



# The 13th International Conference on Concept Lattices and Their Applications

#### Welcome

It is our pleasure to welcome you on the  $13^{th}$  International Conference on Concept Lattices and Their Applications (CLA 2016) held in Moscow, Russia, July 18-22, 2016.

The CLA conference, organized since 2002, aims to provide to everyone interested in Formal Concept Analysis and more generally in Concept Lattices or Galois Lattices, an advanced view on some of the last research trends and applications in this field. It also aims to bring together students, professors, researchers and engineers, involved in all aspects of the study of concept lattices, from theory to implementations and practical applications. As the diversity of the selected papers shows, there is a wide range of research directions, around data and knowledge processing, including data mining, knowledge discovery, knowledge representation, reasoning, pattern recognition, together with logic, algebra and lattice theory.

The program of the conference includes four keynote talks given by the following distinguished researchers: Lev D. Beklemishev (Mathematical Institute of Russian Academy of Science, Moscow), Jérôme Euzenat (INRIA Grenoble Rhône-Alpes), Bernhard Ganter (TU-Dresden), Boris G. Mirkin (National Research University Higher School of Economics, Moscow). This year, 46 papers were submitted, from which 28 papers were accepted as regular papers. We would like to thank here the contributing authors for their valuable work, the members of the program committee and the external reviewers who analyzed the papers with care. All of them participated to the continuing quality and importance of CLA, highlighting its key role in the field.

Then we would also like to thank the steering committee of CLA for giving us the occasion of leading this edition of CLA, the conference participants for their participation and support, and people in charge of the organization, especially Larisa I. Antropova, Ekaterina L. Chernyak, Dmitry I. Ignatov, Olga V. Maksimenkova, whose help was very precious in many occasions and that contributed to the success of the event. We would like to thank our sponsors, namely National Research University Higher School of Economics, ExactPro company, Russian Foundation for Basic Research. 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. We hope you all enjoy the conference and your stay in Moscow!

July 2016

Marianne Huchard Sergei O. Kuznetsov

Program Chairs of CLA 2016

CLA 2016 was organized by the National Research University Higher School of Economics.

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# Invited Speakers

	Data interlinking with formal concept analysis and link keys
	Jérôme Euzenat (INRIA Grenoble)
	Conference Hall, 5-th floor
Part Aller	July 19, 10:15-11:15
	Strictly positive fragments of modal and description logic
Sec. 1	Lev D. Beklemishev (Mathematical Institute of Russian
= /	Academy of Science, Moscow)
The state of the s	Conference Hall, 5-th floor
	July 20, 10:00-11:00
	Relaxing Formal Concepts: Approximate n-Clusters
6=	Boris Mirkin (Tenured Professor, School of Data Analysis
	and Artificial Intelligence, NRU HSE)
1	Conference Hall, 5-th floor
111111111	July 21, 10:00-11:00
1	Things to do in Formal Concept Analysis
Contract	
	Bernhard Ganter (Professor, TU Dresden)
	Conference Hall, 5-th floor
	July 22, 10:00-11:00

			9:00-9:30 am 9:30-9:40 am 9:40-10:00 am	10:00-10:15 am 10:15-11:00 am	11:00-11:20 am 11:20-11:30 am	11:30-1:00 pm	1:00-2:00 pm	2:00-3:20 pm 3:20-3:40 pm 3:40-4:00 pm 4:00-4:30 pm 4:30-5:00 pm 5:00-6:20 pm 6:20-6:30 pm 6:30-21.00 pm
plications ussia		July 22		Invited talk: Bernhard Ganter	Coffee-break	Session 8 Metrics, distances 11:30-1:00 pm and classification	Closing session Lunch	
The 13th International Conference on Concept Lattices and Their Applications National Research University Higher School of Economics, Moscow, Russia July 18-22, 2016	ARY	July 21		Invited talk: Boris G. Mirkin	Coffee-break	Session 5 Pattern Structures	Lunch	Session 6 Fuzziness Coffee-break Session 7 FCA-based resolution of reference problems local excursions
ity Higher School of	PROGRAM SUMMARY	July 20		Invited talk: Lev D. Beklemishev	Coffee-break	Session 4 Many-Relational approaches and lattice structure	Lunch	Excursion and conference dinner
3th International Conal Research Universe-22, 2016		July 19	Registration	Welcome Invited talk:	Jérôme Euzenat Coffee-break	Session 1 Tools and Data	Lunch	Session 2 Implications, closure systems and Coffee-break  Session 3 Applications local excursions
The 13t Nationa July 18-		July 18	Registration	Workshops	Coffee-break	Workshops	Lunch	Workshops Industrial presentation ExactPro Coffee-break Tutorial: Sergei Obiedkov Tutorial: Jérôme Euzenat Welcome Party
			9:30-9:30 am 9:30-9:40 am 9:40-10:00 am	10:00-10:15 am 10:15-11:00 am	11:00-11:20 am 11:20-11:30 am	11:30-1:00 pm	1:00-2:00 pm	2:00-3:20 pm 3:20-3:40 pm 3:40-4:00 pm 4:00-4:30 pm 4:30-5:00 pm 5:00-6:20 pm 6:20-6:30 pm

