

Evgeny Burnaev · Dmitry I. Ignatov ·  
Sergei Ivanov et al. (Eds.)

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# Recent Trends in Analysis of Images, Social Networks and Texts

10th International Conference, AIST 2021  
Tbilisi, Georgia, December 16–18, 2021  
Revised Selected Papers

 Springer

**AIST**



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# Preface

This volume contains the refereed proceedings of the 10th International Conference on Analysis of Images, Social Networks, and Texts (AIST 2021)<sup>1</sup>. The previous conferences (during 2012–2020) 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 makes 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 2021 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 December 16–18, 2021. The conference was organized in a hybrid mode by Ivane Javakhishvili Tbilisi State University, Georgia (offline on campus)<sup>2</sup> and the Skolkovo Institute of Science and Technology, Russia (online)<sup>3</sup>, due to the COVID-19 pandemic constraints.

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

1. Data Analysis and Machine Learning chaired by Sergei O. Kuznetsov (HSE University, Russia), Amedeo Napoli (Loria, France), and Evgenii Tsymbalov (Yandex, Russia)
2. Natural Language Processing chaired by Natalia Loukachevitch (Lomonosov Moscow State University, Russia), Andrey Kutuzov (University of Oslo, Norway), and Elena Tutubalina (Kazan Federal University and HSE University, Russia)
3. Social Network Analysis chaired by Sergei Ivanov (Huawei), Olessia Koltsova (HSE University, Russia), and Jari Saramäki (Aalto University, Finland)
4. Computer Vision chaired by Evgeny Burnaev (Skolkovo Institute of Science and Technology, Russia) 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)

The Program Committee and the reviewers of the conference included 128 well-known experts in data mining and machine learning, natural language processing, image

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<sup>1</sup> <https://aistconf.org>.

<sup>2</sup> <https://www.tsu.ge/en>.

<sup>3</sup> <https://www.skoltech.ru/en>.

processing, social network analysis, and related areas from leading institutions of many countries including Australia, Austria, the Czech Republic, France, Germany, Greece, India, Iran, Ireland, Italy, Japan, Lithuania, Norway, Qatar, Romania, Russia, Slovenia, Spain, Taiwan, Ukraine, the UK, and the USA. This year, we received 118 submissions, mostly from Russia but also from Algeria, Brazil, Finland, Germany, India, Norway, Pakistan, Serbia, Spain, Ukraine, the UK, and the USA.

Out of the 118 submissions, 26 were desk rejected. For the remaining 92 papers, only 25 were accepted into the main volume published in Springer’s Lecture Notes in Computer Science (LNCS) series. In order to encourage young practitioners and researchers, we have included 17 papers in this companion volume in the Communications in Computer and Information Science (CCIS) series. Thus, the acceptance rate of the CCIS volume is 25%. 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 and tutorials dedicated to current trends and challenges in the respective areas.

The invited talks from academia were on natural language processing and related problems:

- Magda Tsintsadze, Manana Khachidze, and Maia Archuadze (Tbilisi State University): “On Georgian Text Processing Toolkit Development”
- Jeremy Barnes (University of the Basque Country): “Is it time to move beyond sentence classification?”
- Irina Nikishina (Skolkovo Institute of Science and Technology): “Taxonomy Enrichment with Text and Graph Vector Representations”
- Zulfat Miftahudinov (Kazan Federal University and Insilico Medicine): “Drug and Disease Interpretation Learning with Biomedical Entity Representation Transformer”

The invited industry speakers gave the following talks:

- Iosif Itkin (Exactpro): “Data intensive software testing”
- Aleksandr Semenov (Sber.Games): “Data science in GameDev”
- Alexey Druitsa (Yandex): “Toloka: professional hands-on tools accelerating the data-centric AI”

This year the program also included two round tables. The first one was devoted to the largest AIST track: “NLP on AIST” chaired by Andrey Kutuzov. The second one facilitated discussion on social aspects of data science practices: “Ethical issues and social challenges in data science” chaired by Rostislav Yavorskiy.

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

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 organization: Ivane Javakhishvili Tbilisi State University in Georgia. The local organizing team also included representatives of Exactpro Systems: Iosif Itkin, Natia Sirbiladze, and Janna Zabolotnaya. In addition, we thank the co-organizers from the Russian side: Alexander Panchenko and Irina Nikishina of Skolkovo Institute of Science



and Technology and the colleagues from various divisions of HSE University. 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 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 as (in Cyrillic) it means “stork”. Since it is a wonderful free bird, a symbol of happiness and peace, this stork gave us the inspiration to organize the AIST conference series. So we believe that this conference will still likewise bring inspiration to data scientists around the world!

December 2021

Evgeny Burnaev  
Dmitry I. Ignatov  
Sergei Ivanov  
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Olessia Koltsova  
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Sergei O. Kuznetsov  
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Amedeo Napoli  
Panos M. Pardalos  
Jari Saramäki  
Andrey Savchenko  
Evgenii Tsymbalov  
Elena Tutubalina

# Organization

The conference was organized by a joint team from the Ivane Javakhishvili Tbilisi State University and Exactpro Systems in Georgia, the Skolkovo Institute of Science and Technology (Skoltech), various divisions of the National Research University Higher School of Economics (HSE University), and the Krasovskii Institute of Mathematics and Mechanics of the Russian Academy of Sciences (IMM UB RAS).

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