Záznamy vložené do ASEP za UI (1. 10. – 31. 10. 2021)

0546619 - ÚI 2022 US eng M - Část monografie knihy
Kalina, Jan - Tobišková, Nicole
Ethical Aspects of Information-Based Medicine (With a Focus on Mental Health).
Ethical Implications of Reshaping Healthcare With Emerging Technologies. Hershey: IGI Global, 2022 - (Musiolik, T.), s. 42-70. ISBN 978-1-7998-7888-9
Grant CEP: GA ČR(CZ) GA19-05704S; GA MZd(CZ) NU21-08-00432
Institucionální podpora: RVO:67985807
DOI: 10.4018/978-1-7998-7888-9.ch003
Modern advanced tools of artificial intelligence assist healthcare professionals in a variety of complex tasks related to medical care. Digitalization and automation accelerate the development and deployment of innovative artificial intelligence tools tailor-made for clinical applications; decision support systems represent an important example of such tools. This chapter is devoted to discussing the role of artificial intelligence in current and prospective medical care and ethical aspects of their deployment. As developed countries currently go through remarkable transforms of medical care involving informatization and centering around medical information and knowledge, this chapter also discusses future ideals of medical care characterized by the concept of information-based medicine. Ethical and patient safety implications of using artificial intelligence within information-based medicine are overviewed here. Specific attention is paid to mental healthcare and ethical aspects of using artificial intelligence in its context.
Trvalý link: http://hdl.handle.net/11104/0323063

0549873 - ÚI 2022 CH eng M - Část monografie knihy
Kůrková, Věra
Some Implications of Interval Approach to Dimension for Network Complexity.
Computational Intelligence and Mathematics for Tackling Complex Problems 2. Cham: Springer, 2022 - (Cornejo, M.; Kóczy, L.; Medina-Moreno, J.; Moreno-García, J.), to appear
Grant CEP: GA ČR(CZ) GA18-23827S
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0325766

0549871 - ÚI 2022 CZ eng J - Článek v odborném periodiku
Kerechanin, J. V. - Frolov, A. A. - Bobrov, P.D. - Húsek, Dušan
Independent EEEG Components Are Meaningful (For Bci Based On Motor Imagery).
Neural Network World. Submitted 2020, 865-3728-1-SM (2022). ISSN 1210-0552
Impakt faktor: 1.518, rok: 2020
Trvalý link: http://hdl.handle.net/11104/0325765

0547626 - ÚI 2023 RIV NL eng J - Článek v odborném periodiku
Hůnová, I. - Brabec, Marek - Geletič, Jan - Malý, Marek - Dumitrescu, A.
Local fresh- and sea-water effects on fog occurrence.
Science of the Total Environment. Roč. 807, č. 2 (2022), č. článku 150799. ISSN 0048-9697. E-ISSN 1879-1026
Grant CEP: GA TA ČR(CZ) SS02030031
Grant ostatní: AV ČR(CZ) StrategieAV21/3

Fog is an important atmospheric phenomenon highly relevant to ecosystems and/or the environment. Two essential prerequisites of fog formation are the presence of fog condensation nuclei and water in the atmosphere. The aim of our study was to examine in detail how fog occurrence is influenced by water areas in the immediate vicinity of the fog observation site. We have used as input data long-term observations on fog occurrence measured at 56 professional meteorological stations in Romania in 1981–2017 and GIS-derived information on water areas and on two topographical indices, TWI and TPI, in the neighbourhood of these stations. We formulated three alternative models of different complexity based on a semiparametric generalised additive logistic model for the probability of fog occurrence with potentially nonlinear, smooth effects modelled via penalised splines. A radius of 9 km appeared to be the most influential when considering the water area in a circle around the fog observation station. Based on our results, we concluded that (i) the water area in the vicinity of the station is a factor influencing fog occurrence, (ii) the water's effect differs according to water type (freshwater or seawater proximity), and (iii) GIS-derived topographical indices are informative for the explanation of fog occurrence and their inclusion enhanced the fit of the models substantially. Our findings, based on a reliable long-term data set of fog occurrence and recent GIS-derived data, explored by a relevant statistical approach will enhance further considerations related to fog formation and its environmental consequences.
Trvalý link: http://hdl.handle.net/11104/0323823