## Workshop Program

## Workshop on Concept Discovery in Unstructured Data (CDUD)

July 18. Myasnitskaya 11, Conference Hall,  $5^{th}$  floor

	Invited talk: Natalia Loukachevitch
9:40-10:20 am	Sentiment analysis of Twitter messages: tasks,
	approaches and results
	Valentin Malykh and Alexey Ozerin
10:20-10.40 am	Reproducing Russian NER Baseline
10.20 10.10 am	Quality Without Additional Data
	Cillian Croops and Bornd Fischer
10:40-11:00 am	Single-Focus Broadening Navigation in Concept Lattice
11:00-11:20 am	Coffee-break
11.00-11.20 am	Tatiana Litvinova, Pavel Seredin, Olga Litvinova,
	Olga Zagorovskaya, Alexandr Sboev, Dmitry Gudovskikh,
11.20 11.40 am	Ivan Moloshnikov and Roman Rybka
11:20-11:40 am	v v
	Predicting The Gender of an Author of a Russian Text
	Using Regression and Classification Techniques
11:40-12:00 am	Ekaterina Chernyak and Dmitry Ilvovsky
	Annotated Suffix Tree for Text Clustering
12:00-12:20 am	Mikhail Bogatyrev and Kirill Samodurov
12100 12120 0111	Framework for Conceptual Modeling on Natural Language Texts
	Bato Merdygeyev and Sesegma Dambaeva
12:20-12:40 am	The Evaluation of the Quality of Ontology
	Based on Analysis of Relations on Concept Lattice
	Umme Hafsa Billah, Sheikh Muhammad Sarwar
12:40-1:00 pm	and Abdullah-Al-Mamun
12:40-1:00 pm	Personalized Language Models for
	Computer-mediated Communication
1:00-2:00 pm	Lunch
_	Abdus Satter, Amit Seal Ami and Kazi Sakib
2:00-2:20 pm	Identification of Dead Fields by Analyzing Usage of Setup Fields and
	Field Dependency in Test Code
	Mikhail Kreines and Elena Kreines
2:20-2:30 pm	Topic Modeling without Generative Probabilistic Model:
	Approach and its Validation
	(research proposal, 5 mins poster intro)
	Oksana Dereza and Vladislav Tushkanov
2:30-2:40 pm	Verb-Noun Collocation and Government Model
	Extraction from Large Corpora
	~ -
	(research proposal, 5 mins poster intro)

