Záznamy vložené do ASEP za UI (1. 12. – 31. 12. 2025)

New ICS records in ASEP (1. 12. – 31. 12. 2025)

0643773 - ÚI 2027 RIV GB eng J - Journal Article
Farisco, M. - Evers, K. - Annen, J. - Blandin, V. - Camassa, A. - Cecconi, B. - Charland, V. - Deco, G. - Gosseries, O. - Laureys, S. - Manasanch, A. - Massimini, M. - Muckli, L. - Panda, R. - Pennartz, C. - Pigorini, A. - Torao, M. - Sanchez-Vives, M. V. - Goldman, J. - Zamora-López, Gorka
Advancing the science of consciousness: From ethics to clinical care.
Neuroscience and Biobehavioral Reviews. Roč. 180, January 2026 (2026), č. článku 106497. ISSN 0149-7634. E-ISSN 1873-7528
R&D Projects: GA MŠMT(CZ) EH22_008/0004643
Institutional support: RVO:67985807
Keywords : Consciousness * Disorders of consciousness * Brain injury * Medicine * Ethics * Clinical neuroscience * Computational neuroscience
OECD category: Neurosciences (including psychophysiology
Impact factor: 7.9, year: 2024 ; **AIS:** 3.03, rok: 2024
Method of publishing: Open access
Result website: https://doi.org/10.1016/j.neubiorev.2025.106497
DOI: https://doi.org/10.1016/j.neubiorev.2025.106497
Significant advances in the scientific investigation of the neurobiology of consciousness have been slow to be translated into clinical settings, limited by a lack of generally agreed working definition (e.g., what is consciousness?) and methodology (e.g., how to identify reliable biomarkers/indicators of consciousness? How to improve sensitivity and specificity of the technological identification of consciousness?). In the present paper we aim at proposing potential strategies for reducing the gap between research, clinical practice, and patients' and their caregivers' needs regarding disorders of consciousness. By implementing a multidisciplinary (i.e., involving different disciplines) and multiperspective (i.e., involving different stakeholders) approach, the paper focuses on disorders of consciousness: it starts from the review of some of the most promising measures of consciousness from brain activity (i.e., electrophysiology and spectral measures, measures of functional connectivity, complexity-based measures). Next the paper introduces brain responses to illusions as a possible new indicator of consciousness (i.e., a feature that facilitates the attribution of consciousness), and illustrates a possible clinical operationalization of the indicators of consciousness through the case of virtual reality. Finally, the paper analyses a set of urgent ethical issues and describes a model for assessing and dealing with those issues, concluding by elaborating key recommendations for improving the clinical treatment of patients with disorders of consciousness through a better translation of research into clinics.
Permanent Link: https://hdl.handle.net/11104/0373627

0643841 - ÚI 2026 RIV DE eng J - Journal Article
Lin, Chun Yu - McDonald, Joseph
Functional monadic ortholattices and locally finite σ-free polyadic ortholattices.
Algebra Universalis. Roč. 87, č. 1 (2026), č. článku 1. ISSN 0002-5240. E-ISSN 1420-8911
R&D Projects: GA ČR(CZ) GF22-23022L
Institutional support: RVO:67985807

Keywords : Monadic ortholattice * Polyadic ortholattice * Cylindric ortholattice * Functional algebra * Super-amalgamation * Regular completion
Impact factor: 0.6, year: 2024 ; **AIS:** 0.309, rok: 2024
Method of publishing: Limited access
Result website:https://doi.org/10.1007/s00012-025-00912-9
DOI: https://doi.org/10.1007/s00012-025-00912-9
In this paper, we show that every monadic ortholattice is isomorphic to a functional one, thereby resolving a recent question posed by Harding. We then study certain substitution-free reducts of the polyadic ortholattices, which we call locally finite
-free polyadic ortholattices, and demonstrate that they stand in a one-to-one correspondence with the locally finite diagonal-free cylindric ortholattices.
Permanent Link: https://hdl.handle.net/11104/0373642

0643501 - ÚI 2027 NL eng J - Journal Article
Aranda, A. - Hartman, David
Morphism extension classes of countable L-colored graphs.
European Journal of Combinatorics. Roč. 132, Part A (2026), č. článku 104256. ISSN 0195-6698. E-ISSN 1095-9971
R&D Projects: GA ČR GBP202/12/G061
Institutional support: RVO:67985807
OECD category: Pure mathematics
Impact factor: 0.9, year: 2024 ; **AIS:** 0.939, rok: 2024
Method of publishing: Limited access
Result website: https://doi.org/10.1016/j.ejc.2025.104256
DOI: https://doi.org/10.1016/j.ejc.2025.104256
In Hartman et al. (2014), Hartman, Hubička and Mašulović studied the hierarchy of morphism extension classes for finite L-colored graphs, that is, undirected graphs without loops where sets of colors selected from L are assigned to vertices and edges. They proved that when L is a linear order, the classes MHL and HHL coincide, and the same is true for vertex-uniform finite L-colored graphs when is a diamond. In this paper, we explore the same question for countably infinite L-colored graphs. We prove that MHL = HHL if and only if L is a linear order.
Permanent Link: https://hdl.handle.net/11104/0373355

0643840 - ÚI 2026 RIV NL eng J - Journal Article
Kunal, M. - Petkovic, M. - Holeňa, Martin - Dropka, N.
Machine learning framework for derivation and optimization of Cz-YAG crystal growth recipe.
Journal of Crystal Growth. Roč. 676, February 2026 (2026), č. článku 128451. ISSN 0022-0248. E-ISSN 1873-5002
Institutional support: RVO:67985807
Keywords : Czochralski crystal growth * Yttrium aluminum garnet (YAG) * Multi-objective optimization * Symbolic regression * Artificial neural networks * Computational fluid dynamics * Process recipe
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Impact factor: 2, year: 2024 ; **AIS:** 0.308, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1016/j.jcrysgro.2025.128451
DOI: https://doi.org/10.1016/j.jcrysgro.2025.128451

We present a generalizable machine learning framework for rapid, dynamic optimization of Czochralski-grown undoped yttrium aluminum garnet (YAG) crystal growth recipes. This framework addresses the high cost and slow iteration cycles of conventional experimental and computational approaches. Steady-state computational fluid dynamics (CFD) simulations at only three distinct crystallization stages are combined with symbolic regression (SISSO++) and artificial neural network (ANN) surrogate models, enabling accurate, multi-objective optimization of process parameters at any crystallization stage around the CFD training window. Trained on 423 high-fidelity CFD cases, the surrogates predict key quality indicators (power, interface deflection, axial temperature gradient, and maximum von Mises stress) with high accuracy. Using an NSGA-II evolutionary optimization pipeline, we identify stage-wise Pareto-optimal settings that closely approximate fully dynamic growth while requiring only a fraction of the resources of direct CFD or experiment. The resulting dynamic process recipe prescribes stage-specific adjustments to rotation rate, pulling rate, and heater position, ensuring flat interfaces, target-aligned thermal gradients, and reduced mechanical stress across the crystallization window. Full CFD validation confirms the physical realizability and quality of the optimized recipes. This framework accelerates process development by orders of magnitude and provides an extensible platform for adaptive, data-driven oxide crystal manufacturing.
Permanent Link: https://hdl.handle.net/11104/0373640

0642825 - ÚI 2027 RIV NL eng J - Journal Article
Geletič, Jan - Krüger, E. - Demuzere, M. - Leuchner, M. - Jurek, M. - Lehnert, M.
Nighttime Artificial Light Intensity in Local Climate Zones: A Comparative Study for Global Cities.
Cities. Roč. 170, March 2026 (2026), č. článku 106722. ISSN 0264-2751. E-ISSN 1873-6084
R&D Projects: GA MŠMT(CZ) EH22_008/0004605
EU Projects: European Commission(XE) 101137851 - CARMINE
Institutional support: RVO:67985807
Keywords : Light pollution * Artificial light at night * Nighttime radiance * Local climate zones * Urban environment * Metropolitan areas
OECD category: Meteorology and atmospheric sciences
Impact factor: 6.6, year: 2024 ; **AIS:** 1.423, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1016/j.cities.2025.106722
DOI: https://doi.org/10.1016/j.cities.2025.106722
Recent studies have proved various impacts of urban light pollution, from public health, shifted vegetated phase of trees, socio-economic consequences, to the energy budget. However, a detailed structure of urban forms and functions was not incorporated into the analysis yet. Using the concept of local climate zones LCZs) in this study, we assess the nighttime lights (NTL) of 32 urban agglomerations between the years 2012 and 2023, remotely accessed by the VIIRS instrument. We found significant statistical differences between the individual LCZs as well as various trends in the analyzed metropolitan areas. LCZ 1, typically representing densely built-up areas with skyscrapers, had the highest mean NTL of all classes. It was followed by LCZ 10 (heavy industry), LCZ 4 (openly arranged buildings tens of stories tall), and LCZ 3 (tightly packed buildings several stories tall). Lower values were identified in LCZ 9, a sparse arrangement of buildings. Significant temporal and regional trends in the NTL of built types of LCZs were detected, showing that changes in NTL cannot be explained simply by population growth. Marked differences in the contribution of individual LCZs to the overall NTL of the cities could provide a tool to focus on hot-spot areas in light pollution mitigation policies.
Permanent Link: https://hdl.handle.net/11104/0372679
Research data: Zenodo

