Paris Descartes ● Lecture Theatre - Pavillon 1 | Session IV2014_3.1: VA - Visual Analytics | Coordinated Multiple Views to Support Image Retrieval | Jorge Marques Prates, Rogério Eduardo Garcia, Rosane Minghim |
|        |                                               |                | A Web-based Tool for the Visual Analysis of Media Annotations |                              |
|        |                                               |                | Pierrick Bruneau, Mickaël Stefas, Hervé Bredin, Anh-Phuong Ta, Thomas Tamisier, Claude Barras |                              |
|        |                                               |                | Animated Geo-temporal Clusters for Exploratory Search in Event Data Document Collections |                              |
|        |                                               |                | Paul Craig, Nena Roa-Seiler, Ana Delia Olvera Cervantes |                              |
|        |                                               |                | DataTube4log: a Visual Tool for Mining Multi-Threaded Software logs |                              |
|        |                                               |                | Sébastien Devaux, Fatma Bouali, Gilles Venturini |                              |
|        |                                               |                | Spectral-Based Contractible Parallel Coordinates |                              |
|        |                                               |                | Koto Nohno, Hsiang-Yun Wu, Kazuho Watanabe, Shigeo Takahashi, Issie Fujishiro |                              |
|        | &lt; University of Paris Descartes ● Lecture Room: salle 108 &gt; | Session IV2014_3.2: VAD - Visualization, Art, and Design | Labyrinth at Versailles: Imaginary Spaces | Prof. Alan Potkin, Northern Illinois University, USA |
|        |                                               |                | Reconstitution of the Labyrinth of Versailles as a Mobile App |                              |
|        |                                               |                | The Gothic Cathedral: An Immersive Information Visualization Space |                              |
|        |                                               |                | EVA: A Visualization framework for organizing concept sketches |                              |
|        |                                               |                | Graphic Visualization in Literary Text Interpretation |                              |
|        |                                               |                | Min Nan Liao, Teng Wen Chang |                              |
|        |                                               |                | Andrea Bellandi, Alessia Belluscì, Amedeo Cappelli, Emiliano Giovannetti |                              |
|        |                                               |                | Antonio Zampolli |                              |
|        |                                               |                | Institute for Computational Linguistics (ILC), Pisa, Italy |                              |</p>
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<td>09:30</td>
<td>11:15</td>
<td><strong>Session iV2014_3.3: KV - Knowledge Visualisation</strong></td>
<td>Bannatyne, Prof. Mark</td>
<td>Phong Hai Nguyen, Kai Xu, Rick Walker, William Wong, Middlesex University, United Kingdom</td>
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<td><strong>SchemaLine: Timeline Visualization for Sense Making</strong></td>
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<td><strong>Semantic Blossom Graph: A new Approach for Visual Graph Exploration</strong></td>
<td>Manuela Rauch, Ralph</td>
<td>Wozelka, Eduardo Veas, Vedran Sabol, Know Center, Austria; Graz University of Technology, Austria</td>
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<td><strong>Detecting Mango Fruits by using Randomized Hough Transform and Backpropagation Neural Network</strong></td>
<td>Kutiba Nanaa, Mohamed Rizon, Mohd Nordin Abd Rahman, Azim Zaliha Abd Aziz, Universiti Sultan Zainal Abidin (UniSZA), Terengganu, Malaysia</td>
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<td><strong>Application of Interactive Surfaces to Support Computer Mediated Collaborative Design Environment</strong></td>
<td>Marianthi Leon, Daniel C. Doolan, Richard Laing, Julian Malins, Huda Salman</td>
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<td><strong>A 2D/3D Visualisation and Modelling Platform for Timber Frame Construction Based on the IFC Data Model</strong></td>
<td>Guofu Xiang, Eyad Elyan, Patrik Holt, Mike Coats, Ross Brown</td>
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**11:15**

*Break*
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<td>11:45</td>
<td><strong>Session iV2014_3.4: Information Visualisation</strong></td>
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<td>13:00</td>
<td>Chair: Prof. Randolph George Goebel, University of Alberta, Canada</td>
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<td><em>keynote Lecture</em></td>
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<td><strong>Trend Towards BigData Visual Analytics</strong></td>
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<td>Prof. Mao Lin Huang</td>
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<td>Director of Information Visualization Lab, The University of Technology, Sydney, Australia</td>
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<td></td>
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<td><strong>How the History of Automotive Industry could inspire Information Visualization</strong></td>
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<td>Dr Ir Benoit Otjacques</td>
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<td>Centre de Recherche Public - Gabriel Lippmann, Luxembourg</td>
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<td>13:00</td>
<td><strong>Lunch Break</strong></td>
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<td>13:30</td>
<td><strong>Society of Information Visualisation Committee &amp;</strong></td>
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<td>iV2015 - Committee Members Meeting</td>
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Visualizations, Information Visualization and Visual Analytics share the same pipeline, basically taking data and producing images on displays. There are some minor differences but all in all they’re quite similar. All three have very similar Grand Challenges (scalability, developing a theory, computing the best presentation, …). I’ve spoken on such and other grand challenges in each of these areas over the last 20 years, identifying what wicked problems really need to be addressed, what big problems would have tremendous impact, and, of course, I am ready to do so again. But progress on these has been quite slow and technology is moving so much more rapidly than anticipated.

In this talk I will identify likely future technologies, technologies that are right around the corner, technologies that will be in need of visualization, for which no good visualizations are currently available. This is an opportunity for visualization, not a grand challenge for visualization. I will compare these with the past grand challenges but the difference will be clear: grand challenges would have tremendous impact on our visualization field, but in the future, at least two decades from now given our pace; opportunistic visualizations will have tremendous impact within the next decade and great payoff defining new visualizations, new interactions, and new paradigms.

Bio-sketch

Georges Grinstein is Professor of Computer Science at the University of Massachusetts Lowell, head of its Bioinformatics Program and Director of its Institute for Visualization and Perception Research. He received his Ph.D. in Mathematics from the University of Rochester in 1978.

His work is broad and interdisciplinary, covering the perceptual and cognitive foundations of visualization, very high-dimensional data visualization, visual analytics and applications. The emphasis is on the modeling, visualization, and analysis of complex information data and systems. He has over 35 years in academia with extensive consulting, over 250 research grants, products in use nationally and internationally, several patents, numerous publications in journals and conferences, a book on interactive data visualization, founded several companies, been the organizer or chair of national and international conferences and workshops in Computer Graphics, in Visualization, and in Data Mining. He has given numerous keynotes and mentored over 25 doctoral students and hundreds of graduate students. He has been on the editorial boards of several journals in Computer Graphics and Data Mining, a member of ANSI and ISO, a NATO Expert, and a technology consultant for various public agencies and commercial organizations.

For the last eight years he has co-chaired the IEEE VAST contests in visual analytics leading to new research areas. He has developed and taught a new course called Radical Design focused on how to develop radically new products instead of evolutionary ones. He is a member of the Department of Homeland Security’s Center of Excellence CCICADA (Command, Control and Interoperability Center for Advanced Data Analysis), and directs the development of Weave, an open source web-based interactive collaborative visual analytics system incorporating numerous innovations (see iWeave.org).

Session iV2014_1.2: Information Visualisation
Chair: Theodor Wyeld, Flinders University, Australia

histroGraph - A Visualization Tool for Collaborative Analysis of Historical Social Networks from Multimedia Collections

Jasminko Novak1,2, Lars Wieneke3, Marten Düring3,4, Isabel Micheel1, Mark Melenhorst1, Javier Garcia Morón5, Chiara Pasini7, Marco Tagliasacchi1, Piero Fraternali7

1European Institute for Participatory Media, Germany; 2University of Applied Sciences Stralsund, Germany; 3Centre Virtuel de la Connaissance sur l’Europe, Luxembourg; 4University of North Carolina at Chapel Hill, NC, USA; 5TU Delft, Netherlands; 6Homeria Open Solutions, Spain; 7Politecnico di Milano, Italy

This paper describes the design and development of histoGraph, an interactive tool for explorative visualization and collaborative investigation of historical social networks from multimedia collections. Development of an interdisciplinary collaboration of computer scientists, historians, HCI researchers and interface designers, the tool aims at supporting historians in the discovery and historical analysis of relationships between people, places and events. A special focus is on the identification and interactive...
visualization of social relations from historical photo collections through a combination of automatic analysis and expert-based crowdsourcing. The tool design bridges the gap between established network analysis and visualization techniques and traditional hermeneutic research methods in historical research. It integrates visual exploration with hybrid social graph construction, hypothesis formulation and the consultation of digitized primary sources. A formative evaluation of the current prototype, developed as a domain-specific application for historians in the field of European integration points to opportunities and critical factors in applying this approach to support and further current research practices in digital humanities.

Directional aggregate visualization of large scale movement data

Yuuki Hyougo¹, Kazuo Misue², Jiro Tanaka²
¹Department of Computer Science, University of Tsukuba, Japan; ²Faculty of Engineering, Information and Systems, University of Tsukuba, Japan

Widespread use of GPS terminals has made possible to collect geospatial movement data. Visualization is an effective method to understand such movement data. However, in large scale movement analysis, because data include complex movements of individuals, it is difficult to read the data by naive visualization methods. In order to solve this problem, we developed a visualization technique that can represent large scale movement data in aggregate manner. This visualization technique has two variations of representations: Ameba representation and Ameba colony representation. Ameba representation can represent movement distance in each direction with map scale from any point in the geographical space, and Ameba colony representation can represent movements in a wide geographical space.

Towards the identification of consumer trajectories in geo-located search data

Xingkai Li¹, Randy Goebel¹, Jonas Sjobergh²
¹University of Alberta, Canada; ²Meme Media Lab, Hokkaido University, Japan

Modern geo-position system (GPS) enabled smart phones are generating an increasing volume of information about their users, including geo-located search, movement, and transaction data. While this kind of data is increasingly rich and offers many grand opportunities to identify patterns and predict behaviour of groups and individuals, it is not immediately obvious how to develop a framework for extracting plausible inferences from these data. In our case, we have access to a large volume of real user data from the Poynt smart phone application, and we have developed a generic and layered system architecture to incrementally find aggregate items of interest within that data. This includes time and space correlations, e.g., are people searching for dinner and a movie, distributions of usage patterns and platforms, etc., geographic distribution of Android, Apple, and BlackBerry users, and clustering to identify relatively complex search and movement patterns we call “consumer trajectories.” Our pursuit of these kinds of patterns has helped guide our development of information extraction, machine learning, and visualization methods that provide systematic tools for investigating the geo-located data, and for the development of both conceptual tools and visualization tools in aid of finding both interesting and useful patterns in that data. Included in our system architecture is the ability to consider the difference between exploratory and explanatory hypotheses on data patterns, as well as the deployment of multiple visualization methods that can provide alternatives to help expose patterns.

In our introduction to our framework here, we provide examples of formulating hypotheses on geo-located behaviour, and how a variety of methods including those from machine learning and visualization, can help confirm or deny the value of such hypotheses as they emerge. In this particular case, we provide an initial basis for identifying semantically motivated data artifacts we call geo-located consumer trajectories. We investigate their plausibility with a variety of time and space series clustering and visualization models.

Session iV2014_1.3: Information Visualisation - Theory & Techniques
Chair: Prof. Takayuki Itoh, Ochanomizu University, Japan

Narrative Visualization: A Case Study of How to Incorporate Narrative Elements in Existing Visualizations
Ana Raquel Figueiras
FCSH - Universidade Nova de Lisboa, Portugal

Stories have long been used to convey information, cultural values, and experiences. Narratives not only have been the main way people make
sense of the world, but also have been the easiest way humans found out to share complex information. However, today we are confronted with the problem of the amount of information available, which sometimes is hard to cope with. Combining storytelling with visualization has been pointed out as an efficient method to represent and make sense of data, at the same time allowing people to relate with the information.

