CONFERENCE PROGRAM

16TH INTERNATIONAL CONFERENCE ON PATTERN RECOGNITION AND INFORMATION PROCESSING

17-19 OCTOBER • MINSK • BSU

2023 PRIP.BY

ARTIFICIAL INTELLIVERSE: EXPANDING HORIZONS

16th International Conference on Pattern Recognition and Information Processing

17 -19 October 2023 • Minsk, Belarus • online Minsk • BSU

The 16th International Conference on Pattern Recognition and Information Processing (PRIP2023) is held in Minsk (Belarus) at the Belarusian State University on October 17-19, 2023. Minsk, Belarus.

The PRIP Conference has a long history. It began in 1991 as the First All-Union USSR Conference on Pattern Recognition and Image Analysis in Minsk. From that time, we had already 16 PRIP conferences.

PRIP is organized by Belarusian State University (BSU), Belarusian State University of Informatics and Radioelectronics (BSUIR) and United Institute of Informatics Problems (UIIP) of National Academy of Sciences of Belarus.

The conference provides a forum for scientists and engineers to exchange up-to-date technical knowledge and experience and define ways of further development of this field. The conference will focus on both theory and applications.

Web-site: https://prip.by/2023/

YouTube channel: https://www.youtube.com/@PRIPConference

#prip #prip2023

PRIP'2023 ORGANIZERS

- BELARUSSIAN STATE UNIVERSITY

in cooperation with

- UNITED INSTITUTE OF INFORMATICS PROBLEMS OF THE NATIONAL ACADEMY OF SCIENCES OF BELARUS
- BELARUSIAN STATE UNIVERSITY OF INFORMATICS AND RADIOELECTRONICS

SUPPORT AND ENDORSEMENT

- THE NATIONAL ACADEMY OF SCIENCES OF BELARUS
- THE BELARUSIAN ASSOCIATION FOR IMAGE ANALYSIS AND RECOGNITION (BAIAR)
- THE ASIA-PACIFIC ARTIFICIAL INTELLIGENCE ASSOCIATION (AAIA)
- BASNET, NATIONAL RESEARCH AND EDUCATION NETWORK
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TIME SCHEDULE PRIP'2023

Day1
Tuesday, October17, 2023

8:30-9:45	**Registration** room 312, Building of Geographical faculty	
10:00-10:15	**Opening of the conference** room 312, Building of Geographical Faculty	
10:15-11:10	**Plenary Session 1** room 312, Building of Geographical Faculty	
11:10-11:30	Coffee Break room 321, Building of Geographical Faculty	
11:30-12:30	**Plenary Session 2** room 312, Building of Geographical Faculty	
12:30-13:30	Pause	
13:30-15:15	**In-person Session A1** room522, Main Building	**Online Session O1** room 517, Main Building
15:15-15:50	Coffee Break room 517, Main Building	
15:50-17:30	**In-person Session A2** room 522, Main Building	**Online Session O2** room 517, Main Building
Conference Dinner (by personal invitations only)		

Day2
Wednesday, October18, 2023

10:00-12:00	**In-person Session A3** room522, Main Building
12:00-12:30	Pause
12:30-14:30	**In-person Session A4** room522, Main Building
14:30-15:00	Pause
15:00-17:00	**In-person Session A5** room522, Main Building

Day3
Thursday, October19, 2023

10:00-12:30	**Hybrid Session H1** room 522, Main Building
12:30-13:00	**Closing Ceremony** room 522, Main Building

SCIENTIFIC PROGRAM

All In-person and Hybrid sessions will be available on
https://www.youtube.com/@PRIPConference
Online sessions will be available on
https://www.youtube.com/@pripconference82

Day 1 Tuesday, October 17, 2023		
Opening of the conference		
10:00 10:15	**Opening**	• Welcome words *of the Dean of Faculty Of Applied Mathematics And Computer Science Of The Belarusian State University* **Yury Orlovich**. • Welcome words *of the conference chairman* **Alexander Nedzved** • Welcome words *of the co-chairman, chairman of BAARI* **Sergey Ablameyko**
Plenary Session 1: KEYNOTE LECTIONS (room 312) Chairman: Acad. Prof. Sergey Ablameyko (Belarus).		
10:15 10:45	**Plenary 1**	**Sergey Ablameyko** (Belarus) Pattern Recognition and Information Processing: 30 Years and 15 Conferences
10:50 11:10		Ana Gavrovska, **Andreja Samčović**, DragiDujković (Serbia) No-reference Perception Based Image Quality Evaluation Analysis using Approximate Entropy
Plenary Session 2: KEYNOTE LECTIONS (room 312) Chairman: Acad. Prof. Sergey Ablameyko (Belarus).		
11:30 11:50	**Plenary 2**	**Zhijie Han,** Guang Yang, Fang Zuo (China) A Review of Virtual Resource Management Research in Cloud Data Centers
11:50 12:10		**Vassili Kovalev** (Belarus) Assessing the Security of Personal Data in Large Scale chest X-Ray Image Screening
12:10 12:30		**Valery Starovoitov**, Umidjon Akhundjanov (Belarus) A Writer-Dependent Approach to Off-line Signature Verification

