

Preface to the Sixteenth International Conference on Concept Lattices and Their Applications, CLA 2022

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Abstract

This volume contains the papers presented at the Sixteenth International Conference on Concept Lattices and Their Applications, CLA 2022, including the satellite workshop entitled “Existing Tools and Applications for Formal Conceptual Analysis, ETAFCA’2022”.

Preface

The CLA conference is an international forum for researchers, practitioners and students dedicated to the practice of Formal Concept Analysis (FCA) and areas closely related to it, including data analysis and mining, information retrieval, knowledge management, knowledge engineering, logic, algebra and lattice theory.

The 16th of CLA, CLA 2022, was going to be held in Tallinn, Estonia organized by the Department of Software Science at Tallinn University of Technology, from June, 20th, to June, 22th, 2022. The program of the conference includes five keynote talks given by the following distinguished researchers:

- Bernard De Baets, (Dept. of Data Analysis and Mathematical Modelling, Ghent University, Belgium)
- Tarmo Uustalu (Dept. of Computer Science of Reykjavik University, Iceland)
- John F. Sowa (Kyndi, Inc., San Mateo, CA, USA)
- Peter Vojtáš (TCharles University, Prague, Czech Republic)
- Boualem Benatallah (Dublin City University, Ireland)

CLA 2022 received 20 submissions out of which 14 were accepted as full papers. Within the framework of CLA 2022, a satellite workshop entitled “Existing Tools and Applications for Formal Conceptual Analysis, ETAFCA’2022” has also been held to promote the different tools

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and illustrate the use of formal conceptual analysis with examples of concrete datasets. This workshop was organized by Alexandre Bazin, Karell Bertet, Christophe Demko, Pierre Martin and Ants Torim, and, after peer review, six short papers have been accepted for ETAFCA'2022. This volume includes all of these contributions.

This edition of CLA also includes a sponsored tutorial entitled “Managing and Linking Data with KG Using PP Semantic Suite” which was given by Albin Ahmeti and Artem Revenko, a tutorial entitled “FCA algorithms with the R package fcaR” by Domingo Lopez and Angel Mora, and another one entitled “Reduction of fuzzy contexts” by Jan Konecny.

We would like to thank all authors and speakers for their extra effort to provide high quality contributions, and the program committee members and external reviewers for their careful and timely review of the submissions. We would also like to thank the CLA steering committee for the opportunity to contribute to the advancement of FCA and related areas. And a special thanks to the local committee. We are all indebted to you.

We would like to thank our sponsors, namely Semantic Web Company and Tallinn University. Finally, we also do not forget that the conference was managed (quite easily) with the EasyChair system, for many tasks including paper submission, selection, and reviewing.

Organization

CLA 2022 was organized by Tallinn University of Technology.

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Plenary talks

Putting order into the ordering of random variables

Bernard De Baets

Department of Data Analysis and Mathematical Modelling.
Ghent University, Belgium.

Abstract: Decision making inevitably involves the comparison and ordering of real variables. In the presence of uncertainty, this entails the comparison of real-valued random variables. We briefly review three approaches to such comparison:

1. *Stochastic dominance*: an approach based on a pointwise comparison of cumulative distribution functions;
2. *Statistical preference*: an approach based on a pairwise comparison in terms of winning probabilities;
3. *Probabilistic preference*: an approach based on multivariate winning probabilities.

Whereas the first and third approaches are intrinsically transitive, the second approach requires considerable mathematical effort to unveil the underlying transitivity properties. Moreover, the first approach ignores the possible dependence between the random variables and is based on univariate distribution functions, the second approach is by definition built on bivariate joint distribution functions, while the third approach is based on the overall joint distribution function.

Monad-comonad interaction laws

Tarmo Uustalu

Dept. of Computer Science of Reykjavik University (Iceland)

Abstract: This talk is not on formal concept analysis, but on a different new application of Chu spaces to computer science, specifically to programming language semantics.

It is standard in this domain to use monads to model notions of computation that involve effects such as computation with input/output, manipulation of store, nondeterminism. An effectful computation cannot return a value on its own: it issues requests to the outside world and needs these responded to make progress. To run, it needs to be paired with an environment that can service these requests. Such notions of environment are modelled with comonads. Protocols of communication between computations and environments admit mathematization by what we call monad-comonad interaction laws. Those are monoid objects in some category of Chu spaces.

I will introduce and explain some basics about monad-comonad interaction laws.

Automated and semi-automated tools for interoperable systems

John F. Sowa

Kyndi, Inc., San Mateo, CA, USA

Abstract: In 2000, Tim Berners-Lee proposed a vision for the Semantic Web that was more ambitious than the tools delivered in 2005. Since then, better technology has been developed for artificial intelligence, natural language processing, and automated reasoning. But the complexity of the new tools is beyond the expertise of most programmers. Fortunately, the technology can also support automated and semi-automated methods that can simplify the interface for both programmers and end users. This talk surveys technology that can enable anybody at any level of expertise to use, control, and interact with computer systems.

Galois-Tukey connections in experiments

Peter Vojtáš

Charles University, Prague, Czech Republic

Abstract: We are motivated by the development from Galois-Tukey connections in set-theory via Question-Answer category in complexity to Challenge-Response reductions of real situations to models. We describe several experiments (use-case, data, prototype, metrics, evaluation, comparison) in computer science ranging from recommender systems to web semantization. We see this as learning of concepts of e.g., user preferred objects or automated tagging.

AI Service Augmentation: Challenges and Directions

Boualem Benatallah

Dublin City University, Ireland

Abstract: AI enabled augmentation promises to transform services through data-driven automation and insights. The entire service economy is rapidly shifting to AI enabled augmentation, embracing deep changes that are required for increased productivity and effectiveness. Nonetheless, despite the early adoption, AI augmented service technologies are still only in their preliminary stages of development, with several unsolved challenges stemming from lack of computational abstractions and models to reason about ambiguity and uncertainty that are inherent in data-driven processes. We will revisit abstractions, concepts, and techniques in data-driven service models and middleware. A key challenge also lies the synergy between human and machine, crowd and AI – augmentation will seek to achieve bridging the gap between disparate systems and processes, and between human and machine. We will discuss synergies

between intent-based composition, composition synthesis, robotic process automation and other technologies as step forward to scale AI augmented services enablement. We will discuss quality control in training data and AI augmented services.