In this paper, we explore the benefits of adding storytelling to visualizations. Drawing on case studies from news media to visualization research websites, we identified possible strategies to introduce storytelling in visualizations such as adding short stories or narrative elements using annotations and using time to introduce the feeling of storytelling or story-flow.

**Graph Exploration by Multiple Linked Metric Views**

Alexandros Panagiotidis¹, Michael Burch¹, Oliver Deussen², Daniel Weiskopf¹, Thomas Ertl¹

¹VISUS, Germany; ²University of Konstanz, Germany

The visualization of relational data by node-link diagrams quickly leads to a degradation of performance at some exploration tasks when the diagrams show visual clutter and overdraw. To address this challenge of large-data graph visualization, we introduce Graph Metric Views, a technique that enriches the visualization of traditional layout strategies for node-link diagrams by additionally allowing an analyst to interactively explore graph-specific metrics such as number of nodes, number of link crossings, link coverage, or degree of orthogonality. To this end we support an analyst with additional histogram-like representations at the axes of the display space for graph-specific metrics. In this way, a cluttered and densely packed node-link diagram becomes more explorable even for dense graph regions: The user can use the distribution of metric values as an overview and then select regions of interest for further investigation and filtering.

**The challenge of semantic symmetry in visualization**

Randolph George Goebel¹, Shi Wei², Yuzuru Tanaka²

¹University of Alberta, Canada; ²Hokkaido University, Japan

We present a fundamental problem which arises within an emerging theory of visualization, and provide examples that illustrate the challenge of what we call semantic symmetry. This theory of visualization distinguishes data domains (e.g., numbers and symbols) from picture domains (e.g., shapes, shading, colour), and provides a framework for specifying a variety of mappings between data and picture domains. Visualization is about enabling inferences about data within the human visual system, so crucially depends on the management of mappings from the data to the picture domain.

But there are many possible choices for these mappings, and only in the last decade has there emerged any serious assessment of how one might measure the quality of a visualization.

The situation is further complicated by what is now called visual analytics, where data to picture mappings allow manipulation of that picture to further understand or reveal the underlying data relationships. This kind of picture manipulation is exactly the departure point for our presentation of the problem of semantic symmetry. Semantic symmetry considers the problem of how to couple data and picture so that changes in one are accurately reflected in the other. We illustrate the foundational nature of the problems arising from the desire for semantic symmetry, and explain the kinds of constraints and framework that are necessary in order to be able to support a more complete theory of visualization.

**Interactive Similarity Links in Treemap Visualizations**

Michael Burch

VISUS, Germany

Exploring hierarchical organizations such as software systems is a challenging task. This gets even harder when these are large, deeply nested, and attached by a list of additional attributes of either quantitive, ordinal, or categorical nature. Treemaps have been designed to graphically represent such hierarchical structures in a spacefilling way where two attributes for each hierarchy element can be visualized in each treemap box.
Abstract

at the same time: by area and by color. Having more than two attributes attached to each hierarchy element can also be visualized by this concept when allowing an analyst to frequently browse the pairwisely represented attributes in the color dimension leaving the box sizes fixed due to mental map preservation. In this paper we enrich standard treemap visualizations by such a browsing feature and additional interaction techniques such as expanding or collapsing them to different levels of hierarchical granularity. To further support the comparison of similar boxes for either one, two, or a list of attributes we add the concept of similarity links whose display thresholds can also interactively be chosen.

Session GMAI2014_1.4: Geometric Modeling & Imaging

Chair: Prof. Muhammad Sarfraz, Kuwait University, Kuwait

Medical Image Segmentation using Particle Swarm Optimization
EL-Hachemi GUERROUT, Samy AIT-AOUDIA, Ramdane MAHIOU
ESI high school of computer, Algeria

Segmentation of medical images is one of the fundamental problems to provide a crucial decision support to physicians. There are several modeling to perform segmentation. We are interested by Hidden Markov Random Fields model (HMRF). This elegant model leads to the problem of minimization an energy function. In this paper we focus on Particles Swarm Optimization (PSO) method to achieve the segmentation. The quality of segmentation is evaluated on grounds truths images using the Kappa index. These results show a superiority of the HMRF-PSO method compared to K-means and threshold based techniques.

Two Methods of Object Designing by Rational Splines
Muhammad Sarfraz1, Malik Zawwar Hussain2
1Kuwait University, Kuwait; 2Punjab University, Pakistan

Object designing has a significance importance in the field of Computer-Aided Design (CAD), Computer-Aided Geometric Design (CAGD) and Computer-Aided Manufacturing (CAM). In this paper, two techniques for the designing of 2D objects are developed. These are based on rational cubic spline interpolant and rational quadratic spline interpolant with shape parameters controlling the shape of the curve in the description of rational functions. It is shown that a piece of curve designed using rational cubic spline interpolant can be presented by two segments of rational quadratic spline interpolant. The developed schemes are simple, local and computationally inexpensive.

Inpainting by an Inverse Problem Resolution
Fatma Zohra Nouri1, Djafer Mezhoud1, Pierre Spiteri2
1Université Badji Mokhtar, Annaba, Algeria; 2ENSEEIHT-Toulouse, France

The inpainting is a fundamental process in the image processing, which has several applications, such as image restoration, reconstructing damaged parts, the removal of unwanted objects in the image[1] etc... The goal is to produce a revised image where treated parts are perfectly fused in it. In this paper, we propose an approach which involves the direct solution of a system of Navier-Stokes equations for an incompressible Newtonian fluid. The main idea is to consider the image intensity as a function of the stream tow. The resolution algorithm automatically transports the information correction to the damaged part of the image, a process which can simultaneously reconstruct several damaged regions by solving an inverse problem, without requiring the user to specify a location treatment. The mathematical analysis of the Navier-Stokes (NS) equations is suc ciently developed (see [5] and references therein), so we try to draw analogies between these equations and inpainting which may introduce ideas of fluid mechanics and dynamics in problems of image processing.

Super-Resolution Using Edge Modification through Stationary Wavelet Transform
Tabinda Sarwar, Fahim Arif
National University of Sciences and Technology, Pakistan

In this paper, a super-resolution technique is proposed that uses a combination of bicubic interpolation and wavelet transform. Bicubic interpolation produces a high resolution image but is prone to blurring artifact. So the blurring artifact is reduced in the wavelet domain. The input low-resolution is up-sampled using bicubic interpolation. The edges of the resultant high-resolution image are enhanced using stationary wavelet transform (SWT). SWT is applied to the image to produce sub-bands of the
image and then these sub-bands are modified by multiplying with a boost value. Then these sub-bands are combined using inverse stationary wavelet transform (ISWT) to produce the final high-resolution image. The quantitative and qualitative analysis illustrate that the proposed technique provides superior results as compared to other existing techniques.

Session BuiltViz2014_1.5: BuiltViz – Tempus Project
Chair: Farzad Khosrowshahi, Leeds Metropolitan University

**Building Performance: Field tests and the performance gap**

Christopher Gorse¹, Felix Thomas¹, Dominic Miles-Shenton¹, David Farmer¹, David Glew¹, Farzad Khosrowshahi¹, Michelle Wishardt¹, Shukri Baba²

¹Leeds Metropolitan University, UK, ²Damascus University, Syria

In recent years the energy performance of buildings has become increasingly important, due to increasingly stringent buildings regulations to meet CO2 reduction targets and the rising costs of energy. Modern techniques of building performance evaluation have proven to be robust and capable of producing repeatable results when undertaken by experienced practitioners. Building performance evaluation often shows a shortfall of the measured “As built” building performance and what had been predicted “As designed” this shortfall is known as the “performance gap”. The consequences of underperforming building fabrics are not limited to the detrimental impact on the environment; occupants are directly affected, incurring higher energy bills and accommodating substandard living conditions which can result in health problems and increasing risk of fuel poverty. Clearly a “performance gap” is not desirable and so inevitably industry may want to question the level of certainty in the science. This has focussed attention of researchers to elaborate on the methods used and clarify on the underpinning science, and in turn, the tools which were once limited to the scientist are finding their place in industry. These tools are now being used to test performance, add value to building surveys and assist with quality control in commercial settings. Construction professionals are gaining valuable insights through the findings, resulting in an increased understanding and awareness of the performance gap and changes being implemented to construction knowledge and practice. This paper reviews several building performance evaluation research methods which have been employed by the Leeds Metropolitan University Centre for the Built Environment (CeBE) group to identify the

**EXECUTIVE MANAGEMENT DECISION SUPPORT TOOL - a hybrid visual model**

Farzad Khosrowshahi¹, Michelle Wishardt¹, Chris Gorse¹, Parisa Ghodous², David Greenwood³, and Talal A-Shihabi⁴

¹ Leeds Metropolitan University, UK; ²University Claude Bernard Lyon 1, France; ³Northumbria University, UK and ⁴Damascus University, Syria

Management at all levels have used decision support tools for a variety of operational and strategic decisions. It is generally recognised that the decisions at the strategic level are both complex and uncertain. They frequently involve simultaneous consideration of several internal and external variables. The executive have long benefitted from the use of supporting tools and techniques. However, these tools often focus on specific issues and are considered in isolation from their complementary tools. The size, nature and complexity of the variables have prevented development of their systematic encapsulation into developing a coherent holistic decision support tool for strategic decisions. The premise of this research is that highly strategic decisions require not just the analysis of several variables but are also reliant on the consideration of several other decisions at various levels of the organisation. The aim of the current research is to develop a support system for strategic decisions by proposing a framework that integrates a network of decision nodes at different levels of the organisation. These decision nodes are aided by tools that are deterministic, thus requiring straightforward calculation or optimisation; or they can be reliant on heuristic approaches and judgement of the decision-maker. Therefore, the work presents a conceptual framework for executive decision support system.
Abstract

Structural Sentence Decomposition via Open Information Extraction
Kacfah Emani Chêikh¹, Ferreira Da Silva Catárina¹, Fi’es Bruno¹, Ghodous Parisa¹ and Farzad Khosrowshahi²
¹University Claude Bernard Lyon 1, France and ²Leeds Metropolitan University, UK

The field of construction engineering is governed by an important volume of legal texts. Each of these texts provide a set of requirements by means of sentences written in natural language. These texts support conformity checking process of objects in construction engineering. Automate or at-least semi-automate this conformity checking process is the target of our project. This automation imposes to be able to make legal requirements processable. Thus, we envisage to rephrase natural language sentences into a set of atomic requirements (i.e a triple: <Subject, Predicate, Object>). Further, we must identify between the facts found in a given sentence, the exist relations (e.g sentence = fact1 AND fact2 or IF fact1 THEN fact2, etc.), expressible using logical operators. For facts extraction, we have used Open Information Extraction-systems. Since they face a drop of precision mainly due to multi-word expressions, provide a method to handle them before OIE itself. Moreover, we also tackle the problem of enumeration items to improve OIE performance. Using OIE for legal sentences semantics handling, handling of multi-word expressions and contextual phrases and finally computation of relations between facts constitute the originality of this work. Such decomposition is the prerequisite to our target: automatic conformity checking.

Enhanced Construction Planning Methodology with 4D Building Information Modeling
Modar Saad¹, Farzad Khosrowshahi² and Michelle Wishardt², and Shukri Baba¹
¹Damascus University, Syria and ²Leeds Metropolitan University, UK

Construction Project Planning, as one of the key processes in project lifecycle, shapes the empirical foundation of the project success and plays a primary role in optimizing and managing construction operation. Dependence on the traditional techniques and documents in construction planning and scheduling still has numerous difficulties and obstacles. Recently, research efforts have tried to enhance planning capabilities with improved and even new methods and techniques. This research paper was divided into two main stages. In the first stage, a comprehensive literature review was conducted to identify the construction planning processes, construction planning techniques and the major limitations and challenges facing the current planning process. Then, a survey was carried out in order to verify the construction planning challenges found throughout the literature review. Based on the extracted facts from the survey, the benefits of the 4D building Information modeling were introduced with the purpose of improving the current construction planning practice.