0643181 - ÚI 2026 RIV GB eng J - Journal Article
Lehnert, M. - Kremser, J. - Janků, Z. - Květoňová, Veronika - Geletič, Jan
Assessing green walls' effects onoutdoor human thermal exposurein temperate climate cities.
Scientific Reports. Roč. 15, č. 1 (2025), č. článku 42053. ISSN 2045-2322. E-ISSN 2045-2322
Grant - others:AV ČR(CZ) StrategieAV21/36
Program: StrategieAV
Institutional support: RVO:67985807
Keywords : Adaptation to climate change * Green facade * Living wall * Thermal comfort * Urban climate * Urban greenery
OECD category: Meteorology and atmospheric sciences
Impact factor: 3.9, year: 2024 ; **AIS:** 1.029, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1038/s41598-025-26214-7
DOI: https://doi.org/10.1038/s41598-025-26214-7
Green walls or vertical gardens are becoming increasingly popular urban heat mitigation measures. However, empirical evidence regarding their efficiency in a temperate European climate remains scarce. In this study, micrometeorological measurements and established biometeorological indices were utilised to investigate the impact of green walls on outdoor thermal exposure and thermal comfort in five case studies in Czech cities. The results indicate that during hot days, green walls can contribute to reducing outdoor heat stress, however, the effect under the European temperate climate is limited. The magnitudes of changes in comparison with conventional facades 50 cm from the walls during hot summer days were: ≈ − 1.2 to + 0.1 K for air temperature, ≈ − 6.4 to + 3.3 K for Mean Radiant Temperature, ≈ − 2.1 to + 0.2 K for Universal Thermal Climate Index, and ≈ − 4.1 to + 0.2 K in the case of Physiologically Equivalent Temperature. The cooling effect is primarily observable in direct greening systems without any supporting structure, rather than in green living wall systems utilising black plant pots. Consequently, the sufficient effectiveness of one of the widely used climate change adaptation measures could not be generally confirmed, suggesting that further investigations in diverse settings should be considered.
Permanent Link: https://hdl.handle.net/11104/0373071

0643774 - ÚI 2026 RIV NL eng J - Journal Article
Kalina, Jan - Kukal, J. - Vyšata, O.
A novel class of rank tests for high-dimensional data with an application to Alzheimer's disease.
Biocybernetics and Biomedical Engineering. Roč. 45, č. 4 (2025), s. 707-717. ISSN 0208-5216. E-ISSN 0208-5216
Institutional support: RVO:67985807
Keywords : EEG Signals * High-dimensional data * Hypothesis testing * Interpoint-distance rank tests * Multiple comparisons
OECD category: Statistics and probability
Impact factor: 6.6, year: 2024 ; **AIS:** 0.996, rok: 2024
Method of publishing: Limited access
Result website: https://doi.org/10.1016/j.bbe.2025.10.005
DOI: https://doi.org/10.1016/j.bbe.2025.10.005
Electroencephalography (EEG) signals are widely used in neuroscience research and biomedical applications, particularly for comparative analyses between two cohorts: patients and control subjects. In EEG research, multivariate two-sample tests remain underused, while multiple comparison procedures are often misapplied as a substitute, leading to inadequate error control. Moreover, existing rank-based tests rely solely on Euclidean distances and lack robustness to outliers. The objective of this work is to develop and evaluate a new class of rank-based tests for high-dimensional data that employ robust Mahalanobis interpoint distances, and to demonstrate their practical value in

the analysis of EEG signals. This class includes a version based on the MRWCD (minimum regularized weighted covariance determinant) estimator, which enhances the robustness of the Mahalanobis distances by mitigating the influence of outliers. To illustrate the effectiveness of these tests, EEG data consisting of 1216 variables from 28 patients with Alzheimer's disease and 146 healthy control individuals were analyzed. The results of multivariate tests reveal significant findings, which are also explored in the context of individual EEG channels and frequencies. Among the approaches tested, rank-based tests using the newly proposed interpoint distances, particularly in combination with the Cucconi test statistic, yield the strongest results. For the comparison between patients and controls, a p-value of 0.004 was obtained, which is below the significance level alpha=0.05, indicating a statistically significant difference.
Permanent Link: https://hdl.handle.net/11104/0373628

0643611 - ÚI 2027 RIV NL eng J - Journal Article
Savický, Petr
On CNF formulas irredundant with respect to unit clause propagation.
Theoretical Computer Science. Roč. 1064, February 2026 (2026), č. článku 115707. ISSN 0304-3975. E-ISSN 1879-2294
Institutional support: RVO:67985807
Keywords : CNF formulas * Unit clause propagation
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Impact factor: 1, year: 2024 ; **AIS:** 0.362, rok: 2024
Method of publishing: Limited access
Result website: https://doi.org/10.1016/j.tcs.2025.115707
DOI: https://doi.org/10.1016/j.tcs.2025.115707
Two CNF formulas are called ucp-equivalent, if they behave in the same way with respect to the unit clause propagation (UCP). A formula is called ucp-irredundant, if removing any clause leads to a formula which is not ucp-equivalent to the original one. As a consequence of known results, the ratio of the size of a ucp-irredundant formula and the size of a smallest ucp-equivalent formula is at most , where is the number of the variables. We demonstrate an example of a ucp-irredundant formula for a symmetric definite Horn function which is larger than a smallest ucp-equivalent formula by a factor . Consequently, a general upper bound on the above ratio cannot be smaller than this.
Permanent Link: https://hdl.handle.net/11104/0373496
Preprint: https://arxiv.org/abs/2309.01750

0643070 - ÚI 2027 RIV US eng J - Journal Article
Slavík, O. - Brabec, Marek - Kofentová, N. - Randák, T. - Horký, P.
The Propensity of European Grayling to Migrate Is Determined by Individual Characteristics.
Ecology of Freshwater Fish. Roč. 35, č. 1 (2026), č. článku e70032. ISSN 0906-6691. E-ISSN 1600-0633
Institutional support: RVO:67985807
Keywords : age * body size * body temperature * movement activity * radiotelemetry
OECD category: Statistics and probability
Impact factor: 1.3, year: 2024 ; **AIS:** 0.442, rok: 2024
Method of publishing: Open access
Result website: https://doi.org/10.1111/eff.70032
DOI: https://doi.org/10.1111/eff.70032
Migrations are characterised as adaptive mechanisms aimed at improving the fitness of an individual.

Hence, the propensity to migrate can be analysed by considering body size and movement activity when individuals search for available resources. We studied the relationships among individual traits, movement activity and migration of the European grayling Thymallus thymallus (Linnaeus 1758) in a native riverine environment during a one-year-long field study. We observed the diel movement activity of 37 individuals along the longitudinal profile of the river using radio tags with temperature sensors. The propensity to migrate differed among the tagged individuals. The fish that maintained positions over the entire annual period and whose dispersal did not exceed 2 km from their original positions were considered a stationary group. The fish migrating downstream from their summer positions to wintering positions and returning to their original positions the following year were considered a migratory group. Long-distance downstream migrations to wintering positions mostly started in early autumn, and the fish reached the farthest positions, up to 30 km apart, in December and January. Upstream migration started at the end of February and was most intensive in March and April. The highest upstream positions were reached by the graylings in summer. These findings demonstrate that fish are motivated to migrate not only to reach spawning areas in spring but also to search for food and shelter resources in summer. Over 24 h periods, the positions along the upstream–downstream axis, movement and body temperature of the migratory and stationary fish differed, indicating their distinct habitat preferences during the diel cycle. Body mass appeared to predict the migration of three-year-old females and males, with a greater migratory propensity for females than males. Our results suggest different behavioural strategies within the population of European grayling, that is, differences between stationary fish and fish migrating long distances among wintering, spawning and feeding areas.
Permanent Link: https://hdl.handle.net/11104/0372920

