

VU Faculty of Mathematics and Informatics Institute of Data Science and Digital Technologies

Annual Report 2021



Akademijos str. 4, LT-08412 Vilnius

Tel. (+370) 210 9300

E-mail: info@mii.vu.lt

<https://www.mii.lt>

Director – Prof. Dr. Habil. *Gintautas Dzemyda*

STAFF

57 research fellows (incl. 53 holding research degree), 14 teachers (all of them holding research degree), 38 doctoral students.

SUBDIVISIONS OF THE INSTITUTE

[Blockchain Technologies Group](#)

[Cognitive Computing Group](#)

[Cyber-Social Systems Engineering Group](#)

[Education Systems Group](#)

[Global Optimization Group](#)

[Image and Signal Analysis Group](#)

[Intelligent Technologies Research Group](#)

[Statistics and Probability Group](#)

[Artificial Intelligence Laboratory](#)

RESEARCH AREAS

Integrated development of mathematics, informatics and information technologies for the knowledge society advanced products and services

DOCTORAL DISSERTATIONS MAINTAINED IN 2021

Albertas Jurgelevičius – *in Informatics Engineering (T 007) defended on 16th December*

Scientific Supervisor: prof. habil. dr. Leonidas Sakalauskas

Scientific Consultant: dr. Virginijus Marcinkevičius

„[Hybrid distributed computing sharing platform](#)“ [in Lithuanian] ([abstract](#))

Mindaugas Jusis – *in Informatics Engineering (T 007) defended on 22th September*

Scientific Supervisor: prof. dr. Saulius Gudas

Scientific Consultant: prof. dr. Arūnas Andziulis

„[Method of data synchronization of autonomous port handling processes](#)“ ([abstract](#) [in Lithuanian])

Mindaugas Morkūnas – *in Informatics Engineering (T 007) defended on 15th September*

Scientific Supervisor: assoc. prof. dr. Povilas Treigys

Scientific Consultant: prof. dr. Arvydas Laurinavičius

„Development of Tumor Microenvironment-Oriented Digital Pathology Methods for Whole Slide Image Segmentation and Classification“ (abstract [in Lithuanian])

Julius Venskus – in *Informatics Engineering (T 007)* defended on 30th June

Scientific Supervisor: assoc. prof. dr. Povilas Treigys

Scientific Consultant: prof. dr. Arūnas Andziulis

„Semi-supervised and Unsupervised Machine Learning Methods for Sea Traffic Anomaly Detection“ (abstract [in Lithuanian])

Andrius Daranda – in *Informatics Engineering (T 007)* defended on 25th June

Scientific Supervisor: prof. habil. dr. Gintautas Dzemyda

Scientific Consultant: prof. dr. Arūnas Andziulis

„Machine learning-based prediction of the behavior of marine traffic participants and discovering non-standard marine traffic situations“ [in Lithuanian] (abstract)

Linus Stripinis – in *Informatics (N 009)* defended on 25th February

Scientific Supervisor: prof. dr. Remigijus Paulavičius

„Study and Application of Hidden Markov Models to Online Analysis of Multivariate Sequence Data“ (abstract [in Lithuanian])

MAIN CONFERENCES ORGANIZED IN 2021

- 11th International Doctoral Consortium "Informatics Engineering Education Research", December, 2021, Druskininkai, Lithuania
- 12th Conference "Data Analysis Methods for Software Systems", December 2–4, 2021, Druskininkai, Lithuania
- 14th International conference on Informatics Education Research, November 3–5, 2021, Utrecht, The Netherlands
- Int. Conf. „Modelling and Simulation of Social-Behavioural Phenomena in Creative Societies (MSBC-2021)“, September 22–24, 2021, Vilnius
- 23rd International conference on Olympiads in Informatics, June 20–27, 2021, Singapore
- 17th International Conference - workshop „Bebras Task Development“, May 17–22, 2021, Druskininkai, Lithuania

BLOCKCHAIN TECHNOLOGIES GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 219 3299

E-mail: remigijus.paulavicius@mii.vu.lt

Head – Dr. *Remigijus Paulavičius*

STAFF

Principal research fellow: Prof. Dr. R. Paulavičius.

Senior research fellows: Dr. E. Filatovas, Dr. V. Medvedev.

Research fellow: Dr. L. Stripinis.

Lecturer: Dr. A. Igumenov.

Doctoral students: S. Grigaitis, J. Arsenjeva, R. Bieliauskas, A. Budžys, M. Hassan.

RESEARCH INTERESTS

Blockchain technologies

Global optimization

Optimization software

Multi-objective optimization

High-performance computing

Artificial intelligence

Image processing

Big Data

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Research and development of public, private and consortium type blockchain systems. Prof. Dr. R. Paulavičius, 2018–2022.

Investigation of the most popular and recent consensus algorithms, such as Proof of Work (PoW), Proof of Property (PoS), Proof of Authorship (PoA), Proof of Importance (PoI), Delegated Byzantium Fault Tolerance (dBFT), etc. Survey of on-chain and off-chain blockchain technology solutions to identify those with the most significant potential to enhance the performance and functionality of currently developed platforms/applications. Experimental analysis of the most popular and emerging algebraic modeling languages, considering a range of relevant comparison criteria. Investigation of data fusion approaches and solutions to identify those integrated into decision-making. Exploration of the potential of machine learning techniques to prevent intrusions in computer networks.

Main publications:

Paulavičius, R., Grigaitis, S., Filatovas, E. (2021) A Systematic Review and Empirical Analysis of Blockchain Simulators. *IEEE Access*, 9, 38010-38028 DOI: [10.1109/ACCESS.2021.3063324](https://doi.org/10.1109/ACCESS.2021.3063324)

Stripinis, L., Žilinskas, J., Casado, L. G., Paulavičius, R. (2021) On MATLAB experience in accelerating DIRECT-GLce algorithm for constrained global optimization through dynamic data structures and parallelization. *Applied Mathematics and Computation*, DOI: [10.1016/j.amc.2020.125596](https://doi.org/10.1016/j.amc.2020.125596)

Orts, F., Cucura, A.C., Ortega, G., **Filatovas, E.**, Garzón, E. M. (2021) Optimal fault-tolerant quantum comparators for image binarization. *The journal of supercomputing*, 77 (8), p. 8433-8444. DOI: [10.1007/s11227-020-03576-5](https://doi.org/10.1007/s11227-020-03576-5).

Markevičiūtė, J., Bernatavičienė, J., Levulienė, R., **Medvedev, V.**, Treigys, P., Venskys, J. (2022) Attention-based and time series models for short-term forecasting of COVID-19 spread. *CMC-Computers, materials & continua*. Henderson, NV: TECH Science Press. vol. 70, no. 1, p. 695-714. DOI: [10.32604/cmc.2022.018735](https://doi.org/10.32604/cmc.2022.018735).

Stripinis, L., Paulavičius, R. (2021) A new DIRECT-GLh algorithm for global optimization with hidden constraints. *Optimization Letters*, 15, p. 1865-1884, DOI: [10.1007/s11590-021-01726-z](https://doi.org/10.1007/s11590-021-01726-z)

National Research Projects

Research Council of Lithuania. **Resolving research reproducibility problems in Artificial Intelligence using Blockchain Technologies** (No. P-MIP-21-196). Dr. E. Filatovas. 2021–2024.

Today, most real-world challenging decision problems (image analysis, voice and face recognition, planning, scheduling, routing, etc.) are solved by employing various Artificial Intelligence techniques. However, Artificial Intelligence research domains (as well as other research fields) face with Reproducibility Crisis. Researchers have difficulties reproducing many key results due to the disconnection between publications and used codes, underlying data, parameter settings, etc. as they lack critical details. Solutions that improve code accessibility, data provenance tracking, research transparency, auditing of obtained results and trust in Artificial Intelligence domains can significantly accelerate algorithm and model development, validation, and transition into real-world applications. Thanks to the features provided by Blockchain Technology, great progress in resolving Reproducibility Crisis and full reproducibility can be achieved.

In this context, the project's main objective is to contribute resolving research reproducibility problems in the Artificial Intelligence field and enhance the research cycle by developing a

conceptual model of a blockchain-based decentralized platform, which would be efficient, scalable, interoperable, and adaptable in various Artificial Intelligence research domains.

Main publication:

Gudžius, P., Kurasova, O., Darulis, V., **Filatovas, E.** (2021) Deep learning based object recognition in multispectral satellite imagery for realtime applications. *Machine vision and applications*, 32 (4), p. 1-14. DOI: [10.1007/s00138-021-01209-2](https://doi.org/10.1007/s00138-021-01209-2)

International Research Projects

2019/10 - 2021/10 “High Performance Computing to Optimize Intensity Modulated Radiotherapy Schedules.” UAL18-TIC-A020-B. Supported by Andalusian Board, Spain. Member of the group of researchers (dr. E. Filatovas is a representative from the Lithuanian side).