Filip, P. - Burdová, K. - Valenta, Zdeněk - Jech, R. - Kokošová, V. - Baláž, M. - Mangia, S. - Michaeli, S. - Bareš, M. - Vojtíšek, L.
Tremor associated with similar structural networks in Parkinson's disease and essential tremor.
Introduction: Despite substantial clinical and pathophysiological differences, the characteristics of tremor in Parkinson's disease (PD) and essential tremor (ET) patients bear certain similarities. The presented study delineates tremor-related structural networks in these two disorders. Methods: 42 non-advanced PD patients (18 tremor-dominant, 24 without substantial tremor), 17 ET, and 45 healthy controls underwent high-angular resolution diffusion-weighted imaging acquisition to reconstruct their structural motor connectomes as a proxy of the anatomical interconnections between motor network regions, implementing state-of-the-art globally optimised probabilistic tractography. Results: When compared to healthy controls, ET patients exhibited higher structural connectivity in the cerebello-thalamo-cortical network. Interestingly, the comparison of tremor-dominant PD patients and PD patients without tremor yielded very similar results – higher structural connectivity in tremor-

dominant PD sharing multiple nodes with the tremor network detected in ET, despite the generally lower structural connectivity between basal ganglia and frontal cortex in the whole PD group when compared to healthy controls. Conclusion: The higher structural connectivity of the cerebello-thalamo-cortical network seems to be the dominant tremor driver in both PD and ET. While it appears to be the only tremor-related network in ET, its combination with large scale hypoconnectivity in the frontal cortico-subcortical network in PD may explain different clinical features of tremor in these two disorders.

Trvalý link: http://hdl.handle.net/11104/0326049

0549815 - ÚI 2022 RIV CZ eng M - Část monografie knihy
Geletič, Jan - **Řadová, Jana** - **Resler, Jaroslav** - **Krč, Pavel** - **Eben, Kryštof** - Belda, M. - Fuka, V. - Vlček, O.
Assessing the Sensitivities of Urban Climate Model PALM-4U.
Supercomputing in Science and Engineering 2019–2020. Ostrava: VSB – Technical University of Ostrava, 2021 - (Vondrák, V.; Kozubek, T.; Jansík, B.), s. 31-33. ISBN 978-80-248-4567-8
Institucionální podpora: RVO:67985807
https://www.it4i.cz/file/be151db89e56452e36511f5410126441/6419/Supercomputing%20in%20Science%20and%20Engineering%202019-2020.pdf
Investigation of the urban climate, and especially that of the urban heat island (UHI) phenomenon, still faces new challenges. Even with increasing computational capabilities and geographic information systems (GIS), there is a need for standardized research methods. Furthermore, research output should be applicable in practise. Microscale meteorological and climate models have been increasingly used for simulations of real urban city environments and especially the impacts of changes in the city structure on the environmental conditions that affect the inhabitants. In this context, various UHI mitigation measures are being considered, with greening of the environment as a typical example. Application of these measures, ´however, needs some prior information about their potential effectiveness or a cost-benefit analysis. For that, it is important to know how sensitive the environment is to the city layout (e.g., building height or
street width) and the material-specific parameters used to describe urban surfaces (e.g., reflectivity or roughness). Currently, the demand for scientifically-based urban climate studies is growing, particularly model-based studies that can provide reliable projections on a city or street-level scale.
Trvalý link: http://hdl.handle.net/11104/0325710

0549809 - ÚI 2022 RIV CZ eng M - Část monografie knihy
Resler, Jaroslav - **Krč, Pavel** - **Geletič, Jan** - Fuka, V.
Validation and Parallel Benchmarking of the New Radiative Transfer Model Version 3.0 for PALM-4U Urban Climate Model.
Supercomputing in Science and Engineering 2019–2020. Ostrava: VSB – Technical University of Ostrava, 2021 - (Vondrák, V.; Kozubek, T.; Jansík, B.), s. 26-27. ISBN 978-80-248-4567-8
Institucionální podpora: RVO:67985807
https://www.it4i.cz/file/be151db89e56452e36511f5410126441/6419/Supercomputing%20in%20Science%20and%20Engineering%202019-2020.pdf
PALM is an open-source large-eddy atmospheric model developed jointly by Leibniz University of Han- over and other European academic institutions. The Institute of Computer Science is the main author ofthe urban surface energy balance model (USM) and the multi-reflection radiative transfer model (RTM) for PALM. The current PALM version (6.0) contains an overall upgrade of the RTM (version 3.0), which increases the scope of modelled processes and enables modelling of larger areas by utilizing new algorithms with im- proved efficiency and scalability and reduced computational complexity. During the development and testing of this new complex model, we needed to run multiple simulations to verify the correctness and convergent properties of the model using different

scenarios, and to test the scalability and efficiency of the parallelization. This new version was described in the Geoscientific Model Development journal (GMD).
Trvalý link: http://hdl.handle.net/11104/0325706

