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Recent Trends in Analysis of Images, Social Networks and Texts

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For the full list of editors *see next page*

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Preface

This volume contains the refereed proceedings of the 9th International Conference on Analysis of Images, Social Networks, and Texts (AIST 2020)¹. The previous conferences (during 2012–2019) attracted a significant number of data scientists – students, researchers, academics, and engineers – working on interdisciplinary data analysis of images, texts, and social networks.

The broad scope of AIST make it an event where researchers from different domains, such as image and text processing, exploiting various data analysis techniques, can meet and exchange ideas. As the test of time has shown, this leads to the cross-fertilisation of ideas between researchers relying on modern data analysis machinery.

Therefore, AIST 2020 brought together all kinds of applications of data mining and machine learning techniques. The conference allowed specialists from different fields to meet each other, present their work, and discuss both theoretical and practical aspects of their data analysis problems. Another important aim of the conference was to stimulate scientists and people from industry to benefit from knowledge exchange and identify possible grounds for fruitful collaboration.

The conference was held during October 15–16, 2020. The conference was organised in the Skolkovo Innovation Center, Russia, on the campus of the Skolkovo Institute of Science and Technology², but held entirely online due to the COVID-19 pandemic.

This year, the key topics of AIST were grouped into six tracks:

1. Data Analysis and Machine Learning chaired by Sergei O. Kuznetsov (HSE University, Russia) and Amedeo Napoli (Loria, France)
2. Natural Language Processing chaired by Natalia Loukachevitch (Lomonosov Moscow State University, Russia), Andrey Kutuzov (University of Oslo, Norway)
3. Social Network Analysis chaired by Vladimir Batagelj (University of Ljubljana, Slovenia) and Olessia Koltsova (HSE University, Russia)
4. Computer Vision chaired by Marcello Pelillo (University of Venice, Italy) and Andrey V. Savchenko (HSE University, Russia)
5. Theoretical Machine Learning and Optimization chaired by Panos M. Pardalos (University of Florida, USA) and Michael Khachay (IMM UB RAS and Ural Federal University, Russia)
6. Process Mining chaired by Wil M. P. van der Aalst (RWTH Aachen University, Germany) and Irina A. Lomazova (HSE University, Russia)

¹ <https://aistconf.org>.

² <https://www.skoltech.ru/en/>.

To facilitate easy communication and negotiation of the area chairs and our authors via only digital channels, due to the virtual character of the event, we invited additional area and program co-chairs for certain tracks, respectively: Alexei Buzmakov (HSE University, Perm, Russia), Ilya Makarov (HSE University, Moscow, Russia), Anna Kalenkova (University of Melbourne, Australia), and Elena Tutubalina (Kazan Federal University, Russia).

The Programme Committee and the reviewers of the conference included 134 well-known experts in data mining and machine learning, natural language processing, image processing, social network analysis, and related areas from leading institutions of many countries including Australia, Austria, Czech Republic, France, Germany, Greece, India, Iran, Ireland, Italy, Japan, Lithuania, Norway, Qatar, Romania, Russia, Slovenia, Spain, Taiwan, Ukraine, United Kingdom, and the USA. This year, we received 115 submissions: mostly from Russia but also from Algeria, Brazil, Finland, Germany, India, Norway, Pakistan, Serbia, Spain, Ukraine, United Kingdom, and the USA.

Out of 115 submissions (not taking into account seven automatically rejected papers), only 27 full papers and four short papers were accepted as regular oral papers in the main volume. Invited talks were also included in the main volume. In order to encourage young practitioners and researchers, we included 14 full and nine short papers in this companion volume after their short presentation at the conference and four non-indexed poster abstracts as well. Thus, the acceptance rate of this volume was around 30%. Each submission was reviewed by at least three reviewers, experts in their fields, in order to supply detailed and helpful comments.

The conference featured several invited talks dedicated to current trends and challenges in the respective areas.