0643743 - ÚI 2026 RIV NL eng J - Journal Article
Ghosh, Anupam
Conditional mutual information: A generalization of causal inference in quantum systems.
Physics Letters. A. Roč. 564, December 2025 (2025), č. článku 131089. ISSN 0375-9601. E-ISSN 1873-2429
R&D Projects: GA ČR(CZ) GA25-18105S
Institutional support: RVO:67985807
Keywords : Complex systems * Causal relation * Conditional mutual information * Quantum systems
Impact factor: 2.6, year: 2024 ; **AIS:** 0.432, rok: 2024
Method of publishing: Limited access
DOI: https://doi.org/10.1016/j.physleta.2025.131089
The concept of causality is fundamental to numerous scientific explanations; however, its extension to the quantum regime has yet to be rigorously explored. This letter introduces the development of a quantum causal index, a novel extension of the classical causal inference framework, tailored to learn the causal relationships inherent in quantum systems. Our study focuses on the asymmetric quantum conditional mutual information (QCMI), incorporating the von Neumann entropy, as a directional metric of causal influence in quantum many-body systems. We analyze spin chains using the QCMI, implementing a projective measurement on one site as the intervention and monitoring its effect on a distant site conditioned on intermediate spins. Additionally, we study the effective causal propagation velocity, which is the speed at which QCMI becomes significant at distant sites. These findings indicate the presence of finite-speed propagation of causal influence, along with the emergence of coherent oscillations.
Permanent Link: https://hdl.handle.net/11104/0373598

0643568 - ÚI 2026 RIV NL eng J - Journal Article
Hladík, M. - Hartman, David
Absolute value linear programming.
Journal of Global Optimization. Roč. 93, č. 4 (2025), s. 1097-1120. ISSN 0925-5001. E-ISSN 1573-2916
Institutional support: RVO:67985807
Keywords : Linear programming * Nonsmooth optimization * Interval analysis * NP-hardness
OECD category: Pure mathematics
Impact factor: 1.7, year: 2024 ; **AIS:** 0.873, rok: 2024
Method of publishing: Limited access
Result website:https://doi.org/10.1007/s10898-025-01569-3
DOI: https://doi.org/10.1007/s10898-025-01569-3
We study linear programming problems involving absolute values in their formulations, which are therefore no longer expressible as standard linear programs. The presence of absolute values makes the problems nonconvex and nonsmooth, and thus hard to solve. In this paper, we study fundamental properties of the topology and the geometric shape of the solution set, and also conditions for convexity, connectedness, boundedness and integrality of the vertices. Further, we address various complexity issues, showing that many basic questions are NP-hard. We show that the feasible set is a (nonconvex) polyhedral set and, more importantly, every nonconvex polyhedral set can be described using absolute value constraints. We also provide a necessary and sufficient condition when a Karush–Kuhn–Tucker (KKT) point of a nonconvex quadratic programming reformulation solves the original problem.
Permanent Link: https://hdl.handle.net/11104/0373434

0643068 - ÚI 2026 RIV NL eng J - Journal Article
Moravec, T. - Musil, Z. - Brabec, Marek - Majovský, M. - Ondra, P. - Zach, P. - Musil, V. - Netuka, D.
Genetic signatures of responsiveness in idiopathic normal pressure Hydrocephalus: Insights from whole-exome and LASSO-based analysis.
Brain and Spine. Roč. 5, November 2025 (2025), č. článku 105879. ISSN 2772-5294. E-ISSN 2772-5294
Institutional support: RVO:67985807
Keywords : Idiopathic normal pressure hydrocephalus * Lumbar drainage * Whole-exome sequencing * Genetic biomarkers * DNA damage response * Cilia
OECD category: Statistics and probability
Impact factor: 2.5, year: 2024 ; **AIS:** 0.856, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1016/j.bas.2025.105879
DOI: https://doi.org/10.1016/j.bas.2025.105879
BACKGROUND: Idiopathic normal pressure hydrocephalus (iNPH) is a potentially reversible neurological disorder characterised by the triad of gait disturbance, cognitive decline, and urinary incontinence, together with ventriculomegaly despite normal cerebrospinal fluid (CSF) pressure (1–3). Although traditionally considered non-genetic and multifactorial, emerging data suggest that rare pathogenic variants and cilia-related mechanisms may contribute to its pathogenesis and modulate responsiveness to CSF diversion (8–12). METHODS: We performed whole-exome sequencing (WES) in 33 consecutive patients with clinically and radiologically confirmed iNPH who underwent a standardised 120-h lumbar drainage (LD) protocol. Responders were defined as those showing ≥20 % improvement in gait speed or ≥3-point increase in Montreal Cognitive Assessment (MoCA) score compared with baseline. Variants were filtered according to ACMG/AMP guidelines (19) and population allele frequency (minor allele frequency <1 %). Least Absolute Shrinkage and Selection Operator (LASSO) logistic regression (20) with ten-fold cross-validation was applied to identify gene-level

predictors of LD responsiveness. RESULTS: After filtering, 110 genes with at least one pathogenic or likely pathogenic variant were retained for modelling. LASSO regression at the λ.1se threshold identified a five-gene panel—FANCD2, ATR, ORAI1, MUC1, and RP1L1—involved in DNA damage response, calcium signalling, epithelial barrier integrity, and ciliary architecture (21–28). The internally derived model achieved an accuracy of 81.8 %, sensitivity 68.8 %, specificity 94.1 %, and positive predictive value 91.7 % for prediction of LD response. CONCLUSIONS: Rare pathogenic variants in genes linked to genome stability, immune and calcium signalling, and ciliary structure may influence LD responsiveness in iNPH. The five-gene model represents a biologically plausible, hypothesis-generating tool for preoperative risk stratification. Validation in larger, multicentre cohorts, integration with shunt outcomes, and functional studies are required before any clinical implementation.
Permanent Link: https://hdl.handle.net/11104/0372916

0643607 - ÚI 2026 RIV SK eng J - Journal Article
Kalina, Jan
Bayesian estimation and regularization techniques in categorical data analysis.
Journal of applied mathematics, statistics and informatics. Roč. 21, č. 2 (2025), s. 105-122. ISSN 1336-9180. E-ISSN 1339-0015
Institutional support: RVO:67985807
Keywords : contingency tables * mutual information * zero-count adjustment * homogeneity test * symmetry test
Impact factor: 0.5, year: 2024 ; **AIS:** 0.074, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.2478/jamsi-2025-0011
DOI: https://doi.org/10.2478/jamsi-2025-0011
This paper explores Bayesian estimation for categorical data, focusing on simple yet effective models that provide a foundation for applying more advanced methods accurately and reliably in real-world applications. We begin by revisiting Bayesian estimators for the binomial distribution and investigating their properties. Next, we develop hypothesis tests for categorical data (sign test, homogeneity test, symmetry test) based on regularized maximum likelihood estimates of the probabilities. Finally, we formulate regularized versions of common association measures for contingency tables and study the regularized version of mutual information, particular for the situation where the regularized version can effectively handle zero counts.
Permanent Link: https://hdl.handle.net/11104/0373486

0642630 - ÚI 2026 RIV US eng J - Journal Article
Jajcay, Lucia - Tomeček, David - Androvičová, R. - Fajnerová, I. - Děchtěrenko, Filip - Rydlo, J. - Tintěra, J. - Lukavský, J. - Horáček, J. - Hlinka, Jaroslav
Deviation From Typical Brain Activity During Naturalistic Stimulation Is Related to Personality Traits.
Psychophysiology. Roč. 62, č. 12 (2025), č. článku e70203. ISSN 0048-5772. E-ISSN 1469-8986
R&D Projects: GA MŠMT(CZ) EH22_008/0004643; GA ČR(CZ) GA21-32608S; GA ČR(CZ) GA19-11753S; GA MŠMT(CZ) EH23_025/0008715
Institutional support: RVO:67985807 ; RVO:68081740
Keywords : fMRI * naturalistic stimuli * NEO-FFI * personality traits * TCI
OECD category: Neurosciences (including psychophysiology; Psychology (including human - machine relations) (PSU-E)
Impact factor: 2.8, year: 2024 ; **AIS:** 1.185, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1111/psyp.70203
DOI: https://doi.org/10.1111/psyp.70203

The relationship between personality and brain activity has been an increasingly popular topic of neuroscientific research. Naturalistic viewing has been shown to enhance individual differences and might, therefore, be particularly useful for exploring this relationship. Here, we thus examine neural signatures of personality using naturalistic fMRI of 82 healthy subjects. We implemented a simple dimensionality reduction method to characterize brain activity by its “typicality,” assessed a range of personality traits using widely-used personality inventories, and tested the relationship between the two. We found that there is, indeed, a relationship between personality and the typicality of brain activity, which appears to be most consistently manifested by lower typicality in subjects with higher Neuroticism/Harm Avoidance. Our results highlight the usefulness of naturalistic viewing data for exploring the relationship between individual differences in personality and brain activity.
Permanent Link: https://hdl.handle.net/11104/0372504
Research data: BioRxiv.org