In-person Session A1 (room 522) *Pattern Recognition and Classification, Knowledge-Based Expert and Decision Support Systems, Application of Pattern Recognition* Chairman: Prof. Victor Krasnoproshin (Belarus)		
13:30 13:45	**Session A1, Tuesday, October 17, 2023**	**Yangxiang Zhao, Yijun Zhou, Zhijie Han** Graph Neural Networks for Communication Networks: A Survey
13:45 14:00		**Victor Krasnoproshin, Vadim Rodchenko, Anna Karkanitsa** Synthesis of Automatic Recognition Systems Based on Properties Commonality
14:00 14:15		**Nikolay Shchurov, Igor Isaev, Oleg Barinov, Irina Myagkova, Sergei Dolenko** Iterative Selection of Essential Input Features Under Conditions of Their Multicollinearity in Space Weather Time Series Forecasting
14:15 14:30		**Dmitry Pertsau, Marina Lukashevich** Compressing a Convolution Neural Network based on Quantization
14:30 14:45		**Sergei Dolenko, Igor Isaev, Sergei Burikov, Tatiana Dolenko, Eugeny Obornev, Mikhail Shimelevich** Methodology for Solving High-dimensional Multi-parameter Inverse Problems of Indirect Measurements
14:45 15:00		**Aliaksandr Kroshchanka, Vladimir Golovko** (Belarus) Neural Networks Interpretation Improvement
15:00 15:15		**Alexander Volchek, Dmitriy Kostiuk, Dmitriy Petrov, Nikolay Sheshko** A System for Visualization and Prediction of Floods on Lowland Rivers

In-person Session A2 (room 522) *Bio-medical Informatics and Computer-Aided Drug Discovery* Chairman: Prof. Alexander Tuzikov (Belarus)		
16:00 16:15	**Session A2, , Tuesday, October 17, 2023**	**Hanna Karpenka, Timofey Vaitko, Alexander Andrianov, Alexander Tuzikov, Keda Yang** Deep Generative Model for Anticancer Drug Design: Application for Development of Novel Drug Candidates Against Chronic Myeloid Leukemia
16:15 16:30		**Anna Gonchar, Konstantin Furs, Alexander Tuzikov, Alexander Andrianov** Application of Semi-supervised GAN in Combination with JT-VAE for Generation of Small Molecules with High Binding Affinity to the KasA enzyme of Mycobacterium Tuberculosis
16:30 16:45		**Yuxiang Chen, Alexander Andrianov, Alexander Tuzikov** Identification of Feature Combinations in Genome-Wide Association Studies
16:45 17:00		**MikalaiYatskou, Elizabeth Smolyakova, Victor Skakun, VasilyGrinev** Simulation Modelling for Machine Learning Identification of Single Nucleotide Polymorphisms in Human Genomes
17:00 17:15		**Danila Varabyeu, Hanna Karpenka, Keda Yang, Alexander Tuzikov, Alexander Andrianov** Application of The LSTM-Based Deep Generative Model for De Novo Design of Potential HIV-1 Entry Inhibitors
17:15 17:30		**Anton Novikov, Alexander Tuzikov, Alexander Batyanovskii** Prediction of protein-protein interaction with cosine matrices

Online Session O1 (broadcasting in room 517) *Machine learning and Intelligent Application* Chairman: Dr. Alexei Belotserkovsky (Belarus)		
13:15 13:30	**Session O1, Tuesday, October 17, 2023**	**Connection troubleshooting**
13:30 13:45		**Justin Diamond** (Switzerland) Learnable Global Layerwise Nonlinearities without Activation Functions
13:45 14:00		**Imad Ali Shah, Fahad Mumtaz Malik, Muhammad Waqas Ashraf** (Pakistan) SFA-UNet: More Attention to Multi-Scale Contrast and Contextual Information in Infrared Small Object Segmentation
14:00 14:15		**ZiRui Shen, Xin Li, Sheng Xu** (China) RMNET: A Residual AND Multi-Scale Feature Fusion Network for High-Resolution Image Semantic Segmentation
14:15 14:30		**Sergey Dubovik, Ivan Lipko** (Russia) Monitoring in Dynamic Systems with Tipping Based on The Principle of Large Deviations
14:30 14:45		**Yunqi Zhu, Haixu Yang, LuhongJin, Dagan Yang, Yu Chen, Xianfei Ye, Sergey Ablameyko, Yingke Xu** (China) HRGC-YOLO For Urine Sediment Particle Detection in High-Resolution Microscopic Images
14:45 15:00		**Nour Atamni, Said Naamneh, Jihad El-Sana** (Israel) Hand Action Recognition
15:00 15:15		**Mikhail Kharinov** About Computer Vision Using Optimal Image Approximations