Main publication:

Moreno, J.J., Miroforidis, J., **Filatovas, E.**, Kaliszewski, I., Martín, G., Gracia, E. (2021) Parallel radiation dose computations with GENOCOP III on GPUs. *The journal of supercomputing*. 77 (1), p. 66-76. DOI: [10.1007/s11227-020-03254-6](https://doi.org/10.1007/s11227-020-03254-6)

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

Imperial College London (UK)

Universidad de Almería (Spain)

Systems Research Institute, Polish Academy of Sciences (Poland)

Kharkiv National University of Radio Electronics, Computer Science Faculty (Ukraine)

Octeract Optimisation Intelligence (UK)

OTHER SCIENTIFIC ACTIVITIES

Dr. R. Paulavičius –

- member of the [Young Academy of the Lithuanian Academy of Sciences](#);
- member of the *Artificial Intelligence and Digital Transformation* working group of the [Arqus University Alliance](#);
- topic editor of Journal *Mathematics*;
- affiliate member of *European Network of Excellence on High Performance and Embedded Architecture and Compilation* (HiPEAC), www.hipeac.net;
- member of the [Lithuanian Computer Society \(LIKS\)](#);
- member of [Lithuanian Mathematical Society](#)

Dr. E. Filatovas –

- member of International Society on Multiple Criteria Decision Making (MCDM);
- member of the Lithuanian Computer Society (LIKS);
- member of Program/Scientific Committees:

Dr. V. Medvedev –

- member of Lithuanian Computer Society, <http://www.liks.lt/> ;
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/> ;
- member of Program/Scientific Committees:

- program committee member of the International Workshop on Secure Mobile Cloud Computing (IWoseMC-20, IWoseMC-2022), <http://iwosemc.eu/>.
- organizing committee member of the Conference on Data Analysis Methods for Software Systems (DAMSS), Druskininkai, Lithuania, <https://www.mii.lt/damss>

Dr. L. Stripinis –

- project researcher in *National Research Project* (P-MIP-21-196)
- Reviewer in the following scientific journals:
 - *Journal of Global Optimization*
 - *Engineering Optimization*

Dr. A. Igumenov –

- member of Lithuanian Computer Society, <http://www.liko.lt/>;
- project researcher, EU co-funded project No. 01.1.1-CPVA-V-701-15-0001 „Development of Vilnius STEAM Center” activity „Preparation of the Methodological Part of STEAM Center activities: Development of Laboratory Descriptors and Integrated Methodologies for Mobile Technology and Visual Programming Laboratory”, <http://steam.lt/>.

COGNITIVE COMPUTING GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9300

E-mail: gintautas.dzemyda@mii.vu.lt

Head – Prof. Habil. Dr. *Gintautas Dzemyda*

STAFF

Principal researchers: Prof. Habil. Dr. G. Dzemyda, Prof. Dr. A. Jakaitienė, Prof. Dr. O. Kurasova.

Principal researchers of projects: Dr. R. Dukynaitė, Dr. G. Dzemydaitė, Dr. G. A. Melnik-Leroy, Dr. S. Raižienė, Prof. habil. dr. Želvys.

Researchers: Dr. R. Karbauskaitė, Dr. G. A. Melnik-Leroy, Dr. A. Usovaitė.

Junior researchers: Dr. M. Sabaliauskas, Dr. D. Stumbrienė, V. Tiešis, J. Vaitekaitis.

Professors: Prof. Dr. Dučinskas, Prof. Habil. Dr. G. Dzemyda, Prof. Dr. Kurasova Olga.

Assistants: Dr. M. Sabaliauskas, Dr. D. Stumbrienė.

Junior assistants: Dr. I. Katin, Dr. L. Ringienė, Ž. Vaišnoras.

Other staff: R. Gipiškis, L. Mikalauskienė, V. Palkevič, Dr. L. Ringienė, Dr. M. Sabaliauskas, A. Šubonienė, V. Tiešis.

Doctoral students: D. Breskuvienė, V. Bulavas, R. Gipiškis, P. Gudžius, M. Karaliutė, G. Krasauskas, N. Kondrat, M. Motiejauskas, I. Pocius, R. Puronaitė, Ž. Vaišnoras, R. Vaišnorė.

RESEARCH INTERESTS

Artificial neural networks

Big data

Bioinformatics

Data mining

Deep learning

Global optimization methods
Multi-objective optimization
Image analysis, feature detection, image reconstruction, medical image processing
Internet data mining
Fractal dimensionality
Local optimization methods
Machine learning
Medical data analysis and decision support
Multiple criteria decision support
Operations research
Optimal control applications
Parallel computing
Simulation models in epidemiology, education, economics, and energy with uncertainty
Statistical simulation
Stochastic programming
Swarm intelligence
Visualization of multidimensional data
Web service development
Psychology in multiple criteria decisions

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Developing cognitive computing capabilities for data visualisation, image analysis and decision-making. Prof. Habil. Dr. G. Dzemyda, Prof. Dr. O. Kurasova. 2020–2022.

Main publications:

1. Dzemyda, G., Sabaliauskas, M. (2021). Geometric multidimensional scaling: A new approach for data dimensionality reduction. *Applied Mathematics and Computation*, Vol. 409, 125561. DOI: [10.1016/j.amc.2020.125561](https://doi.org/10.1016/j.amc.2020.125561)
2. Gudžius, P.; Kurasova, O.; Darulis, V.; Filatovas, E. Deep learning-based object recognition in multispectral satellite imagery for real-time applications. *Machine Vision and Applications*. New York : Springer. ISSN 0932-8092. eISSN 1432-1769. 2021, vol. 32, no. 4, art. no. 98, p. [1-14]. DOI: [10.1007/s00138-021-01209-2](https://doi.org/10.1007/s00138-021-01209-2).
3. Melnik-Leroy, G.A., Dzemyda, G. (2021). How to influence the results of MCDM? – Evidence of the impact of cognitive biases. *Mathematics*, **9** (2), 121. DOI: [10.3390/math9020121](https://doi.org/10.3390/math9020121)
4. Melnik, G.A., Peperkamp, S. (2021). High-Variability Phonetic Training enhances second language lexical processing: evidence from online training of French learners of English. *Bilingualism Language and Cognition*, 1–10. DOI: [10.1017/S1366728920000644](https://doi.org/10.1017/S1366728920000644)

National Research Projects

Research Council of Lithuania. **Geometric Method for Solving the Problem of Multidimensional Scaling.** No. MSF-LMT-4. Prof. Habil. Dr. G. Dzemyda. 2019–2022.

The main goal of the project is to consider the stress function and multidimensional scaling, in general, the geometric point of view, and to develop the so-called Geometric MDS that creates a basis for a new class of algorithms to minimize the MDS stress. The new interpretation of the stress

allows finding the proper step size, and the descent direction forwards the minimum of the stress function analytically if we consider and move a separate point of the projected space.

Main publications:

1. **Dzemyda, Gintautas; Sabaliauskas, Martynas.** Geometric multidimensional scaling: A new approach for data dimensionality reduction // *Applied mathematics and computation*. New York : Elsevier Science. ISSN 0096-3003. eISSN 1873-5649. 2021, vol. 409, art. no.125561, p. [1-14]. DOI: [10.1016/j.amc.2020.125561](https://doi.org/10.1016/j.amc.2020.125561). [DB: Compendex; Zentralblatt MATH (zbMATH); Academic Search Premier; Scopus; Science Citation Index Expanded (Web of Science)]
2. **Dzemyda, Gintautas; Sabaliauskas, Martynas** (2021). New capabilities of the geometric multidimensional scaling. In A. Rocha et al. (Eds.): *Trends and Applications in Information Systems and Technologies. WorldCIST 2021. Advances in Intelligent Systems and Computing*, Vol 1366. Springer, Cham. pp. 264–273.

Research Council of Lithuania. **Effectiveness and Efficiency Analysis of Education Systems in EU Countries Employing Secondary Big Data (EFECTAS)** (No. DOTSUT-39 (09.3.3-LMT-K-712-01-0018) / LSS-250000-57) Dr. A. Jakaitienė. 2018–2022.

The main idea of the project is to assess the factors influencing the effectiveness and efficiency of the EU education systems, to develop effectiveness and efficiency measuring instruments in order to implement sound evidence-based educational policy.

The focus of the analysis was on two types of centralised national examinations (the 10th grade tests and Matura examination) that are being carried out in Lithuania for two decades. The purpose of the research is to analyze the assessments of mathematics and the Lithuanian language and literature for the entire Lithuanian secondary school population that do not have sampling errors while considering the factors of location, school ownership, and gender as important indicators when judging educational effectiveness in terms of quality and equity. We analyse the results of the 10th grade tests for the 2011–2015 period and the results of the same cohorts participating in the Matura examination. The conclusions drawn from national assessment data are somewhat different from international data; thus one cannot neglect national information for the development of educational policy. The variables analysed in the analysis have limited predictive power for achievements in both mathematics and the Lithuanian language and literature, and further analysis is required.

Main publications:

1. Jakaitienė, A., Želvys, R., Vaitekaitis, J., Raižienė, S., ir Dukynaitė, R. (2021). Centralised mathematics assessments of Lithuanian secondary school students: population analysis. *Informatics in Education*, 20(3), 439--462.
2. Želvys, R., Raižienė, S., Vaitekaitis, J., Dukynaitė, R., ir Jakaitienė, A. (2021). Centralised Lithuanian language and literature assessments of secondary school students: population analysis. *Pedagogika*, 141(1), 125--145.