0643765 - ÚI 2026 RIV DE eng J - Journal Article
Piorecká, V. - Vejmola, Č. - Pešková, P. - Piorecký, M. - Jiříček, Stanislav - Koudelka, V. - Griskova-Bulanova, I. - Páleníček, T.
Microstate in rats' EEG: a proof of concept study.
Translational Psychiatry. Roč. 15, November 2025 (2025), č. článku 494. ISSN 2158-3188. E-ISSN 2158-3188
R&D Projects: GA MŠMT(CZ) EH22_008/0004643
Institutional support: RVO:67985807
Keywords : EEG microstates * preclinical models * translational research * electrical source imaging
OECD category: Neurosciences (including psychophysiology
Impact factor: 6.2, year: 2024 ; **AIS:** 2.266, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1038/s41398-025-03702-y
DOI: https://doi.org/10.1038/s41398-025-03702-y
The electroencephalogram (EEG) reflecting brain activity may be characterised through brief periods of stable neural activity patterns that recur over time and are referred to as microstates. Microstates are related to a range of cognitive processes, and their analysis has become an increasingly popular tool for studying human brain function. While microstates have been extensively studied in humans, their presence and characteristics in animal models have yet to be as thoroughly investigated. This study aims to address this gap by detecting and characterising microstates in EEGs of rats collected using a superficial electrode system corresponding to homological areas of the human 10–20 system. Specifically, we demonstrate the presence of microstates in rats’ EEGs, i.e., those that may be captured by the same metrics as in humans. We identified five microstate EEG maps in rats, explaining 71% of the variance in our dataset (N = 30). The explained variance, mean temporal coverage values (0.2), and average duration (0.26 s) are comparable to the human-derived EEG microstates. Via a source localisation technique, the cingulate cortex, precuneus, and insula were found to be associated with the microstates’ temporal dynamics. Among the microstates that showed a broadband character, we also found those that showed an association with the theta and alpha bands. These findings have important implications for the use of microstates as a preclinical tool for investigating brain functions, detecting new biomarkers of brain diseases, and translating this knowledge to humans.
Permanent Link: https://hdl.handle.net/11104/0373624
Preprint: https://www.biorxiv.org/content/10.1101/2025.06.17.660121v1

0643764 - ÚI 2026 RIV US eng J - Journal Article
Vlachos, Ioannis
Spectral brain connectivity in dementia: coherence, imaginary coherence and partial coherence analysis of EEG signals.
Journal of Neural Engineering. Roč. 22, č. 6 (2025), č. článku 066019. ISSN 1741-2560. E-ISSN 1741-2552
Institutional support: RVO:67985807
Keywords : dementias * coherence * brain connectivity * Alzheimer's * frontotemporal dementia
OECD category: Neurosciences (including psychophysiology
Impact factor: 3.8, year: 2024 ; **AIS:** 1.174, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1088/1741-2552/ae1ea1
DOI: https://doi.org/10.1088/1741-2552/ae1ea1
OBJECTIVE. As the prevalence of dementia continues to rise, the need for accurate and early diagnostic tools becomes increasingly critical. Despite diverse underlying causes, dementia types share common cognitive symptoms, making accurate diagnosis essential for effective treatment. APPROACH: This study investigates electroencephalographic (EEG)-based spectral brain connectivity in individuals with Alzheimer's disease (AD, N=36), frontotemporal dementia (FTD, N=23), and healthy controls (HCs, N=29), with the dual aim of identifying condition-specific connectivity patterns and evaluating three coherence-based connectivity measures: coherence, imaginary coherence, and partial coherence. Resting-state, eyes-closed EEG data (19 channels) were analyzed, and connectivity was estimated across frequencies to assess both global and local network alterations. MAIN RESULTS: The results indicate that dementias (both AD and FTD) are characterized by decreased connectivity in higher frequency bands and increased connectivity in lower frequencies, reflecting respectively impaired neural communication and neurodegeneration. Moreover, the severity of cognitive impairment correlates with the spatial extent and magnitude of connectivity disruptions. Notably, partial coherence-unlike coherence and imaginary coherence-effectively distinguishes between the AD and FTD groups, suggesting that direct connectivity measures may provide more discriminative information for differential diagnosis. SIGNIFICANCE. These findings highlight the potential of EEG-based spectral connectivity analysis, particularly partial coherence, as a non-invasive tool to aid in the diagnosis and differential diagnosis of dementia subtypes, supporting early clinical decision-making.
Permanent Link: https://hdl.handle.net/11104/0373623

0643763 - ÚI 2026 DE eng J - Journal Article
Lamsma, J. - Raine, A. - Kia, S. M. - Tomeček, David ... Total 77 authors
Structural brain abnormalities and aggression in schizophrenia: mega-analysis of data from 2095 patients and 2861 healthy controls via the ENIGMA consortium.
Molecular Psychiatry. Online 03 December 2025 (2025). ISSN 1359-4184. E-ISSN 1476-5578
OECD category: Neurosciences (including psychophysiology
Impact factor: 10.1, year: 2024 ; **AIS:** 3.948, rok: 2024
Method of publishing: Open access
Result website:https://doi.org/10.1038/s41380-025-03365-7
DOI: https://doi.org/10.1038/s41380-025-03365-7
It is hypothesised that structural brain abnormalities in individuals with schizophrenia are associated with aggressive behaviour, but this has not been tested directly. We pooled magnetic resonance imaging and clinical data from 2095 patients and 2861 healthy control subjects across 20 sites of the ENIGMA-Schizophrenia Working Group. Using normative modelling, we quantified individual-level deviations from controls (z-scores) for global and regional grey matter volume and white matter microstructural integrity. Ordinal regression models were used to estimate the associations between these deviations and concurrent aggression (odds ratios [ORs] with 99% confidence intervals [CIs]).

In mediation analyses, we examined the roles of positive symptoms - delusions, hallucinations and disorganised thinking - impulsivity and illness insight. Aggression was significantly associated with reductions in total cortical volume (OR [99% CI] = 0.88 [0.78, 0.98], p = 0.003), global white matter integrity (OR [99% CI] = 0.72 [0.59, 0.88], p = 3.50 x 10-5), dorsolateral prefrontal cortex volume (OR [99% CI] = 0.85 [0.74, 0.97], p = 0.002), inferior parietal lobule volume (OR [99% CI] = 0.76 [0.66, 0.87], p = 2.20 x 10-7) and internal capsule integrity (OR [99% CI] = 0.76 [0.63, 0.92], p = 2.90 x 10-4). These associations were robust to adjustment for relevant covariates and partly mediated by positive symptoms and impulsivity. Our findings suggest that the co-occurrence of positive symptoms, impulsivity and aggression in schizophrenia has a neurobiological basis, providing potential targets for therapeutic interventions.
Permanent Link: https://hdl.handle.net/11104/0373622

0642659 - ÚI 2026 eng J - Journal Article
Latif, Yasir - Yaseen, M.
El Niño-Southern Oscillation-driven variability in drought severity across the Upper Indus Basin, Pakistan.
Theoretical and Applied Climatology. Accepted December 2025 (2025)
Institutional support: RVO:67985807
Method of publishing: Open access
DOI: https://doi.org/10.1007/S00704-025-05866-5
Permanent Link: https://hdl.handle.net/11104/0372526

0643175 - ÚI 2026 US eng J - Journal Article
Stepanova, N. - Turčičová, Marie - Zhao, X.
Adaptive almost full recovery in sparse nonparametric models.
Electronic Journal of Statistics. Submitted December 2025 (2025). ISSN 1935-7524. E-ISSN 1935-7524
R&D Projects: GA MŠMT(CZ) EH22_008/0004583
Institutional support: RVO:67985807
Impact factor: 1.3, year: 2024 ; **AIS:** 1.385, rok: 2024
We observe an unknown function of d variables f(\boldsymbol{t}), \boldsymbol{t} \in[0,1]^d, in the Gaussian white noise model of intensity \varepsilon>0. We assume that the function f is regular and that it is a sum of k-variate functions, where k varies from 1 to s (1\leq s\leq d). These functions are unknown to us and only a few of them are nonzero. In this article, we address the problem of identifying the nonzero function components of f almost fully in the case when d=d_\varepsilon\to \infty as \varepsilon\to 0 and s is either fixed or s=s_\varepsilon\to \infty, s=o(d) as \varepsilon\to 0. This may be viewed as a variable selection problem. We derive the conditions when almost full variable selection in the model at hand is possible and provide a selection procedure that achieves this type of selection. The procedure is adaptive to the level of sparsity described by the sparsity index ta\in(0,1). We also derive conditions that make almost full variable selection in the model of our interest impossible. In view of these conditions, the proposed selector is seen to perform asymptotically optimal. The theoretical findings are illustrated numerically.
Permanent Link: https://hdl.handle.net/11104/0373039
Preprint: https://arxiv.org/abs/2512.10488

0643769 - ÚI 2026 RIV US eng C - Conference Paper (international conference)
Korel, L. - Holeňa, Martin
Assigning scientific texts to existing ontologies.