Session  IV2014_1.6: GVA GeoAnalytics
Chair: Dr. Dennis Groth, Indiana University, USA

Using Ontologies for Proposing Adequate Geovisual Analytics Solutions in the Analysis of Trajectories
Gabriel Vatin, Aldo Napoli
MINES ParisTech - CRC, France

This paper presents an original approach for supporting the use of geovisual analytics solutions. Many models have been proposed to characterize information visualization methods, but few have been integrated to an intelligent process for supporting user in geo-information usage. Moreover, several new solutions are continuously proposed by research, but few of them are really used in operational world. For instance, the maritime surveillance systems could gain much more identification capabilities of ship behaviors with adequate geovisual analytics solutions. Therefore, we investigated the use of geovisual methods for the analysis of mobility data, such as ship trajectories. We propose a knowledge-based system using ontologies and rules. These allow modeling the domain of geovisual analytics solutions, and their capacities in the exploration and the analysis of trajectories. This system would be used to support users in geovisual analytics of movement, based on their context of use.

Development of Adaptive Information Visualization Systems with Augmented Reality
Ezequiel R. Zorzal², Celso A. R. de Sousa¹, Alexandre Cardoso¹, Claudio Kirner³, Edgard A. Lamounier Júnior⁴, Marcos G. Quiles⁵
¹University of São Paulo, Brazil; ²Federal University of São Paulo, Brazil; ³Federal University of Itajubá, Brazil; ⁴Federal University of Uberlândia, Brazil
Augmented reality combined with adaptive hypermedia plays an important role on providing effective information visualization systems. In this paper, we propose a comprehensive architecture model in order to provide adaptive information visualization systems with augmented reality. We also provide a novel visual metaphor for real-valued, low-dimensional data with predefined optimal values for each feature inspired on the pseudo-flower metaphor.

Using Visual Cues on DOITree for Visualizing Large Hierarchical Data
Quang Vinh Nguyen¹, Simeon Simoff¹, Mao Lin Huang²
¹University of Western Sydney, Australia; ²University of Technology, Sydney

This paper extends a previous work on node link tree visualization and interaction by providing visual cues on hidden structures. We adopt the effectiveness of DOITree, a multi-focal tree layout algorithm, for exploring large hierarchical structures. The advantages of visualization are its most familiar mapping for users, its capability on providing multiple focused nodes, and its dynamic rescaling of substructures to fit the available space. By providing various methods of topological previews of substructure including simple icon view, tree view and treemap view, we provide better understanding the topology of hidden branches.

Drawing Large Weighted Graphs using Clustered Force-Directed Algorithm
Jie Hua¹, Mao Lin Huang²,³, Quang Vinh Nguyen³
¹UTS, Australia; ²Tianjin University; ³UWS, Australia

Clustered graph drawing is widely considered as a good method to overcome the scalability problem when visualizing large (or huge) graphs. Force-directed algorithm is a popular approach for laying graphs yet small to medium size datasets due to its slow convergence time. This paper proposes a new method which combines clustering and a force-directed algorithm, to reduce the computational complexity and time. It works by dividing a Long Convergence: LC into two Short Convergences: SC1, SC2, where SC1+SC2 < LC. We also apply our work on weighted graphs. Our experiments show that the new method improves the aesthetics in graph visualization by providing a clearer views for connectivity and edge weights.

We present iSyn, a WebGL-based tool for interactive de novo drug design. It features an evolutionary algorithm that automatically designs novel ligands with drug-like properties and synthetic feasibility using click chemistry. iSyn interfaces with our popular and fast molecular docking engine idock, remarkably reducing the evaluation and ranking time of drug candidates. Furthermore, inspired by our user friendly and high-performance WebGL visualizer iview, our iSyn also implements a tailor-made interactive visualizer specifically to aid novel drug design. We believe iSyn can supplement the efforts of medicinal chemists in drug discovery research.

To illustrate the utility of iSyn in generating novel ligands ex nihilo, we designed predicted inhibitors of two important drug targets, which are RNA editing ligase 1 (REL1) from T. brucei, the etiological agent of African sleeping sickness, and cyclin-dependent kinase 2 (CDK2), a positive regulator of eukaryotic cell cycle progression. Results show that iSyn managed to significantly enhance the predicted binding affinity of the best generated ligand by up to 3 orders of magnitude in drug potency.

iSyn is written in C++, Python, HTML5 and JavaScript. It is free and open source, available at http://istar.cse.cuhk.edu.hk/iSyn.zip. It has been tested successfully on both Linux and Windows.

MediMatrix: An Interface for Visualizing Learner-Generated Patient Case Collections in Postgraduate Medical Training
Svenja Schröder¹, Jasminko Novak²
¹Humboldt-Viadrina School of Government, Germany; ²European Institute for Participatory Media, Germany; Univ. of Appl. Sciences Stralsund, Germany

This paper presents a visualization approach to accessing and exploring the knowledge obtained from patient cases created by general practitioners in their medical practice during postgraduate practical training. Our application MediMatrix visualizes this knowledge base by displaying the patient cases in
Abstract

Prediction of the 3D structure of protein-protein complexes is crucial for understanding the biological system of life and thus for designing drugs. However, it is a challenging problem due to the flexibility of backbone and side-chains of the receptor and ligand. In this paper, we present a new framework for fast flexible protein-protein docking based on geometric complementarity. In our approach, the protein surfaces are firstly segmented into several curvature-based local surface patches which describe the effect of side-chain flexibility on each patch by sampling the space of conformations of its side-chains, and then the geometric complementarity can be determined by matching these surface patches. During the matching, we propose a new 3D shape descriptor, Spherical Harmonics Descriptor. The main property of the Spherical Harmonics Descriptor is rotation invariance which avoids taking an exhaustive set of rotations for each pair of patches. Thus, the geometric complementarity matching problem is simplified to be a histogram matching problem. This can greatly reduce the computational cost. Finally, the docking candidates are evaluated by a geometric scoring function. The experimental results demonstrate the high efficiency and accuracy of the proposed method.

Visual Analysis with Dynamic Geometric Complementarity and Physicochemical Matching in Protein Docking

feng lin, LIU HUI, Lee Yong Tsui, Qian Kemao, Seah Hock Soon
Nanyang Technological University Singapore

Session BuiltViz 1.8: BuiltViz – Tempus Project
Chair: Parisa Ghodous, Université de Lyon 1, France

Quality Information Modeling for Construction Using BIM Autodesk 360 Field
Maya Rana¹, Omran Jamal¹, Hassan Bassam¹ and Parisa Ghodous²
¹Tishreen University, Syria ²Université de Lyon 1, France

Building information modeling is a great visualization tool. This tool provides better understanding of what the final product will look like through virtual 3D design to the building. However, we propose in this paper to use BIM Autodesk 360 Field as a quality information modeling and management tool in construction. This is to be done by: easily tracking materials & equipment status, documentation work, resolving issues, visualizing construction activities, and improving communication and collaboration. A case study application of quality assurance & quality control (QA/QC) inspection checklists of the software has recorded 187 quality and safety issues. This is clear evidence that the manually following up executed activities and equipment for quality check, visual interfere, documentation, and reporting are becoming useless and proved to be inefficient. By using BIM 360 Field, we will reach to faster, accurate, easier, and productive project execution and quality products.

BSC Designer to Manage Construction Project Performance Information through Visual Analysis
Maya Rana¹, Omran Jamal¹, Hassan Bassam¹, Ahmad Layal¹, Parisa Ghodous², Farzad Khosrowshahi³, Michelle Wishardth³ and Chris Gorse³
¹Tishreen University, Syria; ²Université de Lyon 1, France and ³Leeds Becket University, Leeds, UK

The success of performance measurement as a system to control and improve performance requires analysis of performance on a regular basis. Previous studies have shown that the managerial efforts required for collecting, saving, processing, and displaying progress data were the main obstacle to its actual application. Therefore, the proposal aim is to introduce a performance measurement system through the use of BSC Designer which provides a good system for the performance information management (MIS). The application of the proposed system using BSC Designer database allows doing multiple comparisons, visual shows and analysis. It is a visual tool for information and knowledge management.
related to the performance achieved by the projects, this is done through the integration of information between the integrated performance indicators and targets and visualization display of information. Though it offers a clear and visible way to analyze and improve performance.

**Transition of the Design Work from Traditional CAD to BIM - Economic Feasibility Study**

Jamal Omran\(^1\), George Haddad\(^1\), Farzad Khosrowshahi\(^2\), Michelle Wishardth\(^3\) and Chris Gorse\(^2\) and Parisa Ghodous\(^3\)

\(^1\)Tishreen University, Syria; \(^2\)Leeds Becket University, Leeds, UK, and \(^3\)Université de Lyon 1, France

Building Information Modeling (BIM) is proposed as an outstanding technology in AEC industry, which improves the design phase by enhancing the production of design documents. However, BIM adoption is not free, and its cost should be paid in order to reap the benefits. Economic feasibility study has been conducted for CAD-to-BIM transition process, implying methodology for transferring, upon which a mathematical model has been developed to describe that process. Moreover, an applied study has been performed on the transition process, depending on the results of a previous study, which indicated that implementing BIM in design phase have shortened the time needed for producing design documents by 75%. Findings indicate that companies which exploit in CAD-to-BIM transferring process would be able to recoup the exploitation about one year and a half after the beginning of the transition process. This study would serve as a framework for adopting BIM technology in place of traditional CAD, and could be utilized by any company working in the AEC design field.

**Visualization of the Expected Damage for Seismic Disaster Planning In Developing Areas**

Samer Bu Hamdan\(^1\), Ghassan Al-Chaar\(^2\), Farzad Khosrowshahi\(^3\), Talal Al-Shihabi\(^1\) and Jad Juriedini\(^1\)

\(^1\)University of Alberta Canada; \(^2\)University of Illinois, Champaign, USA; \(^3\)Leeds Becket University, UK, and \(^4\)Damascus University, Syria

Successful disaster planning depends on the sufficiency of information, which accurately predicts the level of impending damage. The availability of seismic records alone is not sufficient to establish efficient response plans for earthquakes. This fact, combined with the absence of sufficient disaster management systems necessitates the need for alternative methods to overcome the lack of needed data. This data would enable the authorities to prepare efficient and reliable plans to face. This paper proposes a model that simulates the propagation of the seismic wave and provides visual expectation about the damage through analyzing the resultant data.

**Utilization of Fuzzy Logic and GIS in Selecting the Optimal Location for a Facility**

Talal Al-Shihabi\(^1\), Farzad Khosrowshahi\(^2\), Chris Gorse\(^2\) and Mazen Ibrahim\(^3\)

\(^1\)Damascus University, Syria and \(^2\)Leeds Metropolitan University UK

The selection of the optimal site for a facility from a set of alternatives requires the consideration of many - possibly contradicting - factors. The degrees of importance of these factors are generally shaped by inscrutability and the calculation of their values can generally suffer from inaccuracy. Given the importance of such a decision and the many economical, health, and environmental risks associated with it, it is imperative to utilize all possible techniques in support of making such a decision. This paper proposes a model for incorporating Fuzzy Logic into the evaluation of alternatives and the selection of the optimal site for a facility. The degrees of importance for factors and the evaluation scores are converted from crisp to fuzzy values. The comparison of alternatives and the optimal selection are visualized on a GIS system. The model is applied to a case study for selecting the optimal site for a school. The results of this case study show that the possibility of a large gradient assessment of the Fuzzy Logic techniques plays a significant role in increasing the accuracy of the selection of the optimal site for a facility.
This paper proposes a new approach for trajectory clustering and visualization. During clustering, speed and direction are both taken into account as the important properties of a trajectory. Additionally, the temporal change of the trajectories is explicitly considered in the procedure of clustering. Importantly, we introduce the uncertainty to represent the homogeneity of the updating trajectories based on their speed and direction attributes, to help observe and understand the happening of the trajectory data. Finally, based on the use of the HSV color space, we devise three patterns for graphically presenting the trajectory data in different perspectives. Namely, ‘H+S’ visualizes the clustered trajectories emphasizing the speed attribute of them. ‘H+S+Update’ depicts more information on the ‘latest’ trajectory data, compared with the results by ‘H+S’. ‘H+V+Update’ explicitly presents the uncertainty of the trajectory data. Our approach has been shown its potential for trajectory analytics.