# Workshop on Experimental Economics and Machine Learning (EEML)

## July 18. Myasnitskaya 11, Room 421, $4^{th}$ floor

0.40.10.00	Invited talk: Vladimir Bobrikov, Elena Nenova and Dmitry Ignatov
9:40-10:20 am	What is a Fair Value of Your Recommendation List?
	Tatiana Babkina, Mikhail Myagkov, Evgeniya Lukinova,
10:20 - 10.40 am	Anastasiya Peshkovskaya, Olga Menshikova and Elliot Berkman
	Choice of the Group Increases Intra-Cooperation
	Ilya Makarov, Peter Zyuzin, Pavel Polyakov, Mikhail Tokmakov,
10.40 11.00	Olga Gerasimova, Ivan Guschenko-Cheverda and Maxim Uriev
10:40 - 11:00 am	Modelling Human-like Behavior through Reward-based
	Approach in a First-Person Shooter Game
11:00 - 11:20 am	
	Ekaterina Mitrofanova and Alyona Artamonova
11:20 - 11:40 am	Studying of the Family Formation Trajectories
	Deinstitutionalization in Russia Using Sequence Analysis
	Henry Penikas and Maria Ermolova
11:40 - 12:00 am	QAIDS Model Based On Russian Pseudo-panel Data:
	Impact of 1998 and 2008 Crises
	Constantine Sorokin, Elizaveta Bespalova, Alim Moskalenko,
12:00 - 12:20 am	Alexander Safin and Andrey Yagolkovsky
12:00 - 12:20 am	Finding the Sweet Spot in the City:
	a Monopolistic Competition Approach
	Evgenii Tsymbalov
12:20 - 12:40 am	Churn Prediction for Game Industry
	Based on Cohort Classification Ensemble
	Nataly Zhukova and Mikhail Navrotskiy
12:40 - 1:00 pm	Scientific Portal of University Department –
	Shaping User's Research Area through their Behavior
1:00 - 2:00 pm	Lunch
2:00 - 2:20 pm	Rustam Tagiew and Dmitry Ignatov
2.00 - 2.20 pm	Gift Ratios in Laboratory Experiments
	Nikita Nikitinsky, Sergey Shashev,
2:20 - 2:40 pm	Polina Kachurina and Alexander Bespalov
2.20 - 2.40 pm	Big Data and Machine Learning in E-government:
	Automatic Expert Evaluation Case
	Alexander Porshnev, Valeriya Lakshina and Ilya Redkin
2:40 - 3:00 pm	Using Emotional Markers' Frequencies in
	Stock Market ARMAX-GARCH Model (remote talk)
	Sheen S. Levine and Charlotte Reypens
2.00 2.00	Should I Stay or Should I Go?
3:00 - 3:20 pm	The Cognition of Exploration and Exploitation
	across Cultures (remote talk)

# Workshop on Soft Computing Applications and Knowledge Discovery (SCAKD)

## July 18. Myasnitskaya 11, Room 424, $4^{th}$ floor

	Xenia Naidenova, Vladimir Parkhomenko and Konstantin Shvetsov
9:40-10:20 am	Modification of Good Tests in Dynamic Contexts: Application to
	Modeling Intellectual Development of Cadets
10:20 - 10.40 am	Tatyana Afanaseva, Nadezhda G. Yarushkina and Gleb Guskov
10:20 - 10.40 am	ACL-Scale as a Tool for Preprocessing of Many-Valued Contexts
10.40 11.00 200	Alexey Namestnikov, Valeria Avvakumova and Alexandra Chekina
10:40 - 11:00 am	The Ontology-Based Model of Technical Documentation Fuzzy Structuring
11:00 - 11:20 am	Coffee-break
11.20 11.40	Alexander Bozhenyuk and Evgeniya Gerasimenko
11:20 - 11:40 am	Maximum Dynamic Flow Finding Task with the Given Vitality Degree
	Marina Savelyeva and Marina Belyakova
11:40 - 12:00 am	Motion Control in the Mechanical Transport System
	with Fuzzy Given Distance and Time.
10.00 10.00	Andrew Mironov
12:00 - 12:20 am	Logics for Representation of Propositions with Fuzziness Modalities
	Vitaly Martynovich and Evgenii Vityaev
12:20 - 12:40 am	Recovering Noisy Contexts with Probabilistic Formal Concepts
	Andrew Bronevich, Alexander Lepskiy and Henry Penikas
12:40 - 1:00 pm	An Analysis of Coherence of Financial Analysts' Recommendations
	in the Framework of Evidence Theory
1:00 - 2:00 pm	Lunch
	Gerald Plesniewicz, Vu Nguen Thi Min and Dmitry Masherov
2:00 - 2:20 pm	Query Answering over Fact Bases for
	Fuzzy Interval Ontologies (research proposal)
	Artem Grachev and Andrey Shiriy
2:20 - 2:40 pm	Are Clustering Techniques Better than Binary Thresholding
	for Detection of Signal Tracks in Ionogramms? (research proposal, 10 mins)

# Workshop on Algorithms for FCA and Data Mining (AFCADM) $\mbox{July 18. Myasnitskaya 11, Room 426, $4^{th}$ floor }$

17.000 7.700 nm	Simon Andrews
	Optimization Approaches for the Implementation of CbO-Type Algorithms
	Simin Jabbari and Kilian Stoffel
2.20 2.40 pm	A Hybrid Algorithm for Generating Formal
2:20-2:40 pm	Concepts and Building Concept Lattice
	Using NextClosure and Nourine Algorithms
2:40-3:00 pm	Simin Jabbari and Kilian Stoffel
2:40-5:00 pm	Parallel Execution of Binary-Based NextClosure Algorithm
3:00-3:20 pm	Aleksey Buzmakov
	FCAPS: a modular console Application for Pattern Structures