Proceedings of the 20th Conference on Computer Science and Intelligence Systems (FedCSIS). Piscataway: IEEE, 2025 - (Bolanowski, M.; Ganzha, M.; Maciaszek, L.; Paprzycki, M.; Ślęzak, D.), s. 185-193. Annals of Computer Science and Information Systems, 43. ISSN 2300-5963. [FedCSIS 2025: Conference on Computer Science and Intelligence Systems /20./. Krakow (PL), 14.09.2025-17.09.2025]
Institutional support: RVO:67985807
Keywords : ontology * neural network * embedding * text matching * LLM
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Result website:https://doi.org/10.15439/2025F1850
DOI: https://doi.org/10.15439/2025F1850
Humans try to help computers understand the properties of the real world, and ontologies can be used for this task. Scientists publish their research in papers, and their results should be used to improve existing ontologies to be up-to-date. Manual enhancement of ontologies is highly time-consuming for domain experts. This paper proposes a solution to match a scientific text to the most relevant ontology using artificial neural networks. Our approach selects a paragraph or a sentence, uses representation learning to embed it into a vector space by some embedder, and measures its relevance to embedded textual properties from the selected ontology by a modified version of a Siamese neural network. A modification is based on the extension of one branch of the Siamese network to aggregate inputs from a group of embeddings. We have considered different embedders, in particular two variants of BERT, InferSent, GloVe with TF-IDF weighted mean, Doc2Vec in the distributed memory variant, and the Llama 3.1 with LLM2vec framework. Their quality has been evaluated on a use case with available ontologies from several application domains. The best results were achieved with InferSent and SentenceBERT.
Permanent Link: https://hdl.handle.net/11104/0373625

0643771 - ÚI 2027 RIV CH eng C - Conference Paper (international conference)
Purgal, S. J. - Cerna, David M. - Kaliszyk, C.
Differentiable Inductive Logic Programming in High-Dimensional Space.
Learning and Reasoning: IJCLR 2024 Proceedings. Cham: Springer, 2026 - (Dai, W.), s. 147-162. Lecture Notes in Computer Science, 16059. ISBN 978-3-032-09086-7. ISSN 0302-9743.
[IJCLR 2024: International Joint Conference on Learning & Reasoning /4./. Nanjing (CN), 19.09.2024-22.09.2024]
R&D Projects: GA ČR(CZ) GF22-06414L
Institutional support: RVO:67985807
Keywords : Differentiable Logics * Inductive Logic Programming * Predicate Invention
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Result website:https://doi.org/10.1007/978-3-032-09087-4_10
DOI: https://doi.org/10.1007/978-3-032-09087-4_10
Synthesizing large logic programs through symbolic Inductive Logic Programming (ILP) typically requires intermediate definitions. However, cluttering the hypothesis space with invented predicates typically degrades performance. In contrast, gradient descent provides an efficient method to find solutions within high-dimensional spaces, a property not fully exploited by neuro-symbolic ILP approaches. We propose extending the differentiable ILP framework by large-scale (extending its small-scale) predicate invention to emulate search through a high-dimensional space, and thus allowing us to exploit the efficacy of gradient descent. We show that large-scale predicate invention is beneficial to differentiable inductive synthesis and results in learning capabilities beyond existing neuro-symbolic ILP systems. Furthermore, we achieve these results without specifying the precise structure of the solution within the inductive bias.
Permanent Link: https://hdl.handle.net/11104/0373626

0642337 - ÚI 2027 RIV CH eng C - Conference Paper (international conference)
Kalina, Jan
Some Regularized Tools for Dimensionality Reduction.
Artificial Intelligence and Soft Computing. 24th International Conference ICAISC 2025, Proceedings Part II. Cham: Springer, 2026 - (Rutkowski, L.; Scherer, R.; Korytkowski, M.; Pedrycz, W.; Tadeusiewicz, R.; Zurada, J.), s. 243-253. Lecture Notes in Computer Science, 15949. ISBN 978-3-032-03707-7. ISSN 0302-9743.
[ICAISC 2025: International Conference on Artificial Intelligence and Soft Computing /24./. Zakopane (PL), 22.06.2025-26.06.2025]
R&D Projects: GA ČR(CZ) GA25-15490S
Grant - others:AV ČR(CZ) StrategieAV21/34
Program: StrategieAV
Institutional support: RVO:67985807
Keywords : dimensionality * regularization * shrinkage * classification * robustness
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Result website:https://doi.org/10.1007/978-3-032-03708-4_20
DOI: https://doi.org/10.1007/978-3-032-03708-4_20
Dimensionality reduction has become a commonly used part of the analysis of complex economic data. The aim of this work is to study the potential of regularized tools for dimensionality reduction methods and possibly to propose some novel regularized tools. The regularization in the form of shrinkage allows to improve numerical stability of the tools for high-dimensional data and also to reduce variability of parameter estimates at the cost of introducing bias. Firstly, a robust regularized version of the coefficient of multiple correlation is proposed, which may be exploited within a Minimum Relevance Maximum Redundancy supervised variable selection. Secondly, the ridge regularization is discussed not to bring any modification of principal component analysis; this is true also for robust versions of principal component analysis.
Permanent Link: https://hdl.handle.net/11104/0372260

0643476 - ÚI 2026 RIV US eng C - Conference Paper (international conference)
Fradi, N. - Cabessa, Jérémie - Zeglaoui, A.
Few-Shot High-Dimensional Feature Selection with Lagrange Programming Neural Networks.
IJCNN 2025: International Joint Conference on Neural Networks Conference Proceedings. Piscataway: IEEE, 2025. ISBN 979-8-3315-1042-8.
[IJCNN 2025: International Joint Conference on Neural Networks. Rome (IT), 30.06.2025-06.07.2025]
R&D Projects: GA ČR(CZ) GA25-15490S
Institutional support: RVO:67985807
Keywords : Recurrent Neural Networks * Lagrange Programming Neural Networks (LPNNs) * Few-shot Learning * Feature Selection * LASSO * High-Dimensional Data
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Result website:https://doi.org/10.1109/IJCNN64981.2025.11227603
DOI: https://doi.org/10.1109/IJCNN64981.2025.11227603
Few-shot learning and high-dimensional feature selection represent significant challenges in machine learning. In this work, we introduce LPNN-FS, a novel feature selection (FS) technique based on a Lagrange Programming Neural Network (Pk-LPNN) originally developed in the context of compressive sampling. LPNN-FS is a continuous-time recurrent neural network whose dynamics inherently converges to an optimal sparse solution of the LASSO, with its equilibrium point acting as a feature selector. Evaluated in combination with specific downstream classifiers, our model is tested on both synthetic and real-world benchmark datasets characterized by high dimensionality and a limited

number of observations. The results demonstrate that LPNN-FS competes with or outperforms state-of-the-art methods such as LASSO, k-best, and sparse PCA in this few-shot, high-dimensional setting. Overall, this study opens new avenues for leveraging compressive sampling-based techniques in challenging feature selection problems.
Permanent Link: https://hdl.handle.net/11104/0373340

0642774 - ÚI 2026 RIV US eng C - Conference Paper (international conference)
Kalina, Jan
Local Sensitivity Analysis of Highly Robust Regression Estimators.
IJCNN 2025: International Joint Conference on Neural Networks Conference Proceedings. Piscataway: IEEE, 2025. ISBN 979-8-3315-1042-8.
[IJCNN 2025: International Joint Conference on Neural Networks. Rome (IT), 30.06.2025-06.07.2025]
R&D Projects: GA ČR(CZ) GA24-10078S
Institutional support: RVO:67985807
Keywords : outliers * robustness * linear regression * implicit weighting * local sensitivity * subsample sensitivity
OECD category: Statistics and probability
Result website:https://doi.org/10.1109/IJCNN64981.2025.11227341
DOI: https://doi.org/10.1109/IJCNN64981.2025.11227341
Robust regression methods are essential for estimating parameters in linear regression models, especially when data is contaminated by outliers or small fluctuations, common in realworld applications. This paper investigates the local sensitivity of robust regression estimators, focusing on how small modifications in the data affect their predictions. Local sensitivity analysis (LSA) offers valuable insights into the robustness of regression models, a crucial property in decision-making fields like economics, finance, and engineering, where data integrity is often compromised. We examine robust estimators based on implicit weights, including the least trimmed squares (LTS) and least weighted squares (LWS) estimators, along with their regularized versions. A novel adaptive version of the regularized LWS estimator is proposed, incorporating data-driven weights. Experiments on publicly available datasets show that while the LTS and LTSlasso estimators exhibit high local sensitivity, LWS and LWSlasso estimators—especially with adaptive weights—demonstrate superior robustness and predictive performance. These findings highlight the importance of considering local sensitivity in robust regression models, particularly in economic data, where small fluctuations can significantly impact predictions and decisions. The importance of local sensitivity for machine learning is also discussed, with suggestions for future applications in robust machine learning models, particularly in economic contexts.
Permanent Link: https://hdl.handle.net/11104/0372644