Partially drawn links in graph visualizations have been introduced as a concept for further reducing visual clutter caused by many link crossings in combination to a formerly applied layout algorithm focusing on aesthetic graph drawing criteria. Although this visualization strategy has been shown to be useful for a faster and more accurate visual exploration of node-link diagrams in some scenarios, it has not been integrated into a graph visualization tool as an interaction feature to this end. Apart from representing the entire displayed graph in the partially drawn link style we allow the viewer to apply this feature to several nodes, links, or regions of interest. To avoid possible ambiguities introduced by the disconnectedness of start and target nodes further interaction techniques can be applied to mitigate this situation by showing the complete link information for single selected vertices or edges again.

MetricAttitude is a visualization tool based on static analysis that provides a mental picture by viewing an object-oriented software system by means of polymetric views. In this paper, we present a preliminary empirical investigation based on a questionnaire-based survey to assess MetricAttitude with respect to source code comprehension tasks. Participants involved in this study were Computer Science students and software professionals. The obtained results suggest that MetricAttitude is a viable means to comprehend source code and that both the kinds of participants in the empirical investigation considered appropriate it in supporting source code comprehension tasks.

In this paper we investigate methods for visualizing the flow of university-level students through the undergraduate academic experience. We use the lens of transit between major declarations, both in the context of specific major to major mappings, as well as mappings between disciplinary clusters. Our motivation is two-fold. First, we wish to understand the implications for students, in terms of time to degree, fidelity to initial major interest, and intellectual distance travelled by students as they cross boundaries of major clusters. Second, we wish to understand the implications for degree programs, as they seek to attract and retain top students, or manage the consequences of declining enrollments. Our approach utilizes multiple visualization techniques, as we first try and develop high-level understanding of the migratory patterns of students, and then drill down to more fine-grained approaches yielding insights that are aimed at providing specific,
actionable information to a diverse set of stakeholders, including students, faculty, and administrators.

**EVOLVE: A Visualization Tool for Multi-Objective Optimization Featuring Linked View of Explanatory Variables and Objective Functions**

*Maki Kubota¹, Takayuki Itoh¹, Shigeru Obayashi², Yuriko Takeshima²*

¹Ochanomizu University, Japan, ²Tohoku University, Japan

Multi-objective optimization tools have been applied in various academic and industry fields. It is often difficult to optimize all the objectives since they often cause trade-offs. It is also difficult to figure what kinds of trade-offs actually cause. We think visualization of multi-objective optimization results assists users to intuitively understand the distributions of their solutions. This paper proposes a visualization of explanatory variable and objective function spaces in the separate views, so that users can easily understand their relevancy. Also, our tool features the linkage mechanism between the two views. When a user selects certain ranges of the values by a mouse click operation, the tool highlights all the corresponding individuals. This mechanism is useful for users to narrow down the results. We expect the tool assists the understanding of the behavior of the optimization processes and improvement of the future processes.

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**Session Viz2014_2.2: Cultural Heritage Knowledge Visualisation**

Chair: Prof. Francis T. Marchese, Pace University, USA

**Visualizing the history of knowledge production through the bibliography of philosophy**

*Chris Alen Sula*

Pratt Institute, United States of America

This paper examines prospects for visualizing historical bibliography, which studies the history of books and the people, institutions, and machines surrounding them. These studies have potential for revealing not only the history of knowledge production, but also for examining the evolving structures used to organize, catalog, and conceptualize that knowledge. This paper presents a case study in history of philosophy using data from the largest bibliography in the field, which was parsed to extract structured information about each work and its subject heading. Such data reveal (1) the emergence of particular topics across time and space, (2) transmission of ideas as measured through publication location and version information, and (3) the topical shifts in the field over time as reflected by subject classification of texts. Together, these statistical, geospatial, and network visualizations explore the potential of historical bibliography within the digital humanities.

**Visualizing Afghan Culture in a Virtual Village for Training Cultural Awareness in military settings**

*Sibel Tasdemir, Ekaterina Prasolova-Forland*

Norwegian University of Science and Technology, Norway

Training and visualizing operational culture is important since understanding culture is a significant aspect of a mission planning and execution. Serious games and 3D simulations provide efficient military training and battlefield visualization in a safe and relatively inexpensive immersive environment. This article presents the experiences with the CAMO project (Cultural Awareness in Military Operations). The goal of the project was to create a low-cost simulation in the 3D virtual world of Second Life for pre-deployment cultural awareness training among Norwegian military personnel preparing for service in Afghanistan. In this paper, we focus in particular on the role of crowd simulations for visualizing Afghan culture for training purposes.

**Visualising the Correlation Between Vasari’s Accounts of Giotto’s Travels and Contemporary Research to Better Understand their Reliability.**

*Theodor Wyeld*

Flinders University, Australia

Giorgio Vasari (1511 – 1574) was perhaps the first art-historian to earnestly record the life and times of the great artists of the Italian Renaissance. Of the many he recorded, Giotto di Bondone (1267 – 1337) is heralded as the ‘father’ of the Renaissance perspective style. However, contemporary research suggest much of Vasari’s accounts of Giotto’s life and travels are fictional. This paper attempts to explore how reliable Vasari’s accounts are by correlating his chronological narrative of Giotto’s life with contemporary research and Giotto’s chronicled works. Using interactive integrated timeline and mapping visualisation tools it was possible to identify greater accuracy in Vasari’s accounts than that suggested by the literature.
Abstract

How to tell stories using visualization

Ana Raquel Figueiras
FCSH - Universidade Nova de Lisboa, Portugal

The benefits of storytelling's are long-known and its potential to simplify concepts, create emotional connection, and capacity to help retain information has been explored in different areas, such as journalism, education, and others. The necessity to incorporate storytelling in visualizations arises from the need to share complex data in a way that is engaging. Advances in technology have enabled us to go beyond the traditional forms of storytelling and representing data, giving us more attractive and sophisticated means to tell stories.

In this paper, we present the results of a focus group study that was conducted with the purpose of collecting information on the narrative elements in a collection of visualizations and the possible inclusion of storytelling elements in those. In this study information about the visualizations in terms of comprehension, navigation, and likability was also collected with the intent of identifying elements that are appealing in the visualizations. Furthermore, we suggest strategies for storytelling in visualizations.

WebViz - Web Visualization

Web3D Visualization of high detail and complex 3D-mesh caves models

Mauro Figueiredo, José Rodrigues, Ivo Silvestre, Cristina Veiga-Pires
Algarve University, Portugal

This paper presents the novel architecture of a web3D server that stores 3D models with different levels of detail and complexity that enables the interactive visualization and navigation in a web browser and the determination of detailed geomorphological structures of an underground cave. We surveyed an underground cave using a Terrestrial Laser Scanning to acquire a high-level detail point cloud with millions of points. This data allowed generating a high detail 3D-mesh to represent the surface model of the cave chamber, which can be important in studying geomorphological features. The web3D server uses a simplified version of the cave with about 250 thousand triangles that enables client applications to navigate and interact with this simplified model in a Web browser. The more detailed and complex model of the cave with millions of triangles is also stored in the web3D server. This model is used for the identification of geomorphological structures. It provides topological and geometrical information that is implemented in an octree data structure for the design of efficient algorithms to determine important speleothems and stored in a database to make it possible to work with big data models that can exceed the computer's memory.

Designing ActionTrack: A State-of-the-Art Authoring Tool for Location-Based Games and Other Activities

Jukka Antero Holm¹, Kari Laurila²
¹Team Action Zone, Finland; ²Team Action Zone, Finland

Team Action Zone's ActionTrack is a state-of-the-art solution for creating and running location-based activities, including 'Amazing Race' type of games where teams compete against each other along dynamic routes or a map canvas. The routes can include outdoor (GPS), indoor (QR), or location-independent checkpoints, where the users get tasks, questions, information, or entertainment through their smartphones or tablets. In this paper, we discuss the main features of ActionTrack and give several examples of games and other applications designed with the tool.

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Session iV2013_2.3: Visualisation
Chair: Prof. Georges Grinstein, University of Massachusetts Lowell, USA

Medieval Visualization and the Art of Memory

Francis T. Marchese
Pace University, NY, USA

The medieval art of memory was a collection of mnemonic principles and techniques used to organize impressions, improve recall, and assist in the combination and invention of ideas. An essential element of a monk’s education, it was taught for its rhetorical strength. Religious who mastered this art could freely compose lectures, sermons, stories, or poems. Such acts of invention required drawing upon an inventory of knowledge that had been thoroughly consumed, decomposed into manageable chunks, and correlated utilizing the memory principles they had mastered.

iV2014_ Abstract

Medieval memory methods relied heavily on the image creation – both mental and physical. This presentation will explore many of these physical visualizations, drawing upon imagery found in medieval manuscripts. The talk will review the history of memory practice, explore medieval information and knowledge visualization, and demonstrate the relation of these visualizations to this art.

Bio-sketch

Francis T. Marchese is Professor of Computer Science at Pace University where he teaches courses in computer science and software engineering. His research interests span scientific and information visualization; novel user interfaces for visualization; distributed and collaborative visualization; integration of visualization into lifecycles for scientific research and software engineering; and the development of visualization systems at the intersection of art, science, and technology.

He is founder and Director of Pace’s Center for Advanced Media (CAM) and the Pace Digital Gallery. He has published widely in science, technology, history, and art, including a recent co-edited volume with Ebad Banissi entitled Knowledge Visualization Currents: From Text to Art to Culture, (Springer-Verlag(London, 2013) that explores the current state of knowledge visualization research.

Frank has been a visiting scholar at New York University’s Institute of Fine Arts where he has extended his scholarship into museum curatorial studies, installation of art in alternative spaces, and the relationship between text and image in medieval art. He has curated seven digital art exhibitions, is an associate editor of ACM JOCCH (Journal of Computers and Cultural Heritage), and is currently exploring the artistic origins of information visualization as well as the long term conservation of time-based digital art.

<keynote Lecture>

An Artisanal Approach to Interactive Heritage Visualization

Alan Potkin
Northern Illinois University, USA

Artisanal indicates comparatively low-tech, low-cost, steep-learning-curve* tools, applications and deliverables for digital visualization in cultural and environmental conservation: typically when there is limited funding — or none — for specialized personnel and equipment; and where the primary content provider is also the media producer, the graphics designer and the software developer.