Online Session O2 (broadcasting in room 517) *Multimodal Deep Learning and Structures of Knowledge* Chairman: Dr. Alexei Belotserkovsky (Belarus)		
15:45 16:00	**Session O2, , Tuesday, October 17, 2023**	**Connection troubleshooting**
16:00 16:15		**Louis Wong, Ahmed Salih, Mingyao Song, Jason Xu** (USA) Multimodal Deep Regression on TikTok Content Success
16:15 16:30		**Shi-Jinn Horng, Minh-Tuong Le, Dinh-Trung Vu, Thi-Van Nguyen** (Taiwan) Shadow Detection and Removal from Hand Images using Synthetic Dataset
16:30 16:45		**Valerian Ivashenko** (Belarus) Structures and Measures in Knowledge Processing Models
16:45 17:00		**Nikolay Voit, Semen Bochkov** (Russia) Method to Recovery Temporal Event Diagram Workflow Model in Computer-Aided Design
17:00 17:15		**Andrey Gorodetskiy, Irina Tarasova, Anna Krasavtseva** (Russia) Logical-linguistic and Logical-probabilistic Methods of Image Classification in Decision-Making
17:15 17:30		**Igor Gurevich, Vera Yashina** (Russia) Algebraic Model for Automated Detection of Human's Fundus Morphometrical Characteristics Abnormal Changes

Day 2 Wednesday, October 18, 2023		
In-person Session A3 (room 522) *Computer Vision* Chairman: Prof. Valery Starovoitov (Belarus)		
10:00 10:15	Session A3, Wednesday, October 18, 2023	**Marina Lukashevich**, Sergei Bairak, Valery Starovoitov Hyperparameters Optimization of Ensemble-based Methods for Retina Image Classification
10:15 10:30		**Aliaksei Himbitski, Vitali Himbitski, Vassili Kovalev** Generating Graphs with Specified Properties and Their Use for Constructing Scene Graphs From Images
10:30 10:45		**Hao Wang, Sergey Ablameyko** An Improved Small Object Detection Method in Remote Sensing Images Based on YOLOv8
10:45 11:00		**Bin Lei, Wei Wan, Artsiom Nedzvedz, Alexander Nedzved, Alexei Belotserkovsky** Construction of a Semi-Automatic Contour of Areal Objects on Hyperspectral Satellite Images.
11:00 11:15		**Bin Lei, Wei Wang, Qing Bu, Stanislav Sholtanyuk** Shadow Detection and Segmentation on Satellite Images: a Survey
11:15 11:30		**Tongrui Li, Sergey Ablameyko** Person Pose Estimation using SimCC and Swin Transformer
11:30 11:45		**Olga Nedzved, Shiping Ye, Chaoxiang Chen, Viktor Anosov, Mikhail Gerasimenko, Oleg Sakalouski** Analysis of The Skeleton of Human Movement for Orthopedics Tasks
11:45 12:00		**Qing Bu, Wei Wan, Ivan Leonov** Hidden Object Masking Using Deep Learning

In-person Session A4 (room 522) *Image Analysis and Object Detection* Chairman: Prof. Alexander Nedzved (Belarus)		
12:30 12:45	**Session A4, Wednesday, October 18, 2023**	**Dzianis Pirshtuk** Low-Latency Human Portrait Segmentation Network Optimized for CPU Inference
12:45 13:00		**Huafeng Chen, Angelina Pashkevich, Rykhard Bohush, Sergey Ablameyko** Crowd Motion Detection in Video by Combining CNN and Integral Optical Flow
13:00 13:15		**Eugene Rybenkov, Nick Petrovsky** Rate-Distortion Estimation of 2-D non-Separable Filter Banks Based on Quaternionic Filter Banks with JPEG2000 Discrete Wavelet transforms
13:15 13:30		**Vadim Matskevich** Fast Random Search Algorithm in Neural Networks Training
13:30 13:45		**Qing Bu, Aleksey Miroevskiy** Recognition of Buildings on Satellite Images
13:45 14:00		**Anatolii Bobkov, Sergei Gafurov, Victor Krasnoproshin, Herman Vissia** Vissia Natural Language Processing Based on Semantic Patterns Approach
14:00 14:15		**Vadim Matskevich, Xi Zhou, Qing Bu** Neural Network Software Technology Trainable on The Random Search and Gradient Descent Principles
14:15 14:30		**Alexei Belotserkovsky, Rita Abrahamyan, Hayk Grigoryan, Hrachya Astsatryan, Arthur Lalayan, Pavel Lukashevich, Andrey Shuliak** An Advanced Scientific Gateway for Assessing Land Surface Temperatures Utilizing Landsat 8 and VIIRS Data
14:30 14:40		**Qing Bu, Wei Wan, Elizaveta Savitskaya** Comparative Analysis of Semantic Segmentation Methods for Satellite Images
14:40 14:50		**Ding Aodi, Pavel Lukashevich** Based on Weak Light YOLOv3 Multi-Target Detection