Research Council of Lithuania. **Correcting misperceptions of Covid-19 data: an Innovative E-platform CognitiveSTATS for Training Statistical Intuitions in the General Public** (No. 01.2.2-LMT-K-718-05-0042), Dr. G. A. Melnik-Leroy. 2021/11-2023/09

The objective of this project is to create a prototype of the innovative e-platform for statistical intuition training in the general public, cognitiveSTATS, which will help to correct misperceptions of Covid-19 data. In order to implement this project, two activities have been planned: 1. to carry out scientific research and experiments in order to identify the most important problems in Covid-19 data interpretation (statistical and / or cognitive) and the most effective ways of training statistical intuitions; 2.

based on the results of this research, to develop and test a prototype of the public's statistical intuition training platform. The platform CognitiveSTATS will help people understand some crucial phenomena inherent to the pandemic situation (the spread of the infection, the effectiveness of safety measures and vaccines, the probability to get infected, the economic consequences of the pandemic etc.) and evaluate more critically data and information, spreading in the public sphere, including those shared on social media. In order to ensure the effectiveness and the attractiveness of the platform, three innovative milestones will be used for its development: evidence from cognitive science, principles of gamification, and visualizations of Covid-19 data. In this way, the project aims at educating the society, training their skills, and as a consequence, significantly influencing the attitudes and behavior of the public. The research carried out during the project and the developed prototype of the e-platform will be presented in international-level scientific articles. Given that the project idea is adaptable to future pandemic or crisis situations and that population attitudes and behavior are an essential factor in managing any emergency situation, CognitiveSTATS has a long-term perspective and can be widely applied in a data-driven world.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

University of Almeria (Spain)
University College London (UK)
Bar-Ilan University (Israel)
University of Ferrara (Italy)
Southwestern University of Finance and Economics (China)
Belarus State University (Belorussia)
University of Calabria (Italy)
National Cancer Institute of Lithuania
Hospital of Lithuanian University of Health Sciences *Kauno klinikos* (Lithuania)
Maribor University (Slovenia)
Vilnius University Hospital Santaros Kinikos (Lithuania)
Ecole Normale Supérieure (France)

OTHER RESEARCH ACTIVITIES

Prof. Habil. Dr. G. Dzemyda –

- member of Lithuanian Academy of Science, <http://lma.lt> ;
- recently elected as the head of Division of Technical Sciences of the Lithuanian Academy of Sciences;
- member of programme committees of the international conferences:
 - The WorldCist'21 - 9th World Conference on Information Systems and Technologies;
 - ESSE 2021, 2nd European Symposium on Software Engineering;
 - IEEE INISTA 2021, International Conference on INnovations in Intelligent SysTems and Applications (INISTA);
 - SENSORNETS 2021 : 10th International Conference on Sensor Networks;
- chairman of the 12th International Workshop *Data Analysis Methods for Software Systems*, Druskininkai, Lithuania, 2021, <http://www.mii.lt/DatAMSS/> ;
- editor-in-Chief of
- *Baltic Journal of Modern Computing* <http://www.lu.lv/baltic-journal-of-modern-computing/>;
- international journal *Informatica* (IOSPress/VU), <https://www.mii.lt/Informatica/> ;
- editorial board member of 8 international journals: *Financial Innovation*; *International Journal of Computers*; *Communications and Control*; *Applied Computer Systems*; *Informatics in Education*; *Journal of Civil Engineering and Management*; *Nonlinear*

Analysis: Modelling and Control; Mathematics and Informatics. Journal of the Belarusian State University;

- member of IFIP Technical Committee 12 Artificial Intelligence; <http://www.ifiptc12.org.uk/ifiptc12/members.php> ;
- member of Lithuanian Computer Society, <http://www.liks.lt/> ;
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/> ;
- member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/> .

Prof. Dr. O. Kurasova –

- member of editorial boards of international journals:
 - *Nonlinear Analysis: Modelling and Control*, <http://www.mii.lt/NA/> ,
 - *Information Technology and Control*, <https://itc.ktu.lt/index.php/ITC/about/editorialTeam> ;
 - *Baltic Journal of Modern Computing*, <http://www.lu.lv/baltic-journal-of-modern-computing/editorial-board/> ,
 - *Computational Science and Techniques*, <http://journals.ku.lt/index.php/CST/about/editorialTeam> ,
 - *Informatics*, <https://www.mdpi.com/journal/informatics/editors> ;
- member of Association for Computing Machinery, <https://www.acm.org/>
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/> ;
- member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/> .

Prof. Dr. A. Jakaitienė –

- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/index.html> ;
- board member of Lithuanian Statistics Society, <http://www.statistikusajunga.lt/> ;
- member of International Biometric Association, <https://www.biometricsociety.org> ;
- country representative of International Biometric Association in Nord Baltic Region, <http://ibsnbr.org> ;
- country representative at European Statistical Advisory Committee, <https://ec.europa.eu/eurostat/web/european-statistical-advisory-committee-esac> .

Dr. R. Karbauskaitė –

- managing editor of *Informatica* (IOSPress/VU), <https://informatica.vu.lt/journal/INFORMATICA/information/INFORMATICA-Editorial>

Prof. Dr. K. Dučinskas

- board member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/index.html> ;
- board member of Lithuanian Statistics Society, <http://www.statistikusajunga.lt/> ;
- member of International Biometric Association, <https://www.biometricsociety.org> ;

Dr. G. A. Melnik-Leroy

- member of the Cognitive Science Society
 - member of the programme committee of the international conference: New Sounds 2021
-

CYBER-SOCIAL SYSTEMS ENGINEERING GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9306

E-mail: saulius.gudas@mii.vu.lt

www: <https://www.mii.lt/en/structure/scientific-groups/cyber-social-systems-engineering-group>

Head – Prof. Dr. *Saulius Gudas*

STAFF

Professor: Prof. Dr. Saulius Gudas.

Senior research fellow: Prof. Dr. Dalė Dzemydienė.

Research fellows: Dr. Romas Alonderis, Assoc. Prof. Dr. Audronė Lupeikienė, Dr. Saulius Maskeliūnas.

Junior research fellow: Arūnas Miliauskas.

Assistant professors: Dr. Jolanta Miliauskaitė, Dr. Asta Slotkienė.

Assistant research fellow: Laima Paliulionienė.

Affiliated professor: Prof. Dr. Albertas Čaplinskas.

Affiliated researchers: Prof. Habil. Dr. Stasys Jukna, Assoc. Prof. Habil. Dr. Regimantas Pliuškevičius, Assoc. Prof. Dr. Aida Pliuškevičienė.

Doctoral students: Vytautas Radzevičius, Karolis Noreika.

RESEARCH INTERESTS

Causality driven enterprise application software (EAS) engineering methods:

- Foundations of causality-based enterprise software engineering;
- Integration of causal models in the MDA / MDD and Agile processes;
- Causal modeling of enterprise management activities and business processes;
- Model based applications and development (MBD) methods for different types of domains (enterprises, Internet of Things, smart systems, etc.);

Mathematical logic:

- Automated deduction;
- Knowledge analysis methods;
- Deductive systems.

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Research of cyber-social systems and development of engineering methods at the intersection of cyber-physical and cyber-social systems

Prof. Dr. S. Gudas (leader), Dr. R. Alonderis, Prof. Dr. D. Dzemydienė, Assoc. Prof. Dr. A. Lupeikienė, Dr. S. Maskeliūnas, Dr. J. Miliauskaitė, Dr. A. Slotkienė, A. Miliauskas, L. Paliulionienė, Affil. Prof. Dr. A. Čaplinskas, Affil. Assoc. Prof. Habil. Dr. R. Pliuškevičius, Affil. Assoc. Prof. Dr. A. Pliuškevičienė, Affil. Habil. Dr. S. Jukna, doctoral students V. Radzevičius, K. Noreika. 2021–2023.

Main results obtained in 2021:

1. Application of domain causality modeling (S. Gudas, K. Noreika, A. Lupeikienė):
Modification of the Agile management process by supplementing it with causal models to specify interactions between activities in the Agile hierarchy.
2. A dynamic fuzzification approach for interval type-2 membership function development, a detailed example by modeling service quality characteristics has been provided (J. Miliauskaitė)

3. The methodology for development of infrastructure of provision smart services and the system architecture on the base of wireless computer networks was proposed, applicable for domains of cargo transportation and monitoring of water resources (D. Dzemydienė, S. Maskeliūnas, A. Miliauskas).