We’ll present exemplary content from our recent projects/in-progress eBooks, including:

- Post facto evaluation of the reluctantly-adopted aesthetic release regime for the long-delayed Upper Kotmale Hydroelectric Project, which in its original version would have “necessarily-sacrificed” several impressive waterfalls in the tea country near Talewakelle, Sri Lanka;
- Visualizing the iconography and historiography of highly-revered Lao Buddha sculptures in four important Thai Buddhist temples: mapping their “confiscation” during the periodic sackings of Vientiane by the Siamese, their movements overland and by water, and also providing an urbanization time series of Wat Pathumwanaram and environs in Bangkok;
- Layered interactive displays of site evaluations and proposed plans for rehabilitating Giants Tank: taken from the extensive VoC archives of water engineering in Dutch-period (1658-1796) Ceylon;
- Re-establishing the Phralak-Phralam (the “Lao Ramayana”) as the traditional touchstone of Lao literary, visual and performance culture, and digitally replicating the demolished murals inside a new Image Hall;
- Virtualizing the Pak Mun Dam Museum in Ubon Ratchathani, Thailand: an archi val elegy to the distinctive material, cultural, geographic, and ecological aspects of the way of life which prevailed throughout the impacted Mun River basin prior to the dam’s construction, and a compelling prototype for creating similar museums addressing massively-transformative water resources projects elsewhere.
- “People often speak of a ‘steep learning curve’ when they mean the opposite. A steep learning curve is one in which skill improves quickly, meaning something is easy to learn.”

Bio-sketch

Alan Potkin holds a doctorate in environmental planning from the U. of California, Berkeley, following previous post-graduate training in limnology and
iV2014_ Abstract

The wide availability of database systems and low cost of hardware allow enterprises and researchers the opportunity to store large data collections. The challenge then became the understanding of these data.

To overcome this problem Information Visualization (IV) techniques have been employed to amplify the human cognitive ability through graphical data representations, that show properties and relationships from these data. In this work we present an approach to overcome the visual scalability by using a Multi-projection system, allowing the exploration of large datasets. Additionally, this approach allows collaborative interaction and exploration by using mobile devices like tablets and smartphones.

Conferences, Coffee and Complexity. Supporting Cognition and Communication at Conventions

Florian Windhager, Michael Smuc, Lukas Zenk
Danube University Krems, Austria

This article takes information visualization to the field of academic conferences and conventions, to explore how cognition and communication of participants could be supported in such ephemeral, knowledge-intensive environments. With focus on a non-invasive method of data collection, we consider the levels of topical, social, temporal and spatial orientation as primary working areas for any support system. Across these areas, overviews and personalized detail-views have to be intertwined, to allow for the localization and navigation of individual participants. To demonstrate a lean approach to these challenges, we introduce a visual conference exploration system, that allows participants to visually explore conferences before, during and after their attendance and support their personal knowledge management by making use of recommendations, which help to establish new contacts, or find the most interesting panels and talks.

A Heatmap-Based Time-Varying Multi-Variate Data Visualization

Haruka Suematsu¹, Sayaka Yagi¹, Takayuki Itoh¹, Yosuke Motohashi², Kenji Aoki², Satoshi Morinaga²
¹Ochanomizu University, Japan; ²NEC Corporation

Most time-varying data in our daily life is multi-variate. Moreover, most of such time-varying data contains both numeric and categorical values. It is

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Session iV2014_2.4: Information Visualisation - Application
Chair: Prof. Gilles Venturini, University Francois Rabelais of Tours, France

Collaborative Information Visualization Using a Multi-projection System and Mobile Devices

Alessandro Campanhã Moraes, Danilo Medeiros Eler, José Remo Ferreira Brega
Universidade Estadual Paulista "Júlio de Mesquita Filho" - UNESP, Brazil
Abstract

often meaningful to visualize both of them as they are often correlated. We aim to visualize every value in such time-varying data in a single display space so that we can discover interesting relationships among the values of the time-varying data.

This paper presents a heatmap-based time-varying data visualization technique which displays both numeric and categorical values in a single display space. The technique assigns time to the horizontal axis of the display space, and vertically arranges the series of colored belts corresponding to the time-sequence values. It generates one belt for a numeric value, and multiple belts for a categorical value. It clusters the belts according to the similarity of color sequences, and re-arranges the belts based on the clustering result. This paper shows an example of the visualization result applying a time-varying multi-variate marketing dataset.

GRAPE: A Gradation Based Portable Visual Playlist
Tomomi Uota, Takayuki Itoh
Ochanomizu University, Japan

Thanks to recent evolution of portable music players featuring large storage spaces, we tend to carry large number of tunes. It often makes us more bothering to look for tunes which we want to listen to. On the one hand, we usually listen to the tunes on the music players by manually selecting playlists or album names, rather than manually selecting each tune one-by-one. This paper presents GRAPE, a playlist visualization technique being used as user interfaces on the music players. GRAPE presents a set of tunes as a gradation image, by assigning colors to the tunes based on their musical features, and placing them onto a display space by applying self organizing map (SOM). This paper describes the processing flow of GRAPE, and introduces user evaluations to demonstrate the effectiveness of GRAPE.

Session iV2014_2.5: MediVis14: BioMedical Visualization
Chair: Dr. Marjan Trutschl, Louisiana State University Shreveport, USA

Regional Differences in Diagnostic Conversion to Dementia
Ekaterina I Galkina, Georges G Grinstein
Umass Lowell, United States of America

The world is facing serious concerns regarding the ever-increasing number of people painfully affected by dementia, both patients and their caregivers. The ability to predict who will develop dementia or identify risk factors of rapid progression would be a major advance in preventative healthcare. We report on the preliminary results of exploration into regional differences in the rate and time to diagnosis conversion from normal cognition to dementia in a cohort of study volunteers. The possibility that community composition factors, such as race, or clinician subjectivity may play a role in conversion differences between rural and urban environments was considered.

Interactive Biosignal Analysis and Classification
Harri Siirtola, Jorge Ávalos-Salgueiro, Kirsi Penttininen, Katriina Aalto-Setälä, Martti Juhola
University of Tampere, Finland

We often encounter experimental results that are difficult to quantify although the visual recognition of a phenomenon is apparent. We are able to detect patterns and features with our vision that are complex to specify algorithmically. This is because our brain has evolved into a powerful pattern matching machine.

One important class of measurement results in medical research are signals that describe a cycling pattern of some phenomenon. In this work, we developed a software tool, AnomalyExplorer, to assist in classification of Ca2+ signals emitted by cardiomyocytes. AnomalyExplorer was designed and implemented to analyze and classify Ca2+ signals with criteria similar to the criteria used by laboratory personnel. The software tool is based on interactive visualization with a direct manipulation user interface. Our AnomalyExplorer has proven to be a valuable tool as it makes the analysis faster, more accurate, and person-independent. The definition of signal anomalies in terms of visual properties is more flexible than numerical or analytical specification. Our approach is not limited to the Ca2+ signal analysis. The anomaly types are domain-specific, but the interaction and visualization ideas can be applied in any signal analysis problem.
iV2014__Abstract

Computer-Assisted Myocardial Perfusion Assessment

Samuel Silva¹, Joaquim Madeira², Beatriz Sousa Santos²
¹IEETA - University of Aveiro, Portugal; ²DETI / IEETA - University of Aveiro, Portugal

Left ventricle functional analysis can be performed using CTA images. In recent years it has been proposed that CTA imaging might also be used for myocardial perfusion assessment, by visually looking for hypoperfused regions that may correspond to hypoperfusion. Assigning a detected lesion to a specific myocardial segment requires significant effort while the clinician matches the AHA standard myocardial segments to the anatomy of each patient. This article presents an interactive tool which, based on the existence of a previous left ventricle segmentation, automatically matches the lesions detected by the clinician to a myocardial segment and provides feedback over the image regarding the myocardial segments with detected lesions and their severity.

In-vitro validation of image guided surgery system with 3D pre-operative visualization for atrial transseptal puncture.

Jeevan Mahadevu¹, Jebaraj Rathinasamy², Krishnakumar Ramarathnam¹
¹Indian Institute of Technology Madras, India; ²Sri Ramachandra University, porur, Chennai, India

The left atrium (LA) is the most difficult cardiac chamber to access percutaneously. The route through the systemic venous system across the inter-atrial septum is mostly preferred to the more retrograde arterial route as larger catheters and devices could be manipulated safely. The transseptal (TS) puncture permits this direct route to the LA through the inter-atrial septum which is necessary in patients with atrial fibrillation (cardiac ablation), patent fossa ovalis, atrial septal defect (ASD) repair, left atrium appendage closure, balloon mitral valvuloplasty, pulmonary vein stenosis intervention, Antegrade ventricular septal defect closure, stent implantation in the right internal carotid artery. For a safe TS puncture, one requires a delivery system and medical imaging software. At present doctors use biplanar fluoroscopic images during navigation and TS puncture. The two-dimensional echocardiography aids the doctor during the TS puncture. A complete three-dimensional visualization is yet to be established. We propose an efficient method for target localization pre-operatively and three-dimensional visualization with respect to catheter tip of the scene during the procedure. This technique eliminates fluoroscopy. The technique proposed in this work has been validated in-vitro using an atrial phantom, used to train doctors in electrophysiology (EP) labs. The pre-operative image obtained using MRI is registered with the phantom and the catheter tip location inside the phantom and is visualized in three-dimensions.

Visualization of spiral drawing data of patients with Parkinson’s disease

Ilir Jusufi¹, Dag Nyholm², Mevludin Memedi³
¹University of California, Davis, United States of America; ²Neuroscience, Neurology, Uppsala University, Uppsala, Sweden; ³School of Technology and Business Studies, Dalarna University, Borlänge, Sweden

Patients with Parkinson’s disease (PD) need to be frequently monitored in order to assess their individual symptoms and treatment-related complications. Advances in technology have introduced telemedicine for patients in remote locations. However, data produced in such settings lack much information and are not easy to analyze or interpret compared to traditional, direct contact between the patient and clinician. Therefore, there is a need to present the data using visualization techniques in order to communicate in an understandable and objective manner to the clinician. This paper presents interaction and visualization approaches used to aid clinicians in the analysis of repeated measures of spirography of PD patients gathered by means of a telemetry touch screen device. The proposed approach enables clinicians to observe fine motor impairments and identify motor fluctuations of their patients while they perform the tests from their homes using the telemetry device.

Session iV2014_2.6: Visualisation

Chair: Dr Ir Benoît Otjacques, Centre de Recherche Public - Gabriel Lippmann, Luxembourg

<Short Paper>

Visualizing the Evolution of Groups of Politicians Mentioned in the News

Carolina de Figueiredo Bento¹,², Daniel Jorge Viegas Gonçalves¹,², Bruno Emanuel da Graça Martins¹²
¹Instituto Superior Técnico; ²INESC-ID, Lisbon
iV2014 Abstract

In this paper, we describe a tool to visualize and explore communities of politicians arising from mentions in news articles, combining techniques from network analysis and visual analytics. With this tool one can explore the communities, their organization according to parties, with whom a politician was mentioned with in a given year, or key political events, like the emergence of a new prime-minister. User tests involving our tool, and a collection of Portuguese news articles for a period of 10 years, have shown the interest on this kind of tool, and its applicability to analyze group evolution.

<Short Paper>

Augmented Reality and Holograms for the Visualization of Mechanical Engineering parts
Mauro Figueiredo, Pedro Cardoso, César Gonçalves, João Rodrigues
Instituto Superior Engenharia - Algarve University, Portugal

There is an increasing number of students using tablets in schools. Mobile devices gained popularity as an educational tool and there are many schools that use them frequently in educational activities to improve learning. We found that first year students of mechanical engineering in general have difficulties in understanding 3D shapes from 2D views. There are many Augmented Reality (AR) applications available that can be used to create educational contents for these mobile devices. On the other hand, there is an increasing interest in making holograms. In this paper we studied the most popular AR systems and show examples of using an AR system for the visualization of 3D models. We also present the creation of a low cost prototype, the Educholo, that enables the visualization of holograms supported by tablets. With this prototype students can visualize the hologram of mechanical parts, providing a better visualization of the model 3D shape and improving the ability of making the 2D orthographic views and perspectives that they study in the first year of mechanical engineer.