0642661 - ÚI 2026 RIV CZ eng C - Conference Paper (international conference)
Pérez Cabrera, Iván - Vomlel, J.
Structural Learning of BN2A models.
Proceedings of the 13th Workshop on Uncertainty Processing (WUPES'25). Prague: MatfyzPress, 2025 - (Studený, M.; Ay, N.; Capotorti, A.; Csirmaz, L.; Jiroušek, R.; Kleiter, G.; Shenoy, P.), s. 176-187. ISBN 978-80-7378-525-3.
[Workshop on Uncertainty Processing (WUPES'25). Třešť (CZ), 04.06.2025-07.06.2025]
Institutional support: RVO:67985807
Bayesian networks are a popular framework for modeling probabilistic relationships between random variables and have been used successfully in educational tests. There is interest in a particular type of Bayesian networks we have called BN2A, which are characterized as bipartite networks, where the

first layer consists of hidden variables (which commonly represent skills) and the second layer consists of observed variables (which represent questions in a test). In BN2A models all variables are assumed to be binary. The variables in the second layer depend on the variables in the first layer and this dependence is characterized by conditional probability tables representing Noisy-AND models. In this work, we propose an Expectation-Maximization (EM) algorithm for learning the structure of BN2A models, that is, for learning the relationship between hidden variables and observed variables. To test the structural learning algorithm, we conducted two experiments. For the first experiment, we used synthetic data generated from a BN2A model that we previously defined, while for the second experiment we used a well-known real-world dataset in the field of Cognitive Diagnostic Models, the Fraction Subtraction dataset. Our proposed algorithm has interesting potential use cases. One key application is to generate a reasonably accurate BN2A structure model for educational diagnosis, particularly in scenarios where no prior model exists. Depending on the required level of accuracy, the estimated model can be used directly to analyze skill profiles or serve as an initial framework for test designers, who can further refine it before implementation.
Permanent Link: https://hdl.handle.net/11104/0372532

0643745 - ÚI 2026 RIV DE eng C - Conference Paper (international conference)
Ladin, T. - Korel, L. - Holeňa, Martin
Textual embeddings with word-type-weighted word2vec and graph neural networks.
Proceedings of the 25th Conference Information Technologies – Applications and Theory (ITAT 2025). Aachen: Technical University & CreateSpace Independent Publishing, 2025 - (Ciencialová, L.; Čechová, M.; Denti, L.; Holeňa, M.; Mráz, F.; Ostertág, R.; Pardubská, D.; Plátek, M.; Stanek, M.), s. 105-113. CEUR Workshop Proceedings, 4092. ISSN 1613-0073.
[ITAT 2025: Information technologies -- Applications and Theory /25./. Telgárt (SK), 26.09.2025-30.09.2025]
Institutional support: RVO:67985807
Keywords : text representation learning * text embedding * text preprocessing * word2vec
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Result website:https://ceur-ws.org/Vol-4092/paper8.pdf
The increasing use of neural networks for semantic text analysis highlights the need for more efficient methods without compromising quality. We propose a lightweight approach combining traditional word embeddings with graph convolutional networks (GCNs) to improve sentence similarity recognition. By incorporating syntactic information, such as parts of speech and grammatical functions, our method reduces computational demands at least 2.5 times while maintaining accuracy, when tested statistically indifferent to larger models.
Permanent Link: https://hdl.handle.net/11104/0373600

0643604 - ÚI 2026 RIV CZ eng C - Conference Paper (international conference)
Kalina, Jan
The role of agent systems in complex modeling and decision making.
The 19th International Days of Statistics and Economics Conference Proceedings.. Slaný: Melandrium, 2025 - (Löster, T.; Pavelka, T.), s. 121-130. ISBN 978-80-87990-35-3.
[International Days of Statistics and Economics /19./. Prague (CZ), 04.09.2025-05.09.2025]
Institutional support: RVO:67985807
Keywords : multi-agent systems * machine learning * optimization * robust statistics * uncertainty
Result website:https://msed.vse.cz/msed_2025/article/msed-2025-808-paper.pdf

Agent systems, particularly multi-agent systems, are becoming increasingly important tools for modeling and decision-making in complex environments, including finance, optimization, and epidemics. These systems simulate interactions between autonomous agents, which are individual entities that make decisions based on predefined rules, enabling the study of decentralized phenomena such as market behavior, social interactions, and information diffusion. By incorporating advanced statistical techniques, agent systems offer a more dynamic and adaptable approach compared to traditional, centralized models, capturing emergent behaviors and optimizing decisions in uncertain environments. This paper explores the role of agent systems in addressing challenges in complex domains, with a focus on their application in finance, optimization, epidemic modeling, and combating disinformation. The integration of agent-based models with principles of statistics and information theory is examined as a key factor driving the effectiveness of these systems in real-world applications. Through this examination, the paper highlights the growing significance of agent systems in tackling modern, decentralized problems that traditional methods have struggled to address.
Permanent Link: https://hdl.handle.net/11104/0373481

0643744 - ÚI 2026 C - Conference Paper (international conference)
Sedlár, Igor
Relevant Epistemic Logic and Knowledge as Belief Based on Correct Evidence.
[TbiLLC 2025: The International Tbilisi Symposium on Logic, Language and Computation /15./. Kutaisi (GE), 08.09.2025-12.09.2025]
Institutional support: RVO:67985807
Result website:
https://events.illc.uva.nl/Tbilisi/Tbilisi2025/uploaded_files/uploadlibraryitem/abstracts/28.pdf
Relevant logics avoid some problematic principles of classical and intuitionistic logic, such as explosion – everything follows from a contradiction – or the paradoxes of implication – for example, that every implication follows from its consequent [7,12]. Relevant epistemic logics are epistemic logics based on relevant logics [1,3,8,13,14,15,16,17,19,20,21,22]. The motivation for studying them is that they provide a much finer-grained model of epistemic attitudes than that provided by classical epistemic logic. Relevant epistemic logics avoid many problematic closure principles rooted in classical logic – for example, a belief base may be inconsistent but non-trivial, or it may contain a consequent of an implication without containing the implication itself. In addition, informational interpretations of relevant logics [6,7,9,11] suggest that relevant logics provide a natural framework for epistemic logic. Existing relevant epistemic logics model variants of evidence-based belief. In this paper we focus on the interplay between evidence, belief and knowledge. This fills a gap in the literature and complements recent extensions of relevant logics with knowledge-like operators [22]. In particular, we present a reductionist framework in which belief and knowledge are based on various kinds of evidence. Our main technical result is a representation theorem for a certain class of distributive lattices with operators. This theorem entails a completeness result for a large family of reductionist relevant epistemic logics of knowledge, evidence and belief.
Permanent Link: https://hdl.handle.net/11104/0373599

0643761 - ÚI 2026 CZ cze L1 - Norms
Davidová, D. - Konkolová, R. - Řihák, P. - Geletič, Jan (Other) ... Total 33 authors
Koncepce zeleně města Ostravy.
[Greenery Concept of the City of Ostrava.]
978-80-909595-2-1 ; Statutární město Ostrava / Městský ateliér prostorového plánování a architektury ; 2025
Institutional support: RVO:67985807

Keywords : koncepce * Ostrava * městská zeleň
OECD category: Urban studies (planning and development)
Result website:
https://www.mappaostrava.cz/data/storage/Koncepce%20zelen%C4%9B/Koncepce%20zelen%C4%9B%20-%20dokumenty/Koncepce%20zelen%C4%9B%20m%C4%9Bsta%20Ostravy%20-%20textov%C3%A1%20%C4%8D%C3%A1st.pdf
Ostrava se může pochlubit rozsáhlými plochami zeleně v městské a příměstské krajině. Jejich kvalita je však v současnosti velkou výzvou. Stav, funkčnost či dostupnost zeleně často neodpovídají potřebám obyvatel. Přitom právě kvalita zeleně zásadně ovlivňuje, jak se lidem ve městě žije, jak město vnímají a zda v něm chtějí trávit volný čas. Městská krajina Ostravy má specifické prostorové uspořádání – tři hlavní obytná centra a řadu menších částí často venkovského charakteru, které jsou v těsném kontaktu s příměstskou krajinou. Rekreační potenciál příměstské krajiny zůstává do značné míry nevyužitý z důvodu špatné dostupnosti a prostupnosti. Vzhledem k náročnosti a nákladnosti péče o městské parky a další zelené plochy se proto nabízí využití příměstské krajiny jako vhodné alternativy pro každodenní rekreaci. Důležitou roli v tomto kontextu hrají řeky, které přirozeně propojují městskou a příměstskou krajinu. Vytvářejí zelené osy s potenciálem pro odpočinek, pohyb i kontakt s přírodou. Městská krajina v Ostravě zaujímá plochu 10 748 ha, příměstská krajina 10 675 ha. Na podobě zeleně v Ostravě se podílí řada aktérů. Jsou to správci zeleně, vlastníci pozemků, městské obvody i samotní obyvatelé. Sladit jejich očekávání a potřeby je klíčové pro efektivní a smysluplnou správu zelených ploch. Koncepce zeleně pomůže vytvořit město, které je příjemné a udržitelné. Město, které umožňuje každému obyvateli Ostravy, aby se do 5 minut chůze dostal do atraktivní zeleně. Koncepce navrhuje, jak se kvalitně starat o stávající zeleň a kam je potřeba doplnit novou.