Main publications:

1. **Gudas, Saulius**. Causal modelling in enterprise architecture frameworks // *Informatica*. Vilnius : Vilniaus universiteto leidykla. ISSN 0868-4952. eISSN 1822-8844. 2021, vol. 32, no. 2, p. 247-281. DOI: [10.15388/21-INFOR446](https://doi.org/10.15388/21-INFOR446). [Science Citation Index Expanded (Web of Science); Scopus; Zentralblatt MATH (zbMATH)] [IF: 2,688; AIF: 2,773; IF/AIF: 0,969; Q1 (2020, InCites JCR SCIE)] [CiteScore: 5,00; SNIP: 0,927; SJR: 0,436; Q1 (2020, Scopus Sources)] [M.kr.: T 007]
2. Kalibatienė, Diana; **Miliauskaitė, Jolanta**. A dynamic fuzzification approach for interval type-2 membership function development: case study for QoS planning // *Soft computing*. New York : Springer. ISSN 1432-7643. eISSN 1433-7479. 2021, vol. 25, iss. 16, p. 11269-11287. DOI: [10.1007/s00500-021-05899-8](https://doi.org/10.1007/s00500-021-05899-8). [Science Citation Index Expanded (Web of Science); Scopus] [IF: 3,643; AIF: 4,656; IF/AIF: 0,782; Q2 (2020, InCites JCR SCIE)] [CiteScore: 5,10; SNIP: 1,463; SJR: 0,626; Q1 (2020, Scopus Sources)] [M.kr.: T 007]
3. Kalibatienė, Diana; **Miliauskaitė, Jolanta**. A hybrid systematic review approach on complexity issues in data-driven fuzzy inference systems development // *Informatica*. Vilnius : Vilnius University. ISSN 0868-4952. eISSN 1822-8844. 2021, vol. 32, iss. 1, p. 85-118. DOI: [10.15388/21-INFOR444](https://doi.org/10.15388/21-INFOR444). [Social Sciences Citation Index (Web of Science); Science Citation Index Expanded (Web of Science); Scopus] [IF: 2,688; AIF: 2,773; IF/AIF: 0,969; Q1 (2020, InCites JCR SCIE)] [CiteScore: 5,00; SNIP: 0,927; SJR: 0,436; Q1 (2020, Scopus Sources)] [M.kr.: T 007]
4. Kalibatienė, Diana; **Miliauskaitė, Jolanta; Dzemydienė, Dalė; Maskeliūnas, Saulius**. Development of a Fuzzy Inference Based Solar Energy Controller for Smart Marine Water Monitoring // *Informatica*, 2021, vol. 32, Issue 4, DOI: [10.15388/21-INFOR470](https://doi.org/10.15388/21-INFOR470).
5. **Dzemydienė, Dalė; Burinskienė, Aurelija**. Integration of context awareness in smart service provision system based on wireless sensor networks for sustainable cargo transportation // *Sensors: Special Issue Artificial Intelligence and Internet of Things in Autonomous Vehicles*. Basel : MDPI. ISSN 1424-8220. eISSN 1424-8220. 2021, vol. 21, iss. 15, art. no. 5140, p. 1-22. DOI: [10.3390/s21155140](https://doi.org/10.3390/s21155140)

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

Riga Technical University (Latvia)
University of Tartu (Estonia)
Warsaw University of Technology (Poland)
Systems Research Institute Polish Academy of Sciences
University of Geneva (Switzerland)
University of Frankfurt (Germany)

OTHER SCIENTIFIC ACTIVITIES

Prof. Dr. Saulius Gudas

- reviewer of the *Baltic Journal of Modern Computing*, <http://www.bjmc.lu.lv/>;
- reviewer of the journal *Informatica*, <https://www.mii.lt/informatica/>;
- reviewer of the journal *Information Systems and e-Business Management*, <https://www.springer.com/journal/10257>

- member of the Technical Committee TK8 of the Lithuanian Standardization Department;
- IFIP TC8 Information Systems member;
- representative of the National Digital Coalition from LIKS;
- program committee member of the 15th International Baltic Conference on Digital Business and Intelligent Systems (Baltic DB&IS 2022), Riga, Latvia, 4–6 July 2022, <https://dbis2022.lu.lv/about/organisation/>
- program committee member of the ManComp 2021 Workshop <https://wwwswt.informatik.uni-rostock.de/ManComp2021/program>
- program committee member of the 27th International Conference on Information and Software Technologies, ICIST 2021, held in Kaunas, Lithuania, <https://en.ktu.edu/events/27th-international-conference-on-information-and-software-technologies-icist-2021/>

Prof. Dr. Dalė Dzemydienė

- editorial board member of the *Scientific Journal of Riga Technical University: Applied Computer Systems*, <https://acs-journals.rtu.lv/>;
- editorial board member of the *International Journal of Electronic Security and Digital Forensics*, <https://www.inderscience.com/jhome.php?jcode=ijesdf>;
- editorial board member of the *International Journal of Strategic Property Management*, <https://journals.vgtu.lt/index.php/IJSPM/editorialboard> ;
- program committee member of the 15th International Baltic Conference on Digital Business and Intelligent Systems (Baltic DB&IS 2022), Riga, Latvia, 4–6 July 2022, <https://dbis2022.lu.lv/about/organisation/> ;
- program committee member of the International Conference ALTA'21 “Advanced Learning Technologies and Applications”, Kaunas, Lithuania, December 1, 2021, <https://ndma.lt/alta2021/en/programme-committee/> ;
- member of the Council of the Lithuanian Computer Society (LIKS);
- head of the Section of Legal Informatics at the Lithuanian Computer Society (LIKS);
- member of the Council of the Lithuanian Operation Research Society, <https://www.mii.lt/litors/index.php?page=council.en> ;
- member of the European Artificial Intelligence Association;
- member of the European Operation Research Association.

Assoc. Prof. Dr. Audronė Lupeikienė

- editorial board member of the *Scientific Journal of Riga Technical University: Applied Computer Systems*, <https://acs-journals.rtu.lv/> ;
- steering committee and program committee member of the 15th International Baltic Conference on Digital Business and Intelligent Systems (Baltic DB&IS 2022), <https://dbis2022.lu.lv/about/organisation/> ;
- program committee member of the 14th International Conference on Agents and Artificial Intelligence (ICAART 2022), <http://www.icaart.org/> .

Dr. Saulius Maskeliūnas

- chairman of the Council of the Lithuanian Computer Society <https://www.liks.lt/en/contacts/>;
- head of the Technical Committee TK4 “Information technology” of the Lithuanian Standards Board LST;
- member of the Rules of Participation (RoP) working group of the European Open Science Cloud (EOSC), <https://www.eoscsecretariat.eu/working-groups/rules-participation-working-group> ;

- Lithuania representative at the International Federation for Information Processing (IFIP) https://ifip.org/index.php?option=com_content&task=view&id=125&Itemid=441&ref=25 ;
- International AIQT Foundation Advisory Board member (in Artificial Intelligence) <https://www.inaiqt.com/about/foundation-advisory-board/> ;
- member of the Ministry of Transport and Communications project "Development of New Generation Internet Access Infrastructure (RAIN-3)" Steering Committee;
- program committee member of the 15th International Baltic Conference on Digital Business and Intelligent Systems (Baltic DB&IS 2022), <https://dbis2022.lu.lv/about/organisation/> ;
- member of the State Commission of the Lithuanian Language Sub-Commission of Language Technologies.

Laima Paliulionienė

- organizing committee member of the 12th International Workshop on Data Analysis Methods for Software Systems (DAMSS), Druskininkai, Lithuania, December 2–4, 2021, <https://www.mii.lt/damss/index.php/organizers>.

Prof. Habil. Dr. Stasys Jukna

- scientific board member of the *Electronic Colloquium on Computational Complexity* (ECCC), http://eccc.hpi-web.de/colloquium/scientific_board/;
- editorial board member of the *Lithuanian Mathematical Journal*, <https://www.mii.lt/en/lithuanian-mathematical-journal#editorial-board>.

Assoc. Prof. Habil. Dr. Remigijus Pliuškevičius

- editorial board member of the *Lithuanian Mathematical Journal*, <https://www.mii.lt/en/lithuanian-mathematical-journal#editorial-board>.

EDUCATION SYSTEM GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9732

E-mail: valentina.dagiene@mii.vu.lt

<https://www.mii.lt/struktura/moksliniai-padaliniai/educaciniu-sistemu-grupe>

Head – Prof. Dr. *Valentina Dagiene*

STAFF

Chief research fellow: Prof. Dr. V. Dagiene

Senior research fellow: Dr. T. Jevsikova

Research fellows: Dr. A. Juškevičienė, Dr. V. Dolgopolovas.

Other: Dr. G. Stupurienė

Doctoral students: T. Šiaulyš, V. Masiulionytė-Dagiene

Affiliated senior research fellows: Assoc. Prof. Dr. G. Grigas, Dr. L. Markauskaitė.

RESEARCH INTERESTS

- Application of intelligent technologies in education
- Computer science (Informatics) education research

- Computing engineering education research
- Software localisation
- Technology enhanced learning

RESEARCH THEME FOR 2021-2023:

Research on educational environments and technologies to improve the quality of education.
Prof. Dr. V. Dagienė, 2021–2023.

Main objective of the theme: To study the problems of designing, integrating and personalising interactive educational environments and technologies in education.