0549813 - ÚI 2022 RIV CZ eng M - Část monografie knihy
Vlček, O. - Benešová, N. - Belda, M. - Fuka, V. - Resler, Jaroslav - Eben, Kryštof - Geletič, Jan - Krč, Pavel - Rosecký, Martin
Validation of the Model PALM-4U against Observation Campaign in Prague-Dejvice.
Supercomputing in Science and Engineering 2019–2020. Ostrava: VSB – Technical University of Ostrava, 2021 - (Vondrák, V.; Kozubek, T.; Jansík, B.), s. 28-30. ISBN 978-80-248-4567-8
Institucionální podpora: RVO:67985807
https://www.it4i.cz/file/be151db89e56452e36511f5410126441/6419/Supercomputing%20in%20Science%20and%20Engineering%202019-2020.pdf

Investigation of the urban climate has become very important during recent years and aims to help urban city authorities to plan efficient and economically feasible mitigation strategies to counteract the adverse effects of the urban heat island phenomenon (UHI). Different modelling approaches have been used for this purpose and models based on computational fluid dynamic (CFD) techniques represent the most advanced method. Two main approaches are used in this category. The Reynoldsaveraged Navier–Stokes equations (RANS) method calculates only the mean flow while the turbulence is fully parameterized, while the large-eddy simulation (LES) approach models explicitly the resolved turbulent flow and parameterizes only the subgridscale unresolved turbulence. The LES approach is more computationally demanding, but many studies have shown that it significantly outperforms RANS for simulations in complex urban environments.
Trvalý link: http://hdl.handle.net/11104/0325709

0546972 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Bohm, A. - Snopek, P. - Tothová, L. - Bezák, B. - Jajcay, Nikola - Vachalcová, M. - Uher, Tomáš - Kurečko, M. - Kissová, V. - Daňová, K. - Olejník, P. - Michalek, P. - Hlavatá, T. - Petríková, K. - Mojto, V. - Kyselovič, J. - Farský, Š.
Association Between Apelin and Atrial Fibrillation in Patients With High Risk of Ischemic Stroke.
Frontiers in Cardiovascular Medicine. Roč. 8, October 2021 (2021), č. článku 742601. E-ISSN 2297-055X
Institucionální podpora: RVO:67985807
Klíčová slova: trial fibrillation * apelin * biomarker * electrical atrial remodeling * ischemic stroke
Obor OECD: Cardiac and Cardiovascular systems
Impakt faktor: 6.050, rok: 2020
Způsob publikování: Open access
http://dx.doi.org/10.3389/fcvm.2021.742601
 DOI: 10.3389/fcvm.2021.742601
BACKGROUND: Atrial fibrillation (AF) is associated with high risk of stroke preventable by timely initiation of anticoagulation. Currently available screening tools based on ECG are not optimal due to inconvenience and high costs. Aim of this study was to study the diagnostic value of apelin for AF in patients with high risk of stroke. METHODS: We designed a multicenter, matched-cohort study. The population consisted of three study groups: a healthy control group (34 patients) and two matched groups of 60 patients with high risk of stroke (AF and non-AF group). Apelin levels were examined from peripheral blood. RESULTS: Apelin was significantly lower in AF group compared to non-AF group (0.694 ± 0.148 vs. 0.975 ± 0.458 ng/ml, p = 0.001) and control group (0.982 ± 0.060 ng/ml, p < 0.001), respectively. Receiver operating characteristic (ROC) analysis of apelin as a predictor of AF scored area under the curve (AUC) of 0.658. Apelin's concentration of 0.969 [ng/ml] had sensitivity =

0.966 and specificity = 0.467. Logistic regression based on manual feature selection showed that only apelin and NT-proBNP were independent predictors of AF. Logistic regression based on selection from bivariate analysis showed that only apelin was an independent predictor of AF. A logistic regression model using repeated stratified K-Fold cross-validation strategy scored an AUC of 0.725 ± 0.131. CONCLUSIONS: Our results suggest that apelin might be used to rule out AF in patients with high risk of stroke.