<Short Paper>

A Method for Text Detection and Rectification in Real-world Images
Satoshi Yonemoto
Graduate School of Information Science, Kyushu Sangyo University

This paper presents a text detection method that combines with an image rectification. Since texts in natural scenes are not always observed in frontal view, image rectification is needed to robustly recognize them in OCR. A reference pixel that is part of the desirable text area is given by user since this is the easiest way to give the priors. In text detection, first, foreground pixels are extracted. Then, the text components and its structure are analyzed, constructing a graph with the text components. The image rectification is executed based on quadrangle estimation. We have applied this technique to AR annotation overlay.

<Short Paper>

Summarising variations of “Human Computer Interaction” syllabus in Computer Science area
Hascoët Mountaz1, Nakayama Minoru2
1LIRMM CNRS Univ. Montpellier 2, France; 2Human System Science / CRADLE, Tokyo Institute of Technology, Japan

To improve HCI course curriculum, variation of course contents is analysed using course syllabus survey. In this paper, we report the results of a case study using simple statistics to automatically extract relationships from syllabus documents of HCI courses described online.

On the analysis of Wikipedia activity through time
Nuno Silva1, Daniel Gonçalves1,2
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Wikipedia is a popular online encyclopedia whose articles are written as a collaborative effort by its user community. It has been growing in both size and popularity and currently offers articles on a wide range of topics. As with any collaborative project, it is subject to continued revisions and disputes over content. Also, articles see bursts of update activity whenever a topic is of more interest to the community or has somehow become controversial. Analyzing when and what changes are made can, thus, give us an idea of how the community feels about particular subjects. In this paper we present PopCulture, a system that provides a visualization of Wikipedia’s edits, highlighting measures such as controversiality and vandalism that allow us to reflect on how different subjects are perceived by people over time. It makes the comparison of different articles possible, highlighting existing
Abstract

Correlations between topics. Furthermore, articles from different language wikipedias can be compared, in order to find regional and cultural differences of interest and perception. A set of user studies shows that, indeed, users are able to use PopCulture effectively and efficiently to find such trends and differences.

Session iV2014_2.7: VA - Visual Analytics
Chair: Fatma Bouali, University of Lille 2, France

A Visual Analytics of Geometric Distances Between Amino Acids and Surface Pockets of Proteins
Makiko Miyoshi, Ayaka Kaneko, Takayuki Itoh, Kei Yura
Ochanomizu University, Japan

Protein is the major component of the organism. It has a unique typical three-dimensional structure determined by the sequence of amino acids. A concave (pocket) on the surface of a protein is known to be the best target for a drug to react. We started analyzing how "druggability" of proteins related to the locations amino acids in a pocket. As a beginning study, this paper presents a visualization tool for distance analysis between pockets and amino acid residue. Supposing a protein surface is provided as a triangular mesh, this tool first identifies pockets on the protein surface, specifies the deepest points and outer loops of the pockets, and calculates distances between atoms of an amino acid residue and the deepest points or the outer loops of the pockets. The tool then visualizes the statistics of the distance calculation results by polyline charts and the distribution by scatterplots. This paper proposes the a biological interpretation of the visualization results.

From Multiple Linked Views to Multiple Linked Analyses: the Meme Media Digital Dashboard
Jonas Sjobergh, Yuzuru Tanaka
Hokkaido University, Japan

We describe a system called the Digital Dashboard that uses multiple linked views of data. All views allow interaction with the visualization results and interaction is done through direct manipulation. The system has been extended to allow new complex data to be generated in analysis components at runtime, e.g. by statistical analysis or data mining of parts of the data. The resulting data can be used in other linked views or analysis components, so when e.g. a data mining parameter is changed, all linked views (or analysis components) are automatically updated as soon as the new calculations are finished, and when something changes in linked components (e.g. a different subset of the data is selected), the calculations are automatically redone (if necessary).

Parallel Box: Visually Comparable Representation for Multivariate Data Analysis
Hiroaki Kobayashi¹, Tadanobu Furukawa², Kazuo Misue³
¹Department of Computer Science, University of Tsukuba.; ²Fujitsu Laboratories Ltd.; ³Faculty of Engineering, Information and Systems, University of Tsukuba

In visual analytics, data comparison is one of the keys to analyzing data. We develop Parallel Box that is intended to support visual analysis of multivariate data by allowing to compare sets of many multivariate items flexibly. In order to compare data distributions of multivariate data, we combine cumulative bar chart and Box Plot which is widely used in statistics. By using shadow expression on the basis of the visual Gestalt principles of grouping, Parallel Box enables a direct comparison between either datasets or variables. As a case study of Parallel Box, we show social media analysis. Based on the results of our analysis, we prove that Parallel Box is useful for visual analysis.
**Visual Comparison of Multilingual Documents and Lexical Matching**

Hascoët Mountaz¹, Nakayama Minoru²

¹LIRMM CNRS Univ. Montpellier 2, France; ²Human System Science / CRADLE, Tokyo Institute of Technology, Japan

In this paper, we propose a new approach for the comparison and matching of documents written in different languages. Our approach is devoted to situations where documents can be conceptually represented by abstract graphs. Our approach builds on previous work yet it addresses some limitations left open by previous work. The benefits of our approach is twofold. First, our approach makes it possible to compare original multilingual documents without requiring a translation in a pivot language contrary to other approaches. Second, we propose a highly visual and interactive environment so that human experts can perform both comparison of documents and lexical matching in a seamless way contrary to other approaches where matching and comparison are often considered separately.

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**Session iV2014_2.8: HCI - Interaction for Information Visualization**

Chair: Dr. Hascoët Mountaz, LIRMM CNRS Univ. Montpellier II, France

**From Finger Gesture to Finger Choreography: Enabling 3D Live Performances on Smartphones**

Hsin Hsin Lin

INFOETECH Research & Consultancy, Singapore

With the burgeoning availability of touchscreen mobile devices, display monitors and TVs, gestures manipulation on 2D has become a norm: a one or two-finger user interaction with text or 2D images as part of our daily activities. However, interaction with 3D objects and applications remains little explored. Apart from typing, map navigations, most of the 3D object gesture manipulation has been confined to three points of view for rotations, scaling and translations (RST). Currently, commonly seen applications are 3D videogames where the user interacts with virtual game pads displayed on screen. 3D graphics interaction are still in its infancy, largely due to the limitation of the 3D surface constructs and the difficulty of interacting in 3D environments from 2D inputs.

This paper offers a novel perspective on several classes of 3D structures devised by the author, whereby it enables a one or two-finger gestures to achieve as many, and even total degree of freedom (DoF) ad lib. Consequently, it empowers finger choreography on touchscreen of the one-handed handheld device such as a smartphone for 3D performances in realtime. These extensive movements without constraints, coupled with the easy-to-use rich gesture manipulation, enable finger trajectories to be composed, synchronized with music to choreograph a live 3D performance. It presents a palette of finger gestures and the results of the finger choreography on several classes of equation-based 3D objects.

**Flip Visualization for Web based Demographic Simulation System**

Mariko Sasakura¹, Kenichi Iwata², Naoko Matsumoto³

¹Okayama University, Japan; ²Okayama Sozan Senior High School, Japan

We propose flip visualization system which flips many images quickly and allows users to find difference of images easily because of the persistence of vision. In the system we can see flip animation interactively, such as flip forward or backward, increase or decrease flip speed, and stop flipping. We can also divide images into clusters by hand after we found a difference of images. In order to check the effect of flip visualization, we develop a web-based demographic simulation system for archaeology which simulates ancient society. It generates images as results, and we show them by flip visualization.

**Visualising the Code: empowering novice and beginner programmers using a HTML game editor.**

Theodor Wyeld, Zak Barbuto

Flinders University, Australia

Novices and beginners have multiple motivations to learn how to program. The greatest hurdle for them to overcome is the intimidation of the code itself. Making the code easier to understand and operate on assists them in the task of learning to program. This paper reports on a novel HTML games editor interface for assisting novice and beginner programmers to create games for mobile devices. Visualising the results of their programming in the form of a game helped them overcome their initial anxiety. The HTML games editor was developed using a cycled evaluation study to best meet the novice and beginner users’ needs. The goal for novices and beginners to
create a game suitable for playing on a mobile device in 1.5 hours was achieved.

A tool for visually exploring multi-objective mixed-integer optimization models
Rui Borges Lopes1,2, Beatriz Sousa Santos3,4, Carlos Ferreira1,4
1Department of Economics, Management and Industrial Engineering; 2Center for Research & Development in Mathematics and Applications; 3Department of Electronics Telecommunications and Informatics; 4Institute of Electronics Engineering and Telematics of Aveiro, University of Aveiro, Portugal

Multi-objective optimization models have been increasingly used as optimal decisions are searched in settings where several conflicting objectives have to be considered. In these cases compromises must be made and often a large number of non-dominated optimal solutions exist. From these solutions decision-makers must find the preferred one(s). This is typically a difficult task both from a computational and cognitive point of views, as it requires several solutions to be obtained and compared. An interactive visualization tool for fully understanding the best trade-offs is therefore becoming increasingly important. This paper proposes some visualization solutions, implemented in a tool, for aiding decision-makers in finding the preferred solution in multi-objective optimization problems.

Heat Maps for Aggregating Bioacoustic Annotations
Philip Eichinski, Paul Roe
Queensland University of Technology, Australia

In our large library of annotated environmental recordings of animal vocalizations, searching annotations by label can return thousands of results. We propose a heat map of aggregated annotation time and frequency bounds, maintaining the shape of the annotations as they appear on the spectrogram. This compactly displays the distribution of annotation bounds for the user's query, and allows them to easily identify unusual annotations. Key to this is allowing zero values on the map to be differentiated from areas where there are single annotations.

FacetScape: A Visualization for Exploring the Search Space
Christin Seifert, Johannes Jurgovsky, Michael Granitzer
Passau University, Germany

Despite advancing search technologies, information overload has not yet been solved. Getting an overview of information or explorative access to information becomes increasingly difficult with the exponentially increasing amount of information. Search result visualizations, especially for faceted browsing aim at supporting users to find their way through large document collections. We propose FacetScape, a novel visualization for navigation and refinement of search results allowing users to visually construct complex boolean search queries for narrowing down the search space. This visualization combines Voronoi subdivision and a tag cloud representation of the search facets. Further it includes a preview of action (query preview) and interactions to allow users to focus on important aspects of the data for the task at hand (removing of facets). In a comparative user study with 15 users we compared the visualization to a standard faceted browsing interface for different types of search tasks. The study revealed that participants used the unfamiliar interface as efficient and effective as the familiar tree-like display. Results indicate that the FacetScape is a promising way of supporting users in exploring the faceted search space.

Visualizing Large Quantities of Educational Datamining Information
Sandra Gama, Daniel Goncalves
INESC-ID and Instituto Superior Técnico, Universidade de Lisboa, Portugal

Providing the educational community with tools to analyze educational processes may result in a more effective education. Application of Data Mining techniques to educational data results in information on educational settings. However, to comprehend an extensive set of symbolic patterns that is usually difficult to understand. Visualization, due to its potential to display large quantities of data, may overcome this limitation. We used the results of educational data mining techniques that had been applied to analyze the interdependence among courses in a university program and studied
**Abstract**

Visualization mechanisms to enable the analysis of such patterns. We created a multi-level visualization, in which each level depicts a semester with corresponding courses. We have studied visual connectors to display a high number of interrelations between courses. User tests have shown the effectiveness of a connector which combines visual merging techniques with Bezier curves to represent course interrelation.