Main publications:

Jevsikova, Tatjana; Stupurienė, Gabrielė; Stumbrienė, Dovilė; Juškevičienė, Anita; Dagienė, Valentina. Acceptance of distance learning technologies by teachers: determining factors and emergency state influence // *Informatica*. Vilnius: Vilniaus universiteto leidykla. ISSN 0868-4952. eISSN 1822-8844. 2021, vol. 32, no. 3, p. 517-542. DOI: [10.15388/21-INFOR459](https://doi.org/10.15388/21-INFOR459). [Zentralblatt MATH (zbMATH); Scopus; Science Citation Index Expanded (Web of Science)] [Indėlis: 1,000] [Citav. rod.: 2.688 (2020, SCIE)] [M.kr.: N 001,T 007]

Juškevičienė, Anita; Dagienė, Valentina; Dolgopolas, Vladimiras. Integrated activities in STEM environment: methodology and implementation practice // *Computer applications in engineering education*. Hoboken : Wiley. ISSN 1061-3773. eISSN 1099-0542. 2021, vol. 29, no. 1, p. 209-228. DOI: [10.1002/cae.22324](https://doi.org/10.1002/cae.22324). [Science Citation Index Expanded (Web of Science); Scopus] [Indėlis: 0,334] [Citav. rod.: 1.532 (2020, SCIE)] [M.kr.: S 007]

Juškevičienė, Anita; Stupurienė, Gabrielė; Jevsikova, Tatjana. Computational thinking development through physical computing activities in STEAM education // *Computer applications in engineering education: Special Issue: Computational thinking: Enhancing STEAM and engineering education, from theory to practice*. Hoboken:Wiley. ISSN 1061-3773. eISSN 1099-0542. 2021, vol. 29, iss. 1, p. 175-190. DOI: [10.1002/cae.22365](https://doi.org/10.1002/cae.22365). [Compendex; INSPEC; Scopus; Science Citation Index Expanded (Web of Science)] [Indėlis: 1,000] [Citav. rod.: 1.532 (2020, SCIE)] [M.kr.: S 007,T 007,N 009]

International Research Projects

2020-2024 m. **COST: EUGAIN - CA19122** European Network for Gender Balance in Informatics. (**Dr. V. Dagienė, Dr. Anita Juškevičienė**)

Research Council of Lithuania. Research internship. **Using Constructivism, and Project and Challenge Driven Pedagogy for learning Computational Thinking**. Dr. A. Juškevičienė, 2020-2021.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

Ankara University (Turkey)
ETH Zurich (Switzerland)
Lancaster University (UK)
Radboud University Nijmegen (The Netherlands)
Turku University (Finland)

OTHER RESEARCH ACTIVITIES

Prof. Dr. V. Dagienė –

- editor-in-Chief of the journal *Informatics in Education*, <https://infedu.vu.lt/journal/INFEDU> (Clarivate Analytics Web of Science Core Collection; Scopus; etc.);

- editor-in-Chief of the journal *Olympiads in Informatics* (Scopus, etc), <https://ioinformatics.org/page/loi-journal-editorial-board/2> ;
- area editor (Computing Didactics) of the *Baltic Journal of Modern Computing*, <https://www.bjmc.lu.lv> (Clarivate Analytics Web of Science Core Collection; Scopus; etc.);
- editorial board member of the journals: *International Journal of Digital Literacy and Digital Competence*; *International Journal of Instruction*; *Acta Paedagogica Vilnensia*;
- guest co-editor of the *Computer Applications in Engineering Education* (Wiley), Special Issue on Computational Thinking for STEAM and Engineering Education, <https://onlinelibrary.wiley.com/journal/10990542> (Clarivate Web of Science Core Collection);
- coordinator of the Nordplus Network on Innovative Computing Engineering Education Research;
- representative of Lithuania in Education Committee TC3 under the International Federation for Information Processing (IFIP);
- member of Steering Committee of International Olympiads in Informatics: <https://ioinformatics.org/page/committees/6> ;
- chair of the Bebras Board (International Challenge on Informatics and Computational Thinking): <https://www.bebas.org/?q=community> .

Dr. V. Dolgopolas –

- guest co-editor of the *Computer Applications in Engineering Education* (Wiley), Special Issue on Computational Thinking for STEAM and Engineering Education, <https://onlinelibrary.wiley.com/journal/10990542> (Clarivate Web of Science Core Collection).

Dr. T. Jevsikova –

- member of International Federation for Information Processing (IFIP) TC3 WG 3.1 (Informatics for Secondary Education).

Dr. G. Stupurienė –

- Executive Editor of the journal *Informatics in Education*, <https://infedu.vu.lt/journal/INFEDU> (Clarivate Analytics Web of Science Core Collection; Scopus; etc.).

MOST IMPORTANT RESEARCH DISSEMINATION ACTIVITIES

Valentina Dagienė, Gabrielė Stupurienė, Tatjana Jevsikova organises International Challenge on Informatics and Computational Thinking “Bebras”, they create, translate, test tasks and develop methodological materials for teachers.

The international Bebras conference was held in Druskininkai (remotely), with over 60 countries participating (V. Dagienė).

The International Computer Science Olympiad in Singapore (remotely) was organised (V. Dagienė - member of the International Committee).

International journal “Informatics in Education” *Scopus* citation index 3.3 (2020 year), preliminary index of 2021 year – 3.8. *WoS* Journal Citation Indicator - 1,24 (not final).

Tatjana Jevsikova and Anita Juškevičienė have prepared methodologies for the Vilnius STEAM Centre, Laboratory of Robotics and Mobile Computing and Laboratory of Visual Programming.

GLOBAL OPTIMIZATION GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9304

E-mail: julius.zilinskas@mii.vu.lt

Head – Prof. Dr. *Julius Žilinskas*

STAFF

Principal research fellows: Prof. Dr. J. Žilinskas, Prof. Habil. Dr. A. Žilinskas.

Senior research fellows: Assoc. Prof. Dr. A. Lančinskas, Assoc. Prof. Dr. R. Pupeikis.

Doctoral students: S. Tautvaišas, M. Kepalas.

RESEARCH INTERESTS

Optimization and high-performance computing

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Global Optimization. Prof. Dr. J. Žilinskas.

The aim is development of global optimization algorithms and application of them to optimization problems.

The main results were: global optimization algorithms with constraints; heuristic algorithms for facility location problems; Bayesian global optimization; linear convolution computations online optimization algorithm.

Main publications:

Pupeikis, Rimantas. Joint tracking coefficients and the time delay of a nonstationary linear system preceded by a static nonlinearity // International journal of adaptive control and signal processing. Hoboken : John Wiley & Sons Ltd. ISSN 0890-6327. eISSN 1099-1115. 2021, vol. 35, no. 6, p. 941-964. DOI: [10.1002/acs.3233](https://doi.org/10.1002/acs.3233).

Žilinskas, J., Lančinskas, A. & Guarracino, M.R. Pooled testing with replication as a mass testing strategy for the COVID-19 pandemics. Sci Rep 11, 3459 (2021). DOI: [10.1038/s41598-021-83104-4](https://doi.org/10.1038/s41598-021-83104-4)

Zhigljavsky, Anatoly; Žilinskas, Antanas. Bayesian and high-dimensional global optimization. Cham : Springer Nature, 2021. 118 p. (SpringerBriefs in optimization, ISSN 2190-8354, eISSN 2191-575X). ISBN 9783030647117. eISBN 9783030647124. DOI: [10.1007/978-3-030-64712-4](https://doi.org/10.1007/978-3-030-64712-4).

National Research Projects

LMT MIP proposal “Solution of Competitive Facility Location Problems with Constraints Using High Performance Computing Systems”. Main proposer A. Lančinskas

International Research Projects

COST action proposal “Randomised Optimization Algorithms Research Network”. Secondary proposer A. Lančinskas

COST action proposal “The European Network for Data-Driven Decision Making”. Secondary proposer J. Žilinskas

MAIN RESEARCH ACHIEVEMENTS IN 2021

Heuristic algorithms for facility location problems.

Bayesian global optimization.

Linear convolution computations real time optimization algorithm.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

Universidad de Almería (Spain)

Universidad de Murcia (Spain)

Universidad de La Laguna (Spain)

University of Edinburgh (UK)

Università della Calabria (Italy)

Università degli Studi di Cassino e del Lazio Meridionale (Italy)

Cardiff University (UK)

New Jersey Institute of Technology (USA)

OTHER RESEARCH ACTIVITIES

Prof. Dr. J. Žilinskas –

- member of editorial boards of international journals:
 - *Computer Science* (AGH), <https://journals.agh.edu.pl/csci/about/editorialTeam> ;
 - *Informatica* (IOSPress/VU), <http://www.mii.lt/informatica/editors.htm> ;
 - *Information Technology and Control* (KTU), <http://itc.ktu.lt/index.php/ITC/about/editorialTeam> ;
 - *Journal of Global Optimization* (Springer), <https://www.springer.com/journal/10898/editors> ;
 - *Mathematical Methods of Operations Research* (Springer), <http://www.springer.com/mathematics/journal/186/PSE?detailsPage=editorialBoard> ;
 - *Mathematical Modelling and Analysis* (VGTU), <https://journals.vgtu.lt/index.php/MMA/editorialboard> ;
 - *Open Computer Science* (De Gruyter), <https://www.degruyter.com/view/j/comp> ;
 - *Open Engineering* (De Gruyter), <https://www.degruyter.com/view/j/eng> ;
 - *Optimization Letters* (Springer), <http://www.springer.com/mathematics/journal/11590?detailsPage=editorialBoard> ;
 - *SN Operations Research Forum* (Springer Nature), <https://www.springer.com/journal/43069/editors> .
- member of board of Lithuanian Operational Research Society (member society of EURO and IFORS), head of working group Optimization Methods and Applications, <http://www.mii.lt/LitORS/> ;
- member of European Network of Excellence on High Performance and Embedded Architecture and Compilation (HiPEAC), <http://www.hipeac.net> ;
- Chair of Program Committee:
 - WCGO2021 World Congress on Global Optimization, Athens, Greece
- member of Program/Scientific Committees:
 - 18th Workshop on Advances in Continuous Optimization, Toulouse, France,
 - 15th Learning and Intelligent Optimization (LION) conference, Athens, Greece

Prof. Habil. Dr. A. Žilinskas –

- member of IFIP working group WG 7.6 Optimization-Based Computer Aided Modeling and Design, <http://www.ifip.org/bulletin/bulltcs/memtc07.htm> ;
- member of American Mathematical Society, <http://www.ams.org/cml> ;
- member of programme committees 5 following International conferences;
- member of editorial boards of international journals:
 - *Journal of Global Optimization* (Springer), <http://www.springer.com/business+%26+management/operations+research/journal/10898?detailsPage=editorialBoard> ,
 - *Informatica* (IOSPress/VU), <http://www.mii.lt/Informatica/editors.htm> ,
 - *Control and Cybernetics*, <http://control.ibspan.waw.pl:3000/editors/list> ,
 - *Statistics, Optimization and Information Computing*, www.iapress.org/index.php/soic ,
 - *Journal of Intelligent Learning Systems and Applications*, <https://www.scirp.org/journal/jilsa/> ,
 - *International Journal of Grid and High Performance Computing*, <http://www.igi-global.com/Bookstore/TitleDetails.aspx?TitleId=1105&DetailsType=ReviewBoard> ,
 - *The Open Cybernetics and Systemics Journal*, <http://www.bentham.org/open/tocsj/EBM.htm> ,
 - *Baltic Journal of Modern Computing*; <http://www.bjmc.lu.lv/editorial-board/> .
- member of the Lithuanian Academy of Sciences, <http://www.lma.lt/akademijos-nariai-2019> .