Trvalý link: http://hdl.handle.net/11104/0323481

0547633 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Dropka, N. - Böttcher, K. - Holeňa, Martin
Development and Optimization of VGF-GaAs Crystal Growth Process Using Data Mining and Machine Learning Techniques.
Crystals. Roč. 11, č. 10 (2021), č. článku 1218. ISSN 2073-4352. E-ISSN 2073-4352

The aim of this study was to assess the ability of the various data mining and supervised machine learning techniques: correlation analysis, k-means clustering, principal component analysis and decision trees (regression and classification), to derive, optimize and understand the factors influencing VGF-GaAs growth. Training data were generated by Computational Fluid Dynamics (CFD) simulations and consisted of 130 datasets with 6 inputs (growth rate and power of 5 heaters) and 5 outputs (interface position and deflection, and temperatures at various positions in GaAs). Data mining results confirmed a good dispersion of the training data without the feasibility of a dimension-ality reduction. Data clustering was observed in relation to the position of the crystallization front relative to the side heaters. Based on the statistical performance criteria and training results, decision trees identified the most decisive inputs and their ranges for a favorable interface shape and to keep GaAs temperature beyond limits for heavy arsenic evaporation. Decision trees are a recommendable machine learning technique with short training times and acceptable predictive accuracy based on small volume of CFD training data, capable of providing guidelines for understanding the crystal growth process, which is a prerequisite for the growth of low-cost, high-quality bulk crystals.

Trvalý link: http://hdl.handle.net/11104/0323829

0547096 - ÚI 2022 RIV US eng J - Článek v odborném periodiku
Manshour, Pouya - Montakhab, A.
Dynamics of social balance on networks: The emergence of multipolar societies.
Physical Review E. Roč. 104, č. 3 (2021), č. článku 034303. ISSN 2470-0045. E-ISSN 2470-0053

Within the context of social balance theory, much attention has been paid to the attainment and stability of unipolar or bipolar societies. However, multipolar societies are commonplace in the real world, despite the fact that the mechanism of their emergence is much less explored. Here, we

investigate the evolution of a society of interacting agents with friendly (positive) and enmity (negative) relations into a final stable multipolar state. Triads are assigned energy according to the degree of tension they impose on the network. Agents update their connections to decrease the total energy (tension) of the system, on average. Our approach is to consider a variable energy $\epsilon \in [0,1]$ for triads which are entirely made of negative relations. We show that the final state of the system depends on the initial density of the friendly links ρ_0. For initial densities greater than an ϵ-dependent threshold $\rho_{0c}(\epsilon)$, a unipolar (paradise) state is reached. However, for $\rho_0 \leq \rho_{0c}(\epsilon)$, multipolar and bipolar states can emerge. We observe that the number of stable final poles increases with decreasing ϵ where the first transition from bipolar to multipolar society occurs at $\epsilon_* \approx 0.67$. We end the paper by providing a mean-field calculation that provides an estimate for the critical (ϵ dependent) initial positive link density, which is consistent with our simulations.
Trvalý link: http://hdl.handle.net/11104/0323430

0548892 - FZÚ 2022 RIV US eng J - Článek v odborném periodiku
Acero, M. A. - Adamson, P. - Aliaga, L. - Filip, Peter - Hakl, František - Lokajíček, Miloš - Zálešák, Jaroslav
Extended search for supernovalike neutrinos in NOvA coincident with LIGO/Virgo detections.
Physical Review D. Roč. 104, č. 6 (2021), s. 1-10, č. článku 063024. ISSN 2470-0010. E-ISSN 2470-0029
Výzkumná infrastruktura: Fermilab-CZ II - 90113
Institucionální podpora: RVO:68378271 ; RVO:67985807
Klíčová slova: NOvA * supernova: model * LIGO * VIRGO * far detector * near detector
Obor OECD: Particles and field physics; Particles and field physics (UIVT-O)
Impakt faktor: 5.296, rok: 2020
Způsob publikování: Open access
 DOI: 10.1103/PhysRevD.104.063024

A search is performed for supernovalike neutrino interactions coincident with 76 gravitational wave events detected by the LIGO/Virgo Collaboration. For 40 of these events, full readout of the time around the gravitational wave is available from the NOvA Far Detector. For these events, we set limits on the fluence of the sum of all neutrino flavors of $F < 