**RadCloud: Analyzing Texts with Merged Word Clouds**

Michael Burch, Steffen Lohmann, Fabian Beck, Lorenzo Di Silvestro, Nils Rodriguez, Daniel Weiskopf  
VISUS, Germany

Word clouds are a popular means for summarizing text documents. They show the occurrence frequencies of words by several visual features such as font size, color coding, or orientation and are mainly designed to visualize single text data sources. However, previous research has rarely considered the combination of multiple text sources. In this paper, we introduce RadCloud, a technique for textual data analysis and visualization based on multiple word clouds merged into one single view. In particular, our technique is capable of showing the text source for those words by mapping them to corresponding radial coordinates and by arranging them in an overlap-free layout. The approach is implemented in an interactive data analysis and visualization tool and its usefulness is illustrated by a case study analyzing encyclopedia.

**Session IV2014_2.10: Animation, Special Effects and Multimedia Show**

Chair: Bannatyne, Prof. Mark, IUPUI, USA

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**Session IV2014_3.1: VA - Visual Analytics**

Chair: Dr. Harri Siirtola, University of Tampere, Finland

**Effects of visualizing missing data: an empirical evaluation**

Rebecca Andreasson, Maria Riveiro  
University of Skövde, Sweden

This paper presents an empirical study that evaluates the effects of visualizing missing data on decision-making tasks. A comparison between three visualization techniques: (1) emptiness, (2) fuzziness, and (3) emptiness plus explanation, revealed that the latter technique induced significantly higher degree of decision-confidence than the visualization technique fuzziness. Moreover, emptiness plus explanation yield the highest number of risky choices of the three. This result suggests that uncertainty visualization techniques affect the decision-maker and the decision-confidence. Additionally, the results indicate a possible relation between the degree of decision-confidence and the decision-maker's displayed risk behavior.

**Coordinated Multiple Views to Support Image Retrieval**

Danilo Medeiros Eler¹, Jorge Marques Prates¹, Rogério Eduardo Garcia¹, Rosane Minghim²  
¹UNESP, Univ Estadual Paulista, Brazil; ²USP, University of Sao Paulo, Brazil

The number of images available has grown over the years, as well as the number of techniques to aid to organizing and retrieving from image collections. Techniques and systems have been proposed to recover images based on query, in which an image (or words) is used as input parameter and a list of similar images (or images with related text content) is recovered. However, understanding how the retrieved images are related to each other remains as a problem. This paper proposes an approach based on multidimensional visualization and coordination techniques to show the relationship from retrieved images. In this approach, coordination techniques are employed to perform image retrieval methods and highlight the results in visual representations, showing how retrieved images are relate. To evaluate our proposal image collections with and without textual annotations related to each image were used, and also image retrieval mechanisms
**iV2014__ Abstract**

based on distance, topic and semantic to retrieve images from distinct and multimodal datasets.

**A Web-based Tool for the Visual Analysis of Media Annotations**

**Pierrick Bruneau**¹, **Mickaël Stefas**¹, **Hervé Bredin**², **Anh-Phuong Ta**², **Thomas Tamisier**¹, **Claude Barras**²

¹CRP - Gabriel Lippmann; ²LIMSI-CNRS

Multimedia annotation algorithms infer localized metadata in multimedia content, e.g. speakers' voices or subjects' faces. There is a growing need of experts from this domain to perform advanced analyses, that go beyond medium-scale quality metrics. This paper describes a novel visual tool, that addresses the concerns of multimedia experts using interactive visualization principles. Multiple coordinated views, augmented by interactive inspection facilities, ease both the navigation in media annotations and the visual detection of relevant information. The usefulness of our approach is supported by experimental scenarios using a real multimedia corpus.

**Animated Geo-temporal Clusters for Exploratory Search in Event Data Document Collections**

**Paul Craig**¹, **Néna Roa-Seiler**¹,², **Ana Delia Olvera Cervantes**¹

¹Universidad Tecnológica de la Mixteca, Mexico; ²Edinburgh Napier University, UK

This paper presents a novel visual analytics technique developed to support exploratory search tasks for event data document collections. The technique supports discovery and exploration by clustering results and overlaying cluster summaries onto coordinated timeline and map views. Users can also explore and interact with search results by selecting clusters to filter and re-cluster the data with animation used to smooth the transition between views. The technique demonstrates a number of advantages over alternative methods for displaying and exploring geo-referenced search results and spatio-temporal data. Firstly, cluster summaries can be presented in a manner that makes them easy to read and scan. Listing representative events from each cluster also helps the process of discovery by preserving the diversity of results. Finally, clicking on visual representations of geo-temporal clusters provides a quick and intuitive way to navigate across space and time simultaneously. This removes the need to overload users with the display of too many event labels at any one time. The technique was evaluated with a group of nineteen users and compared with an equivalent text based exploratory search engine.

**DataTube4log: a Visual Tool for Mining Multi-Threaded Software Logs**

**Sébastien Devaux**¹,²,³, **Fatma Bouali**¹,², **Gilles Venturini**¹

¹University Francois Rabelais of Tours, France; ²University of Lille2, France; ³Airbus Defence and Space - Space systems, TEA332 Simulation, France

In this paper we study a 3D tubular visualization of software activity log data, with the aim of supporting multithreaded software development and debugging. We consider an existing visualization called Datatube2 that has already been used to help various domain experts in the analysis of large amounts of time-dependent data. Since software logs are also time series, Datatube2 has been enhanced to support the specific data and tasks that are currently found in debugging, yielding to a specific visualization that we called DataTube4log. In this visualization, each line in the tube is devoted to the activity of a thread. Dependencies between threads are materialized with arrows. Synchronization objects are also represented. Using a real dataset, we show how a domain expert has solved a debugging problem. During this experiment, we found that DataTube4log can be easily learned and adopted, and that the ability of the data tube to efficiently render an overview of large time series was beneficial to the software engineer.

**Spectral-Based Contractible Parallel Coordinates**

**Koto Nohno**¹, **Hsiang-Yun Wu**¹, **Kazuho Watanabe**², **Shigeo Takahashi**¹, **Isssei Fujishiro**³

¹The University of Tokyo, Japan; ²NAIST, Japan; ³Keio University, Japan

Parallel coordinates is well-known as a popular tool for visualizing the underlying relationships among variables in high-dimension datasets. However, this representation still suffers from visual clutter arising from intersections among polyline plots especially when the number of data samples and their associated dimension become high. This paper presents a method of alleviating such visual clutter by contracting multiple axes through the analysis of correlation between every pair of variables. In this method, we first construct a graph by connecting axis nodes with an edge weighted by data correlation between the corresponding pair of dimensions, and then reorder the multiple axes by projecting the nodes onto the primary axis obtained through the spectral graph analysis. This allows us to
compose a dendrogram tree by recursively merging a pair of the closest axes one by one. Our visualization platform helps the visual interpretation of such axis contraction by plotting the principal component of each data sample along the composite axis. Smooth animation of the associated axis contraction and expansion has also been implemented to enhance the visual readability of behavior inherent in the given high-dimensional datasets.

Session iv2014_3.2: VAD - Visualization, Art, and Design
Chair: Prof. Alan Potkin, Northern Illinois University, USA

Labyrinth at Versailles: Imaginary Spaces
Copper Frances Giloth¹, Jonathan Tanant²
¹University of Massachusetts, United States of America; ²Jon Lab

This paper details the motivations and the artistic and technical considerations for a digital reconstruction of a labyrinth that existed in the gardens at the Versailles Palace from 1665 to 1774.

Reconstitution of the Labyrinth of Versailles as a Mobile App
Copper Frances Giloth¹, Jonathan Tanant²
¹University of Massachusetts, United States of America; ²Jon Lab, France

A work in progress, the “Labyrinthe de Versailles” mobile app attempts to re-imagine the titular garden in its original 17th century state among the gardens of the Château de Versailles. The app experience, designed to be initially used on Apple iOS mobile devices (iPad, iPhone), is in 3D and geo-localized to help explore the enigmas of the garden that once lived there but was replaced by the “Bosquet de la Reine” in the late 18th Century.

The Gothic Cathedral: An Immersive Information Visualization Space
Francis T. Marchese
Pace University, United States of America

During the Middle Ages Gothic cathedrals were immersive information spaces which supported religious education and practice. Stained glass windows were essential to their function, in which Biblical narratives had been translated by skilled medieval artists into visual forms. This paper analyzes this visual phenomenon from the perspective of spatial information systems and the medieval art of memory.

<Short Paper>
EVA: A Visualization framework for organizing concept sketches
Min Nan Liao¹, Teng Wen Chang²

¹Department of Digital Media Design, National Yunlin University of Science and Technology, Taiwan; ²Department of Digital Media Design, National Yunlin University of Science and Technology, Taiwan

Design process often reflects the personality of designer that might fall into certain patterns. In general, the process can be divided into brief, case retrieval, design decision-making, operation, and outcome. Thus, sketch often clues to design information. Generate a large of prescriptive sketch that is important information in this study. In order to get the quick feedback and generate massive data (sketches) for E-V-Analysis, graphic design is chosen as the design domain.

Through EVA, we found some rules and make the system automatically generated visualization results through chapter 5 of 3 visualization rules. Therefore, in design, designers could understand the change process of the sketch, and understand the creative in design process. Assist designers in the design, we could find the new idea through pass design, let designer's holds that thinking and idea.

<Short Paper>
Graphic Visualization in Literary Text Interpretation
Andrea Bellandi, Alessia Bellusci, Amedeo Cappeli, Emiliano Giovannetti
“Antonio Zampolli” Institute for Computational Linguistics (ILC), Pisa, Italy

We here illustrate a possible approach combining existing technologies for Natural Language Processing (NLP), Knowledge Representation and Reasoning (KRR) and Data Visualization in a coherent Decision Support System (DSS). The approach to the development of the system we are working on can be articulated in two main steps: the customization and integration of existing tools for automatic text annotation (at least linguistic, lexicographic and semantic) and the construction of a user-friendly and highly expressive GUI. The interface should allow a user to: upload her/his own text, run the desired annotation tools, visually interact with the resulting multilayered network to: i) proof-read the results of the automatic annotations, ii) manually add missing elements and/or relations between elements and, finally, iii) formulate and verify specific interpretative hypotheses.
**Session IV2014_3.3: KV - Knowledge Visualization**

**Chair:** Bannatyne, Prof. Mark, IUPUI, USA

**Abstract**

**SchemaLine: Timeline Visualization for Sense Making**

Phong Hai Nguyen, Kai Xu, Rick Walker, William Wong  
Middlesex University, United Kingdom

Timeline visualization is an important tool for sensemaking. It allows analysts to examine information in chronological order and to identify temporal patterns and relationships. However, many existing timeline visualization methods are not designed for the dynamic and iterative nature of the sensemaking process and the various analysis activities it involves. In this paper, we introduce a novel timeline visualization, SchemaLine, to address these deficiencies. SchemaLine is designed to group notes into analyst-determined schema, using a layout algorithm to produce compact but aesthetically pleasing timeline visualization, and includes fluid user interactions to support sensemaking activities. It enables interactive temporal schemata construction with seamless integration with visual data exploration and note taking. Our preliminary evaluation results show that the participants found the new method easy to learn and use, and its features effective for the sense making activities for which it was designed.

**Semantic Blossom Graph: A new Approach for Visual Graph Exploration**

Manuela Rauch¹, Ralph Wozelka¹, Eduard Veas¹, Vedran Sabol¹,²  
¹Know Center, Austria; ²Graz University of Technology, Austria

Graphs are widely used to represent relationships between entities. Indeed, their simplicity in depicting connectedness backed by a mathematical formalism, make graphs an ideal metaphor to convey relatedness between entities irrespective of the domain. However, graphs pose several challenges for visual analysis. A large number of entities or a densely connected set quickly render the graph unreadable due to clutter. Typed relationships leading to multigraphs cannot clearly be represented in hierarchical layout or edge bundling, common clutter reduction techniques. We propose a novel approach to visual analysis of complex graphs based on two metaphors: semantic blossom and selective expansion. Instead of showing the whole graph, we display only a small representative subset of nodes, each with a compressed summary of relations in a semantic blossom. Users apply selective expansion to traverse the graph and discover the subset of interest. A preliminary evaluation showed that our approach is intuitive and useful for graph exploration and provided insightful ideas for future improvements.