Dr. A. Lančinskas –

- affiliate member of European Network of Excellence on High Performance and Embedded Architecture and Compilation (HiPEAC), <http://www.hipeac.net>

IMAGE AND SIGNAL ANALYSIS GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9328

E-mail: povilas.treigys@mii.vu.lt

Head – Assoc. Prof. Dr. *Povilas Treigys*

STAFF

Senior research fellows: Assoc. Prof., Dr. Povilas Treigys, Dr. G. Korvel, Assoc. Prof., Dr. G. Tamulevičius, Dr. Jolita Bernatavičienė

Affiliated research fellows: Prof. Habil. Dr. K. Kazlauskas, Prof. Habil. Dr. Adolfas Laimutis Telksnys.

Projects specialist: G. Navickas

Specialist: S. Virbukaitė

Doctoral students: B. Čiapas, J. Jucevičius, S. Virbukaitė, M. Danilovaitė, R. Jurkus, A. Vaitulevičius

Study staff: L. Aidokas, A. Rasmusson, J. Globienė, M. Liutvinavičius

RESEARCH INTERESTS

Audio and image signal processing; pattern recognition; robotics; machine learning; natural language processing; machine learning.

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Project title: Digital signal analysis and modelling.

Tasks in 2021:

- To develop deep learning models for sea traffic anomaly detection
- To develop autoencoder based collagen network extraction deep learning model in WSI images.
- To investigate deep learning models for Lombard effect analysis.
- To prepare prostate MRI cancerous zones detection application.
- To develop short period forecast model of COVID-19 infection spread.

Main results:

- Developed semi-supervised and unsupervised machine learning methods for sea traffic anomaly detection.
- Developed tumor microenvironment-oriented digital pathology methods for whole slide image segmentation and classification.
- Evaluation of Lombard speech models in the context of speech in noise enhancement.
- Application prepared and submitted for funding.
- Developed attention-based and time series models for short-term forecasting of COVID-19 spread.

Main publications:

1. Morkūnas, Mindaugas; Žilėnaitė, Dovilė; Laurinavičienė, Aida; Treigys, Povilas; Laurinavičius, Arvydas. Tumor collagen framework from bright-field histology images predicts overall survival of breast carcinoma patients // Scientific reports. Berlin : Nature research. ISSN 2045-2322. 2021, vol. 11, no. 1, art. no. 15474, p. [1-13]. DOI: [10.1038/s41598-021-94862-6](https://doi.org/10.1038/s41598-021-94862-6).
2. Korvel, Gražina; Treigys, Povilas; Kostek, Božena. Highlighting interlanguage phoneme differences based on similarity matrices and convolutional neural network // Journal of the Acoustical Society of America. Melville : Acoustical Society of America. ISSN 0001-4966. eISSN 1520-8524. 2021, vol. 149, iss. 1, p. 508-523. DOI: [10.1121/10.0003339](https://doi.org/10.1121/10.0003339).
3. Markevičiūtė, Jurgita; Bernatavičienė, Jolita; Levulienė, Rūta; Medvedev, Viktor; Treigys, Povilas; Venskus, Julius. Attention-based and time series models for short-term forecasting of COVID-19 spread // CMC-Computers, materials & continua. Henderson, NV : TECH Science Press. ISSN 1546-2218. eISSN 1546-2226. 2022, vol. 70, no. 1, p. 695-714. DOI: [10.32604/cmc.2022.018735](https://doi.org/10.32604/cmc.2022.018735).

National Research Projects

- Nuasmenintų akių dugnų vaizdų bazės kūrimas. Vilnius Region Biomedical Research Committee approval no.:158200-18/11-1057-572, project duration 11-2018 – 10-2030.
- Postdoctoral Project “Investigating speech in the presence of noise interferences employing signal processing and machine learning methods”, 2021-07-2023.07.

International Research Projects

H2020National Competence Centres in the framework of EuroHPC, Project duration 2020-9-1 – 2022-8-31, Project Reference: 951732.

- Within the EuroCC project under the European Union’s Horizon 2020 (H2020), participating countries are tasked with establishing a single National Competence Centre (NCC) in the area of high-performance computing (HPC) in their respective countries. These NCCs will coordinate activities in all HPC-related fields at the national level and

serve as a contact point for customers from industry, science, (future) HPC experts, and the general public alike. The EuroCC project is funded 50 percent through H2020 ([EuroHPC Joint Undertaking](#) [JU]) and 50 percent through national funding programs within the partner countries. The EuroCC activities—with 33 member and associated countries on board—is coordinated by the High-Performance Computing Center Stuttgart (HLRS). The project aims to elevate the participating countries to a common high level in the fields of **HPC, HPDA and artificial intelligence (AI)**. To this end, the EuroCC project will establish National Competence Centres (NCCs) in the participating countries, which will be responsible for surveying and documenting the core HPC, HPDA, and AI activities and competencies in their respective countries. Ultimately, the goal is to make HPC available to different users from science, industry, public administration, and society.

COST action CA18231 "Multi3Generation: Multi-task, Multilingual, Multi-modal Language Generation", Member of Managing Committee Dr. G. Korvel 2019-2023

- Language generation (LG) is a crucial technology if machines are to communicate with humans seamlessly using human natural language. A great number of different tasks within Natural Language Processing (NLP) are language generation tasks, and being able to effectively perform these tasks implies (1) that machines are equipped with world knowledge that can require multi-modal processing and reasoning (e.g. textual, visual and auditory inputs, or sensory data streams), and (2) the study of strong, novel Machine Learning (ML) methods (e.g. structured prediction, generative models), since virtually all state-of-the-art NLP models are learned from data. Moreover, human languages can differ wildly in their surface realisation (i.e. scripts) as well as their internal structure (i.e. grammar), which suggests that multilinguality is a central goal if machines are to perform seamless language generation. Language generation technologies would greatly benefit both public and private services offered to EU citizens in a multilingual Europe and have strong economic and societal impacts.

Main results:

- Machine learning algorithms for tumour classification.
- Feature space analysis for machine based recognition.
- Machine learning algorithms for multiscale data analysis.
- Machine learning methods for language generation.
- Efficient deployment of fractal theory to industry applications.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INNOVATION) PARTNERS

- Hospital Kauno klinikos of Lithuanian University of Health Sciences (Lithuania)
- Vilnius University Hospital Santaros klinikos (Lithuania)
- National Cancer Institute (Lithuania)
- Brno University of Technology (Czech Republic)
- Gdansk University of Technology, Faculty of Electronics, Telecommunications and Informatics, Audio Acoustics Laboratory
- Aveiro University, Portugal

OTHER RESEARCH ACTIVITIES

Assoc. Prof. Dr. P. Treigys –

- reviewer of the journals:

- *Informatica*, <http://www.mii.lt/informatica>;
- *Modelling and Control Journal*, <http://www.mii.lt/NA>;

Prof. Habil. Dr. A. L. Telksnys –

- member of Council on Digitization of Lithuanian Cultural Heritage;
- board member of the Ministry of Culture of the Republic of Lithuania Archives;
- member of the IEEE Technical Committee on eHealth;
- member of the Working group WG 7.1 Modeling and Simulation of the International Federation of Information Processing (IFIP);
- member of the Lithuanian Academy of Sciences;
- member of Commission of the Seimas of the Republic of Lithuania on Lithuanian traditions and heritage actualization;
- editorial board member of the international journals: *Informatica*, <http://www.mii.lt/Informatica/editors.htm>; *Information Technology and Control*, <http://www.itec.ktu.lt/index.php/ITC/about/editorialTeam>; *Tamkang Journal of Science and Engineering*, http://www2.tku.edu.tw/~tkjse/editorial_board-en.htm;
- editorial board member of the journal *Informacijos mokslai*, <http://www.leidykla.vu.lt/lt/mokslo-darbai/informacijos-mokslai/informacijos-mokslai-2011-55-tomas/redaktoriu-kolegija/>;
- Prepared the Concept of Lithuanian speech into Electronic Media Research Development in 2014–2020 *LIEPA 2*.

