Information Visualisation

- AI & Visual Analytics& Data Science –

Edited by

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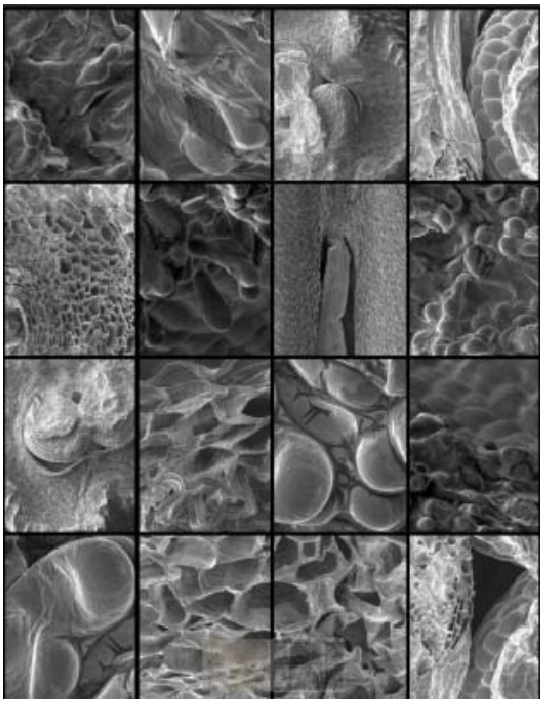

Proceedings

2023 27th International Conference Information Visualisation

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Sycamore and Second Order Cellular Automata, Lilium
Anna Chupa, Michael Chupa & Leslie O'Brien

Left Image – **Sycamore and Second Order Cellular Automata**
We generated time-evolved, five-state second-order 1D cellular automata (CA) via a Python script using a randomized initial state for the CA. High-resolution (8100 x 16200 pixels) PNG images were rendered into a "design gallery" for artist selection for compositing with photographic imagery. The resulting image was printed to cotton fabric, and free-motion quilted using a longarm quilting machine. Our interest in second-order CA rules was prompted by the similarity of the forms produced when juxtaposed with photographic sources of natural materials, in this case, Sycamore tree bark.

Right Image – **Lilium**
We used the Scanning Electron Microscope at varying levels of magnification on samples from reproductive sections from a Lilium genus. There are details from pollen on an anther, an ovary, and a stigma imaged at 50x, 120x, 200 and 250x, 650 and 1000x.

Anna Chupa is a photographer and textile artist whose photos, textile designs, quilts, and mixed-media installations have been exhibited in Austria, China, England, France, Germany, Italy, Morocco, the Netherlands, Spain, and throughout the United States. Prof. Chupa's most recent projects are textile designs that combine biomorphic forms with renderings of cellular automata, and art quilts documenting the landscape and architecture of the Camino de Santiago. She received her MFA in Photography from the University of Delaware.

Michael Chupa is a High-Performance Computing Engineer who has worked in scientific visualization and research computing in academia and industry for two decades. Chupa has an undergraduate degree from Oberlin College in Physics and an M.S. in Computational Engineering from Mississippi State University.

Leslie Hayden O'Brien is the Scanning Electron Microscopy (SEM) Manager for the Institute for Functional Materials and Devices (IFMD) at Lehigh University. Before coming to Lehigh, she was an Applications Scientist for Nanoscience Instruments (Alexandria, VA) and a Research Scientist at the Joint Pathology Center in Silver Spring MD. She was also a Laboratory Manager for the US Geological Survey in Menlo Park and for the University of Michigan, Ann Arbor. Dr. O'Brien received her B.S. in Environmental Geosciences from the University of Notre Dame and her Ph.D. in Geology from Rensselaer Polytechnic Institute.

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Preface

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Do aspects of our lives depend on and are driven by data, information, knowledge, user experience, and cultural influences in the current information era? Does the infrastructure of any information-dependent society rely on the quality of data, information, and analysis of such entities from past and present and projected future activities and, most importantly, how it is intended to be applied? Information Visualization, Analytics, Machine Learning, Artificial Intelligence, and Application domains are state-of-the-art developments that effectively enhance understanding of these well-established drivers. Several key interdependent variables are emerging that are becoming the focus of scientific activities, such as Information and Data Science. Aspects tightly tie raw data (origin, autonomous capture, classification, incompleteness, impurity, filtering) and data scale to knowledge acquisition. Its dependencies on the application domain and its evolution steer the next generation of research activities. From raw data to knowledge, processing the relationship between these phases has added new impetus to understanding and communicating these. The tradition of use and communication by visualization is deep-rooted. It helps us investigate new meanings for the humanities, history of art, design, human factors, and user experience, leading to knowledge discoveries and hypothesis analysis. Modern-day computer-aided analytics and visualization have added momentum in developing tools that exploit metaphor-driven techniques within many applied domains to simply storytelling through data. The methods are developed beyond visualization to simplify the complexities, reveal ambiguity, and work with incompleteness. The next phase of this evolving field is to understand uncertainty, risk analysis, and tapping into unknowns; this uncertainty is built into all stages of the processes, from raw data to the knowledge acquisition stage. But there is a new twist: fast-developing generative AI with ever-increasing access to data outsmarting humans in decision-making. A new evolutionary step in the human journey, no doubt.

This collection of papers on this year's information visualization forum, compiled for the 27th conference on Information Visualization incorporating the following: Artificial Intelligence – analytics, machine-, deep-learning, and Learning Analytics - IV2023, advocates that a new conceptual framework will emerge from information-rich disciplines like the Humanities, Psychology, Sociology, Business of everyday activities as well as the science-rich disciplines. To facilitate this, IV2023 provides the opportunity to resonate with many international and collaborative research projects, lectures, and panel discussions from distinguished speakers that channel how this new framework conceptually and practically has been realized. This year's theme is enhanced further by AI's impact on all aspects of life and learning analysis of today's multifaceted and data-rich environment.

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Joining us in this search are some 70-plus researchers who reflect and share a chapter of their thoughts with fellow researchers. The papers collected, peer-reviewed by the international reviewing committee, reflect the vibrant state of information visualization, analytics, applications, and results of researchers, artists, and professionals from more than 25 countries. It has allowed us to address the scope of visualization from a much broader perspective as we step into the age of AI. Each contributor to this conference has added a new view and thoughts that challenge our beliefs and further encourage our adventure of innovation.

Ebad Banissi
On behalf of the editors

Acknowledgments

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We are deeply grateful to all the researchers, authors, and reviewers for their efforts in their critical views of papers. They assisted the Information Visualization community with their expertise and feedback to shape this event and such the collection of research possible.

Special thanks go to a dedicated team of organizing and liaison committee members who helped shape the Information Visualisation forum.

Finally, we sincerely thank the Graphicslink team for their continuous efforts in preparing, organizing, and handling the conference administration. Special thanks to colleagues from Universidade NOVA de Lisboa, João Moura Pires, and Nuno Datia for their help with the online provision of the event and Dr. Harri Siirtola of Tampere University for mastering the local organisation. Appreciation is also due to Javier Gurrola, the Production Editor of IEEE Computer Society Conference Publication Services, for the high standard of editorial production of the Proceedings.

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DHKV – Digital Humanities Knowledge Visualisation
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