Ostrava can boast extensive green areas in the urban and suburban landscape. However, their quality is currently a major challenge. The condition, functionality, or accessibility of green spaces often does not meet the needs of residents. Yet it is precisely the quality of greenery that fundamentally influences how people experience the city, how they perceive it, and whether they want to spend their free time there. The urban landscape of Ostrava has a specific spatial structure – three main residential centers and a number of smaller areas, often with a rural character, which are in close contact with the suburban landscape. The recreational potential of the suburban landscape remains largely untapped due to poor accessibility and permeability. Given the demanding and costly maintenance of urban parks and other green areas, the suburban landscape offers a suitable alternative for everyday recreation. In this context, rivers play an important role, as they naturally connect the urban and suburban landscapes. They create green corridors with potential for relaxation, movement, and contact with nature. The urban landscape of Ostrava covers an area of 10,748 ha, while the suburban landscape covers 10,675 ha. Many actors contribute to the form of greenery in Ostrava. These include green space managers, landowners, municipal districts, and the residents themselves. Aligning their expectations and needs is key to effective and meaningful management of green areas. The Greenery Concept will help create a city that is pleasant and sustainable—a city where every resident of Ostrava can reach an attractive green space within a 5-minute walk. The concept proposes how to properly care for existing greenery and where new greenery needs to be added.
Permanent Link: https://hdl.handle.net/11104/0373620

0642665 - ÚI 2026 CZ L5 - Specialized public database
Geletič, Jan
Satellite remote sensing dataset for urban climate in Bergen and Prague.
2024
R&D Projects: GA TA ČR(CZ) TO01000219
Institutional support: RVO:67985807
Keywords : land and surface temperature * landsat * Prague * Bergen * Land surface emissivity

OECD category: Meteorology and atmospheric sciences
Result website:
https://zenodo.org/records/10458544
Shared dataset contains remote sensing data necessary for a land surface temperature (LST) calculation. Layers were processed for two cities; Bergen (Norway) and Prague (Czech Republic). Original data were downloaded from the U.S. Geological Survey (https://doi.org/10.5066/P975CC9B). For a LST calculation, a land surface emissivity (LSE) algorithm was used.
Processing of LANDSAT-8 and LANDSAT-9 data
Reading metadata file for each scene (*MTL.txt)
Reprojection of scene (note: Bergen scenes have two UTM Zones; 31N and 32N)
Cloud cover raster (see folder 01_CloudCover)
Calculation Top-Of-Atmosphere (TOA) reflectance for bands 10 and 11 (TB_10 and TB_11), saving to folder 02_TOA-reflectance
Calculating of NDVI and Fractional Vegetation Cover (FVC), saving to folder 03_FVC-NDVI
Calculating of LSE for both bands, same as different and mean LSE (folder 04_LSE)
Calculating of LST
Saving of metadata file (see *metadata.txt)
Permanent Link: https://hdl.handle.net/11104/0372536

0642667 - ÚI 2026 eng L5 - Specialized public database
Bauerová, P. - Šindelářová, A. - Keder, J. - Vlček, O. - Patiño, W. - Resler, Jaroslav - Krč, Pavel - Řezníček, Hynek - Geletič, Jan - Bureš, Martin - Eben, Kryštof - Belda, M. - Radović, J. - Fuka, V. - Ezau, I.
TURDATA: a database of low-cost air quality and remote sensing measurements for the validation of micro-scale models in the real Prague urban environments.
2024
R&D Projects: GA TA ČR(CZ) TO01000219
Institutional support: RVO:67985807
Keywords : air quality * monitoring * low-cost sensor network * street * LIDAR
OECD category: Meteorology and atmospheric sciences
Result website:
https://zenodo.org/records/10655033
TURDATA is a supplementary data set for the TURBAN project Prague observation campaign described in the manuscript Bauerová et al. 2024 (submitted for publication). The measurement campaign focused on air pollution and meteorological measurement, including vertical profiles in selected part of Prague city centre called here as Legerova domain. Within this area, one professional meteorological station (MS) Prague Karlov and one reference traffic air quality monitoring (AIM) station Prague 2-Legerova (classified as traffic hotspot) are located. To gain high spatial and temporal resolution data, the supplementary measurement network was established, which consisted of:
- 20 combined low-cost sensor (LCS) stations for monitoring of PM10, PM2.5, NO2 and O3 concentrations (using Plantower PMS7003 particle counters and Envea Cairsense electrochemical sensors) placed in different sites and different height levels AGL (higher = H, lower = L),
- 1 mobile telescopic meteorological mast for measuring temperature, relative humidity, wind velocity and direction and air pressure (using 2D ultrasonic anemometer Gill WindSonic 60 and weather station Gill MetConnect THP),
- 1 MTP-5-He microwave radiometer (MWR; Attex) for temperature vertical profile,
- 1 StreamLine XR Doppler LIDAR (HALO Photonics) for wind vertical profile.
Permanent Link: https://hdl.handle.net/11104/0372539

0643022 - ÚI 2026 cze U - Conference, Workshop Arrangement
Geletič, Jan - Květoňová, Veronika - Krč, Pavel
Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku.
[Praha, 05.11.2025-05.11.2025, (W-CST)]
EU Projects: European Commission(XE) 101137851 - CARMINE
Institutional support: RVO:67985807
OECD category: Meteorology and atmospheric sciences
Odbor ochrany prostředí MHMP ve spolupráci s Ústavem informatiky Akademie věd ČR a Fakultou životního prostředí České zemědělské univerzity uspořádal další Konzultační setkání na toto téma dne 5.11.2025 v prostorech Pražského informačního centra.
Permanent Link: https://hdl.handle.net/11104/0372866

0643026 - ÚI 2026 CZ cze A - Abstract
Květoňová, Veronika - Lehnert, M. - Geletič, Jan
Pocitové mapování jako nástroj identifikace tepelně (ne)příjemných lokalit v Praze.
Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. Praha: Odbor ochrany prostředí MHMP, 2025.
[Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. 05.11.2025-05.11.2025, Praha]
Grant - others:AV ČR(CZ) StrategieAV21/36
Program: StrategieAV
Institutional support: RVO:67985807
OECD category: Meteorology and atmospheric sciences
Result website:https://praha.eu/web/portalzp/w/konzult-setk-praha-11-25-zvys-odolnosti-mest-prostredi-vuci-extremnimu-horku
Rostoucí urbanizace a projevy změny klimatu s sebou přinášejí negativní dopady na města a jejich obyvatele, kteří jsou vystaveni riziku zhoršení fyzického i duševního zdraví. Tyto výzvy podtrhují nutnost efektivních urbanistických řešení vedoucích ke zpříjemnění tepelného prostředí. V posledních desetiletích se studiem městského klimatu zabývá řada exaktně orientovaných studií, nicméně většina z nich je založena na analýzách meteorologických charakteristik (nejčastěji teploty vzduchu nebo povrchu) či detailněji na tepelné expozici. Pro komplexní pochopení tepelného prostředí a následného plánování opatření ke snížení tepelného stresu a celkového zpříjemnění městského (tepelného) prostředí je však důležité zohlednit také další faktory. Za tímto účelem byla v létě 2025 provedena na území hlavního města Prahy kampaň zaměřená na vnímání pocitové teploty v souvislosti s horkými letními podmínkami. Výsledky identifikují oblasti vnímané obyvateli jako nepříjemně horké, stejně jako lokality asociované s chladnějšími tepelnými podmínkami. Tyto identifikované lokality budou dále detailně analyzovány na úrovni mikroměřítka, a to v kombinaci s informacemi o reálném tepelném prostředí a interakcích obyvatelstva.
Permanent Link: https://hdl.handle.net/11104/0372867