Prof. Habil. Dr. K. Kazlauskas –

- member of Lithuanian Computer Society, <http://www.liks.lt>;
- member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>;
- reviewer of international journals:
 - *IEEE Trans. On Signal Processing*;
 - *IEEE Trans. On Circuits and Systems*;
 - *Informatica*;
 - *Information Technology and Control*.

Assoc. Prof. Dr. G. Tamulevičius –

- reviewer for the international journals:
 - *Informatica*, <http://www.mii.lt/Informatica/>;
 - *Baltic Journal of Modern Computing*, www.lu.lv/baltic-journal-of-modern-computing ;
 - *Nonlinear Analysis: Modelling and Control Journal*, <http://www.mii.lt/NA>;
 - *IEEE Access*, *IEEE Access*.
 - *Neurocomputing* <https://www.journals.elsevier.com/neurocomputing>
 - *IEEE Journal of Biomedical and Health Informatics* <https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=6221020>
 - *International Journal of Applied Mathematics and Computer Sciences* <https://www.amcs.uz.zgora.pl/>
- member of IEEE Computer society and Signal processing society sections.

Dr. G. Korvel –

- Member of Lithuanian Computer Society, <http://www.liks.lt>;

- Member of Lithuanian Society of Young Researchers. <http://www.ljms.lt/>;
- Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- Editorial board member:
 - A member of editorial board of The Journal of Intelligent Information Systems
- Reviewer of international journals:
 - *Journal of the Audio Engineering Society* www.aes.org/journal/;
 - *Archives of Acoustics* acoustics.ippt.gov.pl;
 - *Metrology and Measurement Systems* <http://www.metrology.pg.gda.pl/>;
 - *Journal of Intelligent Information Systems* <https://link.springer.com/journal/10844>;
 - *Information Technology and Control* <http://itc.ktu.lt/>;
 - *Informatica* www.mii.lt/informatica;
 - *Pattern Recognition Letters* www.journals.elsevier.com/speech-communication;
 - *Speech Communication* www.journals.elsevier.com/speech-communication;
 - *Symmetry* <https://www.mdpi.com/journal/symmetry>
 - *Applied Sciences* <https://www.mdpi.com/journal/applsci>
 - *Electronics* <https://www.mdpi.com/journal/electronics>

Dr. J. Bernatavičienė –

- Managing Co-editor of Baltic Journal of Modern Computing, <http://www.bjmc.lu.lv/editorial-board/>;
- Member of Lithuanian Computer Society (Artificial Intelligence Section), <http://www.liks.lt/>;
- Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>;
- Member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>;
- Reviewer of international journals:
 - *Informatica (IOSPress/VU)*,
 - *Baltic Journal of Modern Computing*
 - *Sensors*
 - *Applied Sciences*
 - *Journal of Marine Science and Engineering*

G. Navickas –

- Member of Lithuanian Computer Society, <http://www.liks.lt/>;
- Member of IEEE <http://www.ieee.org/>;

INTELLIGENT TECHNOLOGIES RESEARCH GROUP

4 Akademijos, LT-08663 Vilnius.

Tel. 210 9311

E-mail: virginijus.marcinkevicius@mii.vu.lt

Head – Dr. *Virginijus Marcinkevičius*

STAFF

Senior researchers: Dr. Virginijus Marcinkevičius, Prof. Dr. Saulius Minkevičius, Prof. Dr. Darius Plikynas, Prof. Dr. Igoris Belovas.

Affiliated researchers: Prof. Habil. Dr. Leonidas Sakalauskas, Dr. Stasys Steišūnas,

Junior researcher: Chaževskas Andrius

Professors: Dr. Igoris Belovas.

Doctoral students: Chaževskas Andrius, Dulskis Vytautas, Gričius Rolandas, Šiktorov Pavel, Stankevičius Mantas, Urbonaitė Neringa, Vaitkevičius Paulius.

RESEARCH INTERESTS

Machine learning and its application.

Artificial intelligence and its application.

Natural language processing.

Cyber security.

Mathematical modeling.

Image analysis.

Data mining and visualization.

Application of modeling, classification and clustering methods in medicine (e.g. in genetics) and economics.

Optimization. Application of stochastic optimization methods in engineering.

Multi-agent systems: simulation and application in social research.

RESEARCH PROJECTS CARRIED OUT IN 2021

National Research Projects

Project title: Integruotų lietuvių kalbos ir raštijos išteklių informacinės sistemos plėtra – Raštija 2. Dr. Virginijus Marcinkevičius. 2018– 2021.

Main goal is development of the measuring metrics, conceptual and agent-based simulation model aimed at investigation of the social impact of cultural processes.

Main results:

1. New algorithms for 3D simulation and visualization of Riemann zeta function.
2. Experimental analysis of algorithms using ensembles of recurrent neural networks to detect phishing websites.
3. A model for queueing networks consisting of 100 subnets under high load conditions.
4. Completed LMT research group project No. P-MIP-17-368 “Kultūros procesų socialinio poveikio metrikos, konceptualaus bei imitacinio modelio kūrimas/ Development of metrics, conceptual and simulation models of the social impact of cultural processes.”

Publications:

Accepted:

1. Belovas, I. Central and local limit theorems for numbers of the tribonacci triangle. *Mathematics*, 2021, 9 (8:880), 1–11. ISSN: 2227-7390 ; eISSN: 2227-7390; Journal Impact Factor: 2.258; Aggregate Impact Factor: 1.221; Quartile: Q1; DOI: [10.3390/math9080880](https://doi.org/10.3390/math9080880)
2. Plikynas, D., Miliauskas A., Laužikas, R., Dulskis, V., Sakalauskas L. (2021) Agent based Simulation of Cultural Impact on Social Cohesion. *Quality and Quantity*, ISSN: 00335177 (Accepted; IF=3.65, Q1).
3. Bulavas, V.; Marcinkevičius, V.; Ruminski, J. Study of multi-class classification algorithms' performance on highly imbalanced network intrusion datasets // *Informatica*. Vilnius : Vilniaus universiteto leidykla. ISSN 0868-4952. eISSN 1822-8844. 2021, vol. 32, iss. 3, p. 441-475; Journal Impact Factor, 2.688 Aggregate Impact Factor: 2.449; Quartile: Q1).

4. Belovas, I. Series with binomial-like coefficients for the Riemann zeta function. *Ann. Mat. Pura Appl.*, 2021, online first, 1–9. ISSN: 0373-3114; eISSN: 1618-1891; Journal Impact Factor: 0.969; Aggregate Impact Factor: 1.221; Quartile: Q2;
5. Belovas, I. Central and local limit theorems for the weighted Delannoy numbers. *An. St. Univ. Ovidius Constanta, Ser. Mat.*, 1–20 [accepted]. ISSN: 1224-1784 ; eISSN: 1844-0835; Journal Impact Factor: 1.045; Aggregate Impact Factor: 1.221; Quartile: Q2
6. Belovas, I., Sakalauskas, L., Starikovičius, V., Sun, E. W. (2021). Mixed-stable models: an application to high-frequency financial data. *Entropy*, 23(6:739), 1–12 (Journal Impact Factor: 2.524; Aggregate Impact Factor: 3.837; Quartile: Q2). ISSN: 1099-4300.
7. Belovas, I. An inequality for the modified Selberg zeta-function. *Ramanujan Journal*, 2021, 55(3), 1063–1082; ISSN: 1382-4090; eISSN: 1572-9303; Journal Impact Factor: 0.837; Aggregate Impact Factor: 1.221; Quartile: Q3
8. Belovas, I., Sakalauskas, L., Starikovičius, V. A method for accelerated computation of the Riemann zeta function on the complex plane. *Publ. Math. Debr.*, 1–19 [accepted]; ISSN: 0033-3883 ; eISSN: 2064-2849; Journal Impact Factor: 0.636; Aggregate Impact Factor: 1.221; Quartile: Q4.
9. Belovas, I. Limit theorems for numbers satisfying a class of triangular arrays. *Glasnik Matematički*, (2021), 1–29 [online first]. ISSN: 0017-095X; Journal Impact Factor: 0.66; Aggregate Impact Factor: 1.221; Quartile: Q4.
10. Minkevičius, S.; Sakalauskas, L. On the law of iterated logarithm for extreme queue length in an open queueing network // *International journal of computer mathematics: computer systems theory*. Abingdon : Taylor and Francis Ltd. ISSN 0020-7160. eISSN 1029-0265. 2021, vol. 6, iss. 3, p. 220-235; Quartile: Q4.
11. Jurgelevičius, A.; Sakalauskas, L., Marcinkevičius V. (2021). Application of a Task Stalling Buffer in Distributed Hybrid Cloud Computing. *Elektronika Ir Elektrotechnika*, 27(6), 57-65. Quartile: Q4.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INOVATION) PARTNERS

SAP (Germany)
 Neurotechnology (Lithuania)
 University of Tartu (Estonia)
 Vilnius Gediminas Technical University (Lithuania)
 Ghent University (Belgium)
 Warsaw University of Technology (Poland)
 Lithuanian Culture Research Institute (Lithuania)

OTHER SCIENTIFIC ACTIVITIES

Prof. L. Sakalauskas –

- Editorial board member of Journal Technological and Economic Development of Economy <http://www.tandf.co.uk/journals/journal.asp?issn=2029-4913&linktype=145>
- Elected member of International Statistical Institute (2001) <http://isi-web.org> ;
- Member of European Working Group on Continuous Optimization <http://www.iam.metu.edu.tr/EUROPT>
- Member of European Working Group on Stochastic Optimisation <http://www.mii.lt/EWGSO>
- Member of European Working Group on Civil Engineering and Sustainable Development <http://www.orsdce.vgtu.lt>