In-person Session A5 (room 522) *Signal and Information Processing and Modeling* Chairman: Dr. Marina Lukashevich (Belarus)		
15:00 15:15	**Session A5, Wednesday, October 18, 2023**	**Daniil Krasnoproshin, Maxim Vashkevich** Speech Emotion Recognition Using SVM Classifier With Suprasegmental MFCC Features
15:15 15:30		**Valery Taranchuk, Daniil Shunkevich** Principles and Solutions for Integrating Computer Algebra Tools and Applications Based on Open Semantic Technologies
15:30 15:45		**Hao Li, Jun Ma, Xunhuan Ren, Kaiyu Wang** Novel Fall Detection Algorithm Based on Multi-Threshold Fall Model
15:55 16:00		**Denis Likhachov, Nick Petrovsky, Elias Azarov** Improving Spatial Resolution of First-Order Ambisonics Using Sparse MDCT Representation
16:00 16:15		**Valery Taranchuk, Vladislav Savionok** Methodological and Technical Solutions for Creating and Forming a Knowledge Base by Integrating the Mathematica System and the Nevod Package
16:15 16:30		**Sergey Shibalko, Yuriy Kharin** Parsimonious Models of Multivariate Binary Time Series: Statistical Estimation and Forecasting
16:30 16:45		**Ivan Leonov** Performance Analysis for Sequential Statistical Discrimination of Gaussian Random Fields
16:55 17:00		**Tuleubay Safiullin, Michael Abramovich** Detecting Anomalies in Network Traffic Using Machine Learning Techniques

Day 3 Thursday, October 19, 2023		
Hybrid Session H1 (room 522) *Artificial Intelligence and its Application* Chairman: Prof. Alexander Nedzved (Belarus)		
9:45 10:00	Hybrid Session H1, Thursday, October 19, 2023	**Connection troubleshooting**
10:00 10:15		**Alexander Starovoytov, Victor Krasnoproshin** Technology for making real-time decisions based on neural network forecasting
10:15 10:30		**Andrei Fedoseyev** Tutoring process and artificial intelligence
10:30 10:45		**Vladimir Lutkovski, Dzianis Sarnatski, Serafim Yablonski** Spiking neuron model for embedded systems
10:45 11:00		**Dzmitry Mazouka, Victor Krasnoproshin** Efficient scene image synthesis based on pipeline technology
11:00 11:15		**Oleg Naidovich, Shiping Ye, Alexander Nedzved** Survival analysis in credit scoring
11:15 11:30		**Daniil Dzenhaliou, Vladimir Sarvanov** Improving efficiency of VF3 and VF3-light algorithms for sparse graphs
11:30 11:45		**Alexander Doudkin, Alex Voronov, Alex Voronov, Valentin Ganchenko, Yauheni Marushko, Leonid Podenok** Estimation of Informative Features in the Analysis of 2D Images of Bone Objects in Forensic
11:45 12:00		**Sviatlana Ihnatsyeva, Rihard Bogush** Person re-identification using compound descriptor and invisible region replacement
12:00 12:10		**Akim Sergeev, Alexandr Solomevich, Vladimir Malugin** multi-country analysis of the covid-19 pandemic typology using machine learning and neural network algorithms
12:10 12:20		**Alexander Usatoff, Alexander Nedzved, Shiping Ye** Outlier filtering in a sample
12:20 12:30		**Guo Jiran** Model identification of wood drying and shrinkage processes

Instruction to authors for oral presentation

Speakers are requested to meet their session chairman **10** minutes before the session starts. The session rooms will be indicated in the booklet, which is included in your conference documents. Oral presentations are limited to **15** minutes for regular papers and include a few minutes for discussion**.** Speakers are urged to adhere to this limit and follow instructions from their session chairmen.

The lecturing halls will be equipped with a computer and projector.

Also, participants are invited to present their recent results briefly not appearing in the official program.