The invited talks from academia were on Computer Vision and Natural Language Processing, respectively:

- Marcello Pelillo (Ca' Foscari University of Venice, Italy): “Graph-Theoretic Methods in Computer Vision: Recent Advances”
- Miguel Couceiro (LORIA, Université de Lorraine, France): “Making Models Fairer Through Explanations”
- Leonard Kwuida (Bern University of Applied Sciences): “On Interpretability and Similarity in Concept Based Machine Learning”
- Santo Fortunato (Indiana University Network Science Institute, USA): “Consensus Clustering in Networks”

The invited industry speakers gave the following talks:

- Nikita Semenov (MTS AI, Russia): “Text and Speech Processing Projects at MTS AI”
- Ivan Smurov (ABBYY; Moscow Institute of Physics and Technology, Russia): “When CoNLL-2003 is not Enough: are Academic NER and RE Corpora Well-Suited to Represent Real-World Scenarios?”

An extended part of Ivan’s industry talk was included in the main volume under the title “RuREBus: a Case Study of Joint Named Entity Recognition and Relation Extraction from e-Government Domain.”

We would like to thank the authors for submitting their papers and the members of the Programme Committee for their efforts in providing exhaustive reviews.

According to the programme chairs, and taking into account the reviews and presentation quality, the Best Paper Awards were granted to the following papers:

- Track 1. Data Analysis and Machine Learning: “Gradient-Based Adversarial Attacks on Categorical Sequence Models via Traversing an Embedded World” by Ivan Fursov, Alexey Zaytsev, Nikita Klutchnikov, Andrey Kravchenko, and Evgeny Burnaev;
- Track 2. Natural Language Processing: “Do Topics Make a Metaphor? Topic Modeling for Metaphor Identification and Analysis in Russian” by Yulia Badryzlova, Anastasia Nikiforova, and Olga Lyashevskaya;
- Track 3. Social Network Analysis: “Detecting Automatically Managed Accounts in Online Social Networks: Graph Embedding Approach” by Ilia Karpov and Ekaterina Glazkova;
- Track 4. Computer Vision: “Deep Learning on Point Clouds for False Positive Reduction at Nodule Detection in Chest CT Scans” by Ivan Drokin and Elena Elicheva;
- Track 5. Theoretical Machine Learning and Optimization: “Fast Approximation Algorithms for Stabbing Special Families of Line Segments with Equal Disks” by Konstantin Kobylkin;
- Track 6. Process Mining: “Checking Conformance between Colored Petri Nets and Event Logs” by Julio Cesar Carrasquel, Khalil Mecheraoui, and Irina Lomazova.

We would also like to express our special gratitude to all the invited speakers and industry representatives.

We deeply thank all the partners and sponsors, especially the hosting university and our main sponsor and the co-organiser this year, the Skolkovo Institute of Science and Technology, as well as the National Research University Higher School of Economics (including its subdivisions). Our special thanks go to Springer for their help, starting from the first conference call to the final version of the proceedings. Last but not least, we are grateful to Evgeny Burnaev and all the organisers, especially our secretary Irina Nikishina, and the volunteers, whose endless energy saved us at the most critical stages of the conference preparation.

Here, we would like to mention that the Russian word “aist” is more than just a simple abbreviation (in Cyrillic) – it means “a stork”. Since it is a wonderful free bird, a

symbol of happiness and peace, this stork gave us the inspiration to organise the AIST conference series. So we believe that this conference will still likewise bring inspiration to data scientists around the world!

October 2020

Wil M. P. van der Aalst
Vladimir Batagelj
Aleksey Buzmakov
Dmitry Ignatov
Anna Kalenkova
Michael Khachay
Olessia Koltsova
Andrey Kutuzov
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Ilya Makarov
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Panos M. Pardalos
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Elena Tutubalina

Organisation

The conference was organised by a joint team from Skolkovo Institute of Science and Technology (Skoltech), the divisions of the National Research University Higher School of Economics (HSE University), and Krasovskii Institute of Mathematics and Mechanics of the Russian Academy of Sciences.

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- School of Data Analysis and Artificial Intelligence, HSE University (Moscow, Russia)
- Laboratory of Algorithms and Technologies for Networks Analysis, HSE University (Nizhny Novgorod, Russia)
- International Laboratory for Applied Network Research, HSE University (Moscow, Russia)
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- Laboratory for Social and Cognitive Informatics, HSE University (St. Petersburg, Russia)
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