- President of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS>
- Chair of Lithuanian Conference on Operations Research and Application in Business and Technics <http://www.mii.lt/OT-2016> .
- Reviewer of international journals:
 - Annals of Operation Research (Springer)
 - European Journal of Operational Research (Elsevier)
 - Informatica (IOSPress/VU)
 - Central European Journal of Operational Research (Springer),
 - Information Technology and Control (KTU),
 - International Transactions on Operational Research (Wiley&Sons)
 - Methodology and Computing in Applied Probability (Springer)
 - Technological and Economic Development of Economy (Francis&Taylor)

Prof. D. Plikynas -

- Reviewer in
 - Computational and Mathematical Organization Theory (Springer)
 - Entropy (MDPI)
 - PeerJ
 - Economics (VU)
 - Information Technology and Control (KTU)
- Member of
 - Artificial Intelligence section of Lithuanian Computer Society (LIKS-AIS)
 - ESSA (European Social Simulation Association)
 - ECCAI (European Coordinating Committee for Artificial Intelligence)

Assoc. Prof. Dr. I. Belovas –

- Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- Reviewer of international journal “Nonlinear Analysis: Modelling and Control”

Prof. Dr. S. Minkevičius –

- Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- Reviewer of international journal Informatica (IOSPress/VU)

Dr. V. Marcinkevičius –

- Member of Council of Lithuanian Computer Society, <http://www.liks.lt/en/modules/tinycontent/index.php?id=3>
 - Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
 - Member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>
 - Member of European Working Group on Stochastic Optimisation <http://www.mii.lt/EWGSO>
 - Reviewer of international journal Informatica (IOSPress/VU)
 - Member of editorial board of journal Applied Computer Systems
 - Member of IST-141-RTG on Exploratory Visual Analytics group
 - Substitute in COST action Statistical and machine learning techniques in human microbiome studies.
-

STATISTICS AND PROBABILITY GROUP

4 Akademijos, LT-08663 Vilnius

Tel. 210 9731

E-mail kestutis.kubilius@mii.vu.lt

Head – Prof. Habil. Dr. *Kęstutis Kubilius*

STAFF

Principal research fellows: Prof. Habil. Dr. K. Kubilius, Dr. (HP) S. Norvidas.

Professor: Prof. Habil. Dr. M. Sapagovas (emeritus).

Senior research fellows: Dr. D. E. Otera, Dr. M. Radavičius, Dr. M. Vaičiulis.

Research fellows: Dr. A. Astrauskas, Dr. A. Bakšaev, Dr. A. Čiginas, Dr. V. Kurauskas, Dr. J. Novickij.

Affiliated research fellows: Dr. J. J. Mačys, Prof. Dr. R. Mikulevičius, Prof. Habil. Dr. R. Rudzakis, Prof. Habil. Dr. J. K. Sunklodas.

Doctoral students: A. Medžiūnas

RESEARCH INTERESTS

Statistical inference for long memory processes

Heavy tails

Self-similar processes

Rough paths

Finite population statistics and statistical analysis of data

Extremal problems in harmonic analysis

Differential equations with an integral boundary condition

Random graphs

Combinatorics

Discrete mathematics

Algebraic geometry

RESEARCH PROJECTS CARRIED OUT IN 2021

Projects Supported by University Budget

Analysis and Application of Probabilistic and Deterministic Models. Prof. Habil. Dr. K. Kubilius. 2020–2021.

The problem of large excursions of the random fields close to Gaussian ones are considered.

The conditions of proximity to a Gaussian field are stated in terms of cumulants. These conditions are easily verified for a broad class of empirical processes and fields.

A class of fractional stochastic differential equations (FSDEs) with coefficients that may not satisfy the linear growth condition and non-Lipschitz diffusion coefficient are considered. The almost sure convergence rate of the backward Euler approximation scheme for solutions of the considered SDEs is obtained. A strongly consistent and asymptotically normal estimator of the Hurst index $H > 1/2$ for positive solutions of FSDEs is proposed.

The non-permutability graph of subgroups, which generalizes the permutability graph of subgroups, and that is a graph constructed from (a subspace of) the subgroups lattice are studied. Its planarity for some specific classes of groups are studied.

Main publications:

Rudzkis, Rimantas; Bakšajev, Aleksej. Large excursion probabilities for random fields close to Gaussian ones // *Extremes*. New York : Springer. ISSN 1386-1999. eISSN 1572-915X. 2021, vol. 24, iss. 3, p. 591-615. DOI: [10.1007/s10687-021-00411-9](https://doi.org/10.1007/s10687-021-00411-9).

Kubilius, Kęstutis; Medžiūnas, Aidas. Positive solutions of the fractional SDEs with non-Lipschitz diffusion coefficient // *Mathematics*. Basel : MDPI. eISSN 2227-7390. 2021, vol. 9, iss. 1, art. no. 18, p. [1-14]. DOI: [10.3390/math9010018](https://doi.org/10.3390/math9010018).

Muhie, Seid K.; Otera, Daniele Ettore; Russo, Francesco G. Non-permutability graph of subgroups // *Bulletin of the Malaysian Mathematical Sciences Society*. Singapūras : Springer Singapore. ISSN 0126-6705. eISSN 2180-4206. 2021, vol. 44, iss. 6, p. 3875-3894. DOI: [10.1007/s40840-021-01146-3](https://doi.org/10.1007/s40840-021-01146-3).

OTHER RESEARCH ACTIVITIES

Prof. K. Kubilius –

- Co-editor-in-Chief of the *Modern Stochastics: Theory and Applications*, <https://www.i-journals.org/vtxpp/VMSTA/> ;
- Editorial board member of the *Lithuanian Mathematical Journal*, <http://www.springer.com/mathematics/journal/10986?detailsPage=editorialBoard>;
- Editorial board member of the *Mathematical Modelling and Analysis*, <http://inga.vgtu.lt/~mma/> .

Prof. S. Norvidas –

- Editorial board member of the *Lithuanian Mathematical Journal*, <http://www.springer.com/mathematics/journal/10986?detailsPage=editorialBoard>.

Affiliated Prof. R. Rudzkis –

- Member of the Board of the Research Council of Lithuania

Prof. Emeritus M. Sapagovas –

- Editorial board member of the *Lithuanian Mathematical Journal*, <http://www.springer.com/mathematics/journal/10986?detailsPage=editorialBoard> ;
- Editorial board member of the journal *Nonlinear Analysis: Modelling and Control*, <https://www.mii.lt/NA/>;
- Editorial board member of the journal *Informatica*, <https://www.mii.lt/Informatica/>;
- Editorial board member of the *Mathematical Modelling and Analysis*, <http://inga.vgtu.lt/~mma/> .

ARTIFICIAL INTELLIGENCE LABORATORY

Akademijos 4, LT-08663 Vilnius.

Tel. (+370 5) 210 9311

E-mail: virginijus.marcinkevicius@mif.vu.lt

Head – Dr. *Virginijus Marcinkevičius*

STAFF

Senior researchers: Dr. Virginijus Marcinkevičius.

Junior researcher: Dr. Jūratė Vaičiulytė, Linas Aidokas

Other staff: Neringa Urbonaitė

Doctoral students: Shubham Juneja, Vytautas Paura.

RESEARCH INTERESTS

Advance machine learning in process automatization.

Natural language processing.

Image processing and analysis with deep neural networks.

Visual odometry and localization.

RESEARCH PROJECTS CARRIED OUT IN 2021

National Research Projects

The main goal is to investigate machine and imitational learning usage for robot navigation and localization in real environments. Research of natural language processing applications in human-machine interface

Main results:

1. Bulavas, Viktoras; Marcinkevičius, Virginijus; Ruminski, Jacek. Study of multi-class classification algorithms' performance on highly imbalanced network intrusion datasets // Informatica. Vilnius : Vilniaus universiteto leidykla. ISSN 0868-4952. eISSN 1822-8844. 2021, vol. 32, iss. 3, p. 441-475; Journal Impact Factor, 2.688 Aggregate Impact Factor: 2.449; Quartile: Q1).
2. Jurgelevičius, A.; Sakalauskas, L., Marcinkevičius V. (2021). Application of a Task Stalling Buffer in Distributed Hybrid Cloud Computing. Elektronika Ir Elektrotechnika, 27(6), 57-65. Quartile: Q4.

MAIN R&D&I (RESEARCH, DEVELOPMENT AND INOVATION) PARTNERS

SAP (Germany)

Neurotechnology (Lithuania)

OTHER SCIENTIFIC ACTIVITIES

Dr. V. Marcinkevičius –

- Member of Council of Lithuanian Computer Society, <https://www.liko.lt/liko-vadovai/>
- Member of Lithuanian Mathematical Society, <http://www.mif.vu.lt/lmd/>
- Member of Lithuanian Operational Research Society, <http://www.mii.lt/LitORS/>
- Member of European Working Group on Stochastic Optimisation <http://www.mii.lt/EWGSO>
- Reviewer of international journal Informatica (IOSPress/VU)
- Member of editorial board of journal Applied Computer Systems
- Member of IST-141-RTG on Exploratory Visual Analytics group
- Substitute in COST action Statistical and machine learning techniques in human microbiome studies.