0643027 - ÚI 2026 RIV CZ cze A - Abstract
Řezníček, Hynek - Geletič, Jan - Belda, M. - Resler, Jaroslav - Nosek, Š. - Krč, Pavel
Projekt MicroBUS – Mikroměřítkové nástroje pro kvantifikaci dopravně - urbanistických scénářů v městské zástavbě z pohledu imisních limitů.
[MicroBUS project – microscale instruments for quantifying traffic and development related urban scenarios concerning air pollution limits.]
Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. Praha: Odbor ochrany prostředí MHMP, 2025.
[Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. 05.11.2025-05.11.2025, Praha]

R&D Projects: GA TA ČR(CZ) SQ01010181
Institutional support: RVO:67985807
Keywords : large-eddy simulation * urban microclimate * PALM-4U * air pollution * wind tunnel modeling * street trees
OECD category: Meteorology and atmospheric sciences
Result website:
https://praha.eu/web/portalzp/w/konzult-setk-praha-11-25-zvys-odolnosti-mest-prostredi-vuci-extremnimu-horku

ZÁKLADNÍ ÚDAJE: Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. Praha: Odbor ochrany prostředí MHMP, 2025. [Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku. 05.11.2025-05.11.2025, Praha]. ABSTRAKT: Cílem projektu MicroBUS je vytvoření nových nástrojů pro hodnocení rozptylu dopravních emisí v městské zástavbě ve vysokém časovém a prostorovém rozlišení. K jejich vytvoření bude využita synergie pokročilých metod, jako jsou výpočetní mechanika tekutin, experimenty v aerodynamickém tunelu, již naměřené koncentrace a mikroklimatické parametry v reálném prostředí městských hotspotů, a statistické metody pro odvození ročních statistik, pro něž jsou stanoveny imisní limity. Hlavním výstupem projektu bude vyhodnocení stávající kvality ovzduší v místním měřítku, včetně možného dopadu dopravních scénářů v městských hotspotech. Předpokládáme, že výsledky využijí městské úřady a orgány státní správy při návrhu opatření k dosažení imisních limitů.

BASIC INFORMATION: Consultation meeting Increasing the resilience of urban environments to extreme heat. Prague: Department of Environmental Protection, Prague City Hall, 2025. [Consultation meeting Increasing the resilience of urban environments to extreme heat. November 5, 2025-November 5, 2025, Prague]. ABSTRACT: The aim of the MicroBUS project is to create new tools for assessing the dispersion of transport emissions in urban areas with high temporal and spatial resolution. To create these tools, we will use the synergy of advanced methods such as computational fluid dynamics, wind tunnel experiments, already measured concentrations and microclimatic parameters in the real environment of urban hotspots, and statistical methods for deriving annual statistics for which emission limits are set. The main output of the project will be an assessment of the current air quality on a local scale, including the possible impact of traffic scenarios in urban hotspots. We expect that the results will be used by municipal authorities and state administration bodies in designing measures to achieve emission limits.
Permanent Link: https://hdl.handle.net/11104/0372872

0643613 - ÚI 2026 RIV CZ eng V - Research Report
Brabec, Marek - Malý, Marek - Malá, Ivana
DC 5.3 Odhady kovariancí odhadnutého pole koncentrací.
Prague: ICS CAS, 2025. 29 s.
R&D Projects: GA TA ČR(CZ) SS02030031
Institutional support: RVO:67985807
Keywords : statistický design * optimalizace * minimax * prostorový statistický design
OECD category: Statistics and probability
Obsahem tohoto dokumentu je popis výsledku typu O: SS02030031-V96, Předběžná optimalizace pro zadané scénáře. Je popsána implementace navrženého algoritmu v software R s využitím dříve dosažených teoretických výsledků. Prostřednictvím této implementace byly získány výsledky optimalizace umístění stanic při zadaných scénářích, které jsou hlavním obsahem výsledku. Je ukázán dopad některých modifikací základního scénáře.
Permanent Link: https://hdl.handle.net/11104/0373498

0643081 - ÚI 2026 US eng V - Research Report
Ráčková, L. - Brabec, Marek - Klinka, M. - Králík, M. - Brázdil, M. - Dobrovolná, J.
Linking Multi-Night Sleep Heart Rate to Vigilance: Insights from Antarctic Field Research.
v1. - Durham: ResearchSquare, 2025. ResearchSquare Preprints, rs-7768957.
Institutional support: RVO:67985807
Keywords : heart rate * sleep duration * sleep * vigilance * performance * Antarctica * reaction time
Result website:https://doi.org/10.21203/rs.3.rs-7768957
DOI: https://doi.org/10.21203/rs.3.rs-7768957
This study investigated the associations between sleep heart rate, sleep duration, and Psychomotor Vigilance Task performance using repeated measures data collected during an Antarctic expedition. Data were collected without inducing sleep restriction, reflecting naturalistic sleep patterns. Results revealed that a higher mean sleep heart rate on the preceding night was significantly associated with slower reaction time on the PVT. In contrast, association with sleep duration did not reach statistical significance. Interestingly, being a first-time participant was a significant predictor of faster reaction times, whereas age was not, suggesting that the observed performance differences are more likely attributable to an adaptive response to environmental novelty rather than age-related cognitive variation. Night-to-night variations in sleep parameters were not significant predictors. These findings suggest that mean sleep heart rate may serve as a more effective metric than sleep duration for predicting vigilant performance in real-life contexts without induced sleep deprivation. Despite limitations of a modest sample size and data from a single expedition, this study offers novel insights into optimizing human performance in extreme environments and informing risk mitigation strategies. Future research should replicate these findings across diverse contexts and integrate longitudinal physiological and psychological assessments for a comprehensive understanding of performance variability.
Permanent Link: https://hdl.handle.net/11104/0372926

0643171 - ÚI 2026 CZ eng V - Research Report
Brabec, Marek - Juruš, P. - Malý, Marek - Pelikán, Emil - Šrotýř, M. - Turčičová, Marie
Souhrnná zpráva projektu LINE za rok 2025.
Prague: ICS CAS, 2025. 145 s. Technical Report.
Institutional support: RVO:67985807
Tato zpráva byla vytvořena řešitelským týmem Ústavu informatiky AV ČR, v.v.i. v Praze pro potřeby společnosti GasNet, s.r.o. na základě objednávky č. 4500058090. Ve zprávě jsou shrnuty výsledky činností prováděných v roce 2025. Je popsán proces zpracování vstupních dat a jsou řešeny úlohy detekce odlehlých pozorování spotřeby, časoprostorových trendů a analýzy bilančních rozdílů
Permanent Link: https://hdl.handle.net/11104/0373032

0643739 - ÚI 2026 E - Electronic Document
Geletič, Jan - Květoňová, Veronika - Krč, Pavel
Konzultační setkání Zvyšování odolnosti městského prostředí vůči extrémnímu horku.
Praha: Strategie adaptace hl. m. Prahy na klimatickou změnu, 2025
Institutional support: RVO:67985807
Result website:https://adaptacepraha.cz/konzultacni-setkani-zvysovani-odolnosti-mestskeho-prostredi-vuci-extremnimu-horku/
Odbor ochrany prostředí MHMP ve spolupráci s Ústavem informatiky Akademie věd ČR a Fakultou životního prostředí České zemědělské univerzity uspořádal další Konzultační setkání na toto téma dne 5. 11. 2025 v prostorech Pražského informačního centra.
Permanent Link: https://hdl.handle.net/11104/0373596

0642674 - ÚI 2026 CZ cze E - Electronic Document
Květoňová, Veronika - Geletič, Jan - Krč, Pavel - Resler, Jaroslav
Spojení zkušeností obyvatel s vědeckými daty rozšiřuje poznání o tepelné zátěži.
Praha: Akademie věd České republiky, 2025
Grant - others:AV ČR(CZ) StrategieAV21/36
Program: StrategieAV
Institutional support: RVO:67985807
Keywords : popularizace vědy * popularisation of science
OECD category: Meteorology and atmospheric sciences
Result website:
https://www.avcr.cz/cs/o-nas/Z-Akademie/Spojeni-zkusenosti-obyvatel-s-vedeckymi-daty-rozsiruje-poznani-o-tepelne-zatezi/
Co říkají data o letních vedrech ve městě a co pociťují lidé? Spojením numerických modelů a zkušeností obyvatel vzniká nový pohled na tepelný stres ve veřejném prostoru. Proč se vyplatí zapojit veřejnost do bádání a jak občanská věda doplňuje exaktní vědu, vysvětlují Veronika Květoňová, Jan Geletič, Pavel Krč a Jaroslav Resler z Ústavu informatiky AV ČR.
Permanent Link: https://hdl.handle.net/11104/0372546