**Detecting Mango Fruits by using Randomized Hough Transform and Backpropagation Neural Network**

Kutiba Nanaa, Mohamed Rizon, Mohd Nordin Abd Rahman, Azim Zailha Abd Aziz  
Universiti Sultan Zainal Abidin (UniSZA), Terengganu, Malaysia

A new method for mango detection is presented in this paper. This method is based on a preprocessing operators on image include converting to gray image, finding edges, calculating distances to edges, opening morphology and converting to binary color image. To take advantage of oval shaped mango fruit, we apply Randomized Hough Transform method to detect potential places for mango fruit in input images. By using Backpropagation Neural Network, we recognize mango fruits from these potential places. The dataset used to implementing this paper is 50 RGB images captured of mango fruits on tree. As shown in experimental results, in the case of clear fruit in input images, the detection rate up to 96.26% while it decreases in the case of partially covering or overlapping. However, this method is able to apply to detect other fruits in varied sizes and colors.

**BuiltViz14: 8th International Conference Visualisation in Built and Rural Environments**

**Application of Interactive Surfaces to Support Computer Mediated Collaborative Design Environment**

Marianthi Leon, Daniel C. Doolan, Richard Laing, Julian Malins, Huda Salman

This paper explores drawing as a design medium for conceptualising ideas within the built environment professionals and its application through computer mediated environments and tangible interfaces in particular. Developments in human-computer interactions’ technologies allow the integration of physical and digital realms. Furthermore, advances in multi-touch displays promote the haptic experience, which is substantial for externalising and communicating visual ideas among designers. As a result, an interactive surface is tested in two different studies with a multidisciplinary
Abstract

The aim of the paper is to compare two different design applications, a commercial available one and a tailor-made one, to further analyse the effect of such an environment on the participants’ perceptual, conceptual and collaborative actions and, eventually, to propose further research on augmented design platforms.

A 2D/3D Visualisation and Modelling Platform for Timber Frame Construction Based on the IFC Data Model
Guofu Xiang, Eyad Elyan, Patrik Holt, Mike Coats, Ross Brown

This paper presents a 2D/3D visualisation and modelling platform for automatic framing and designing of Engineered Wood Products (EWPs) based on the Industry Foundation Classes (IFC) data model. It aims at having a platform that meets the Building Information Modelling (BIM) practices providing industry efficiency in timber frame construction. Initial results show that the proposed platform offers faster and more effective processes.

Session IV2014_3.4: Information Visualisation
Chair: Prof. Randolph George Goebel, University of Alberta, Canada

Trend Towards BigData Visual Analytics
Prof. Mao Lin Huang
Director of Information Visualization Lab, The University of Technology, Sydney, Australia

BigData, according to Wikipedia, is “the term for a collection of data set so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications”. Given the scale and complexity of today’s data, visual analytics is rapidly becoming a necessity rather than an option for comprehensive exploratory analysis. According to Gartner 3Vs model, BigData has three characteristics: 1) volume, 2) velocity and 3) variety.

Although many significant works have been done in information visualization that could deal with the visual analytics of large-scale (or extreme-scale or ultra-scale) data that addressed the ‘volume’ issue in 3Vs model, not many previous works done that focused on providing visual solutions that address the ‘velocity’ issue in BigData visual analytics.

The key challenge for BigData analysis is its speed (velocity). Rapid generation of big data can lead to significant business insight and prediction, but only when real-time data can be quickly analyzed in a few minutes (or few hours) rather than weeks or months. Accordingly, the reduce of the processing time in both the data collection and visual display becomes extremely important.

Stream data visualization could be the one of a few existing visual solutions that could address the ‘velocity’ issue. However, stream data processing does not visit every data item in the data stream. Therefore, it is hard to generate visual patterns (e.g. the density patterns) for analysis.

In this talk, we propose an alternative approach called 5Ws model. By using this model, we can minimize the access (or visit) time by collecting some basic information from the head (the 1st package) of the ‘life (or moving)’ data. We only visit each data item once. We don’t need to access the content of the data. Therefore, we can collect and visualize these data in real-time.

The collected information include What type of the data is, Why the data occurred, Where the data came from, When the data occurred, Who received the data and How the data was transferred. From these behaviours of the data, we may create some density patterns for visual analytics. The model is tested by using the network security ISCX2012 dataset. The experiment shows that this new model worked efficiently with appropriate visualizaton methods, that well addresses the ‘velocity’ issue for BigData visual analytics.

Bio-sketch
Dr Mao Lin Huang is an Associate Professor and Director of Information Visualization Lab, in the University of Technology, Sydney, Australia. His research interests include graph drawing, multi-dimensional data visualisation, visual analytics and visual data mining. He has published more than 160 research publications, including high quality journal articles, book chapters and conference papers. These publications have received more than 900 citations according to Google Scholar.
Huang has supervised (and is supervising) 2 Post-Doctors and 12 PhD students, working on the above areas. Dr Huang has chaired various international conferences/symposiums, and has been involved in the program committees of many international conferences. He is an editor of various conference proceedings. He has also been a reviewer for several well-known IEEE Transactions and other journals, including the IEEE Trans. on Computer Graphics and Visualization; the IEEE Trans. on Knowledge & Data Engineering; the IEEE Trans. on Systems, Mans and Cybertics; and Journal of Information Visualization (IVS).

**<keynote Lecture>**

**How the History of Automotive Industry could inspire Information Visualization**

**Dr Ir Benoît Otjacques**  
Centre de Recherche Public - Gabriel Lippmann, Luxembourg

This talk aims to inspire the audience by adopting an unusual perspective to think about the information visualization domain. More concretely, it will draw relationships between the automotive industry and infavis.

- Both domains have myths based on memorable items that became instantly famous or underestimated ideas that have surprisingly proven to be very robust ones.
- The automotive industry was founded by a few people who had a passion for fast running and technology and infavis also has founding fathers, like Bertin or Shneiderman who loved graphics and interaction.
- The automotive industry has evolved to integrate new concepts or new technologies, like disk brakes or turbocharged diesel engines and infavis has faced revolutions like Apps and tablets.

From several points of view, infavis could be inspired by what automotive industry has already achieved.

- In terms of integration of components designed and produced by a myriad of suppliers, infavis still stays far behind the automotive industry. This refers to formal specifications, API documentation.
- In the 60's in the USA, Ralph Nader became famous with his book "Unsafe at any speed" that raised the public awareness about the poor safety of automobiles of that time... Graphics and infavis techniques can also be dangerous... Where is the neutral NCAP organization that give ratings to the visualization propositions?
- Modern cars place connectivity and user experience at the heart of their design. Although infavis share common roots with HCI, we sometimes forget that the proposed techniques should at least be useful, hopefully efficient and also increasingly engaging, sexy and funny.
- The automotive industry has seen revival of very old ideas, like the electric car who was already there in the beginning of the 20th century. Shouldn't we also review the infavis history to assess whether the reasons that prevents some of the very ancient proposals to be successful some decades ago are still valid today?

**Bio-sketch**

Since 2002, Dr Benoît Otjacques is deputy scientific director of the "Informatics, Systems and Collaboration" department of the Public Research Centre - Gabriel Lippmann, located in Luxembourg. He has been active in applied research for almost twenty years. For more than 10 years, he has focused his research on human-computer interaction and information visualization. More recently, he also added Visual Analytics to the scope of his interests.

Dr Otjacques has authored or co-authored more than 60 papers in journals and international conferences. He was also the initiator of the team who designed and implemented the Calluna visualization tool. He has been involved in dozens of various projects: scientific projects based on competitive funding as well as applied projects with private companies and public administration.

Dr Otjacques holds an engineering degree from the University of Louvain, Belgium; a PhD in computer science, specialized in information visualization from the University of Namur, Belgium and three Masters in relationship with information technologies, innovation and management from Universities of Nancy (France), Mons (Belgium) and Namur (Belgium). As the keynote may suggest it, he also has a passion for classic cars.
Research and Training Centre in Construction and Environment
A Centre of Excellence at Damascus University

Project Objective
The project aims to establish a center of excellence for research and training in construction and environment at Damascus University. Other universities in Syria, Aleppo University and Tishreen University, will participate in the project to provide feedback and share the experience of the establishment of this center. The project has a set of research themes and training areas that relate to the major problems that face the construction sector in Syria.

Project Partners
- Main Beneficiary: Damascus University, Syria
- EU Partners: Leeds Metropolitan University, UK, Northumbria University, UK, Kassel University, Germany
- Syrian Partners: Aleppo University, Syria, Tishreen University, Syria, University of Claude Bernard Lyon I, France

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F.T. Marchese, E. Banissi (Eds.)

Knowledge Visualization Currents
From Text to Art to Culture

- Presents the state of the art in visualization research and development
- Highlights research developing at key intersections with other disciplines and its applicability to addressing complex real-world problems
- Discusses how visualization researchers are addressing complex issues of representation in knowledge, art, and culture

Lying at the intersection of education, art, and cultural heritage, visualization is a powerful tool for representing and interpreting complex information.

This unique text/reference reviews the evolution of the field of visualization, providing innovative examples of applied knowledge visualization from disciplines as varied as law, business management, the arts and humanities. With coverage of theoretical and practical aspects of visualization from ancient Sumerian tablets through to twenty-first century legal contracts, this work underscores the important role that the process of visualization plays in extracting, organizing, and crystallizing the concepts found in complex data.

Topics and features:

- Contains contributions from an international selection of preeminent authorities
- Presents a thorough introduction to the discipline of knowledge visualization, its current state of affairs and possible future developments
- Examines how tables have been used for information visualization in historical textual documents
- Discusses the application of visualization techniques for knowledge transfer in business relationships, and for the linguistic exploration and analysis of sensory descriptions
- Investigates the use of visualization to understand orchestral music scores, the optical theory behind Renaissance art, and to assist in the reconstruction of an historic church
- Describes immersive 360 degree stereographic visualization, knowledge-embedded embodied interaction, and a novel methodology for the analysis of architectural forms

This interdisciplinary collection of the state of the art in knowledge visualization will be of considerable interest to researchers from a broad spectrum of backgrounds in both industry and academia.
R. Spence

**Information Visualization**

An Introduction

- Relevant to ANY discipline in which insight into data is a requirement and assumes no knowledge of mathematics or computer science
- Its design orientation focuses on creative visual and interaction design, supported by exercises and case studies
- Over 40 video clips (none longer than 5 minutes) available to help instructors illustrate concepts and techniques

The need to gain insight into data is common to many scientific and social disciplines. An effective way to facilitate insight is, first, to transform the (often numerical and confusing) data into representational images that are much easier to comprehend and which often lead to an “Ah Ha!” moment. There are many available representations ranging from the simple pie chart to those that are more comprehensive: a selection is illustrated by application to a variety of fields ranging from history to medicine, and the reason for their effectiveness analysed. But much greater insight into data is possible if a user can interact with its visual representation. To this end an effective framework for interaction design, Norman’s Action Cycle, is introduced and illustrated using familiar examples: it is then applied to applications such as house purchase, web navigation, product design and involuntary browsing. An underlying concern of the book is with creative visual and interaction design.
"Inner Shrine": Inspired by the poem "Journey Home" composed by the noted Indian poet, Rabindranath Tagore, combined with my writing, "Inner Shrine" reveals the emotional and spiritual journey in searching of one's soul. To find the inward space of one's own—the home of the heart, one has to experience life to the fullest. It is the most intricate encounter that wanderers have to undertake, through which they discover the essence of their existence and the answer for who we are. © Jing Ziou