## Main program

July 18. Myasnitskaya 11, Conference Hall,  $5^{th}$  floor

9:00-9:40 am	Registration (5-th floor)
09:40-11:00 am	Workshops
11:00-11:20	Coffee-break
11:20-1:00 pm	Workshops
1:00-2:00 pm	Lunch
2:00-3:20 pm	Workshops
	Industrial Presentation: Olga Moskaleva and Anna Gromova (ExactPro)
3:20-3:40 pm	Using intelligent systems and structural analysis to assure orderly
	operations of the modern trading and exchange platforms
3:40-4:00 pm	Coffee-break
4:00-5:00 pm	Tutorial: Sergei Obiedkov (NRU HSE, Moscow)
4.00-5.00 pm	Query Learning and Attribute Exploration
5:00-6:20 pm	Tutorial: Jérôme Euzenat (INRIA Grenoble)
5.00-0.20 pm	Introduction to ontology matching

## July 19. Myasnitskaya 11, Conference Hall, $5^{th}$ floor

9:30-10:00 am	Registration (5-th floor)
10:00-10:15 am	Welcome
10:15-11:15 am	Invited talk: Jérôme Euzenat. Chair: Peter Eklun
10:15-11:15 am	Data interlinking with formal concept analysis and link keys
11:15-11:30 am	Coffee-break
	Session 1. Tools and Data. Chair: Alexey Buzmakov
	Mehwish Alam, Thi Nhu Nguyen Le and Amedeo Napoli
	LatViz: A new practical tool for performing interactive exploration over concept lattices
11.20 1.00	Al A N I AI A D
11:30 - 1:00 pm	Alexey A. Neznanov and Andrey A. Parinov Unified External Data Access Implementation
	in Formal Concept Analysis Research Toolbox
	iii Formai Concept Analysis Research Tooloox
	Daniel Borchmann and Tom Hanika
	Some Experimental Results on Randomly Generating Formal Contexts
1:00-2:00 pm	Lunch
	Session 2. Implications, closure systems and their applications
	Chair: Jaume Baixeries
	Jessie Carbonnel, Karell Bertet, Marianne Huchard and Clémentine Nebut
	FCA for Software Product Lines representation: Mixing product and characteristic
	relationships in a unique canonical representation
2:00-4:00 pm	
2.00 1.00 pm	Estrella Rodríguez Lorenzo, Pablo Cordero, Manuel Enciso,
	Rokia Missaoui and Angel Mora Bonilla
	CAISL: Simplification Logic for Conditional Attribute Implications
	Evangaga Kriggal Nort Clagues with Constraints
	Francesco Kriegel, NextClosures with Constraints Alexandre Bazin
	Comparing Algorithms for Computing Lower Covers of Implication-closed Sets
4:40-4:30 pm	Coffee-break
nio noo pin	Session 3. Applications. Chair: Xavier Dolques
	Cynthia Pitou and Jean Diatta
	Textual information extraction in document images guided by a concept lattice
	Dmitry Palchunov, Gulnara Yakhyaeva and Ekaterina Dolgusheva
4:30-6:30 pm	Conceptual Methods for Identifying Needs of Mobile Network Subscribers
	Tim Wray, Jan Outrata and Peter Eklund
	Scalable Performance of FCbO Algorithm on Museum Data
	Mr. The True Alebert Discouler Visual True intend Annal New 1
	My Thao Tang, Aleksey Buzmakov, Yannick Toussaint and Amedeo Napoli
	Building a Domain Knowledge Model Based on a Concept Lattice Integrating Expert Constraints

July 20. Myasnitskaya 11, Conference Hall,  $5^{th}$  floor

	Invited talk: Lev D. Beklemishev.
10:00-11:00 am	Chair: Manuel Ojeda-Aciego
	Strictly positive fragments of modal and description logic
11:00-11:30 am	Coffee-break
	Session 4. Many-Relational approaches and lattice structure.
	Chair: François Brucker
	Jens Kötters
	Intentional Concept Graphs as Patterns over Power Context Families
11:30-1:00 pm	Cristina Nica, Agnès Braud, Xavier Dolques,
	Marianne Huchard and Florence Le Ber
	Exploring Temporal Data Using Relational Concept Analysis -
	An Application to Hydroecological Data
	Laurent Beaudou and Lhouari Nourine
	Partial duplication of convex sets in lattices
1:00-2:00 pm	Lunch
2:00-10:00 pm	Excursion and conference dinner

July 21. Myasnitskaya 11, Conference Hall,  $5^{th}$  floor

10.00.11.00	Invited talk: Boris G. Mirkin. Chair: Pablo Cordero
10:00-11:00 am	Relaxing Formal Concepts: Approximate n-Clusters
11:00-11:30 am	
11:30-1:00 pm	Session 5. Pattern Structures. Chair: Bernhard Ganter  Alexey Masyutin and Sergei O. Kuznetsov Continuous Target Variable Prediction with Augmented Interval Pattern Structures: Lazy Algorithm  Aleksey Buzmakov and Amedeo Napoli On Scaling of Fuzzy FCA to Pattern Structures  Natalia V. Korepanova and Sergei O. Kuznetsov Pattern Structures for Treatment Optimization in Subgroups of Patients
1:00-2:00 pm	Lunch
2:00-4:00 pm	Session 6. Fuzziness. Chair: Jan Outrata  Irina Perfilieva and Marek Vajgl Data Retrieval and Noise Reduction by Fuzzy Associative Memories  Inma P. Cabrera, Pablo Cordero, Francisca García-Pardo, Manuel Ojeda-Aciego and Bernard De Baets On the existence of right adjoints for surjective mappings between fuzzy structures  Tim B. Kaiser, Lars Lumpe and Stefan E. Schmidt A Fresh View on Fuzzy Formal Concept Analysis and Mathematical Morphology
4:00-4:30 pm	Coffee-break
4:00-6:30 pm	Session 7. FCA-based resolution of reference problems. Chair: Florence Le Ber Víctor Codocedo, Jaume Baixeries, Mehdi Kaytoue and Amedeo Napoli Characterization of Order-like Dependencies with Formal Concept Analysi  Yury Kashnitsky and Sergei O. Kuznetsov Global optimization in learning with important data: an FCA-based approach  Artem Bocharov, Dmitry Gnatyshak, Dmitry I. Ignatov, Boris G. Mirkin and Andrey Shestakov A Lattice-based Consensus Clustering Algorithm  François Brucker and Pascal Préa The Approximate Seriation Problem in Formal Context Analysis

July 22. Myasnitskaya 11, Conference Hall,  $5^{th}$  floor

10:00-11:00 am	Invited talk: Bernhard Ganter. Chair: Amedeo Napoli Things to do in Formal Concept Analysis
11:00-11:30 am	Coffee-break
11:30-1:00 pm	Session 8. Metrics, distances and classification. Chair: Pascal Préa Tobias Gäbel-Hökenschnieder, Stefan E. Schmidt, Thorsten Pfeiffer and Mosadak Al Salamat Generalized metrics and their relevance for FCA and closure operators Dhouha Grissa, Blandine Comte, Estelle Pujos-Guillot and Amedeo Napoli A Hybrid Data mining Approach for the Identification of Biomarkers in Metabolomic data Sergei O. Kuznetsov and Tatyana Makhalova Stability for triadic concepts
1:00 pm	Closing session, Lunch

## Social event on July 20



**(**) 14:00

# Higher School of Economics, Myasnitskaya 11

T

# Novospassky monastery



## Krutitskoe podvore

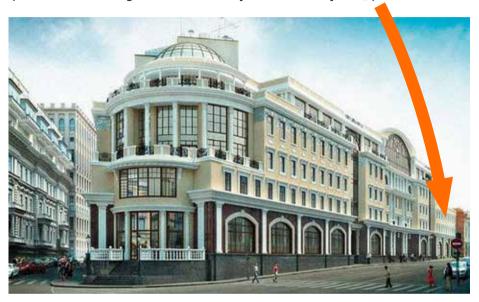


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## **Conference venue**

# Myasnitskaya street 11 (entrance adjacent to Myasnitskaya 13)



#### How to get there?

The HSE campus is easily accessible by subway, with the following stations just 5-10 minutes away:

- Lubyanka (Лубянка) (red line)
- Chistye Prudy (Чистые пруды) (red line)
- Turgenevskaya (Тургеневская) (orange line)
- Kitay-Gorod (Китай-город) (orange line)

Lubyanka metro station: Exit to Myasnitskaya Ulitsa, which you should follow. The destination will be on your right. Estimated travel time: 8 minutes.

Chistye Prudy and Turgenevskaya metro stations: Exit to Myasnitskaya Ulitsa, which you should follow towards the city centre. The destination will be on your left. Estimated travel time: 7 minutes.

Kitay-Gorod metro station: Exit to Ulitsa Maroseyka, which you should follow for 100 metres, then turn right onto Bolshoy Zlatoustinskiy Pereulok (350 metres), and then bear right onto Myasnitskaya Ulitsa, which you should follow for 150 metres. The destination will be on your right. Estimated travel time: 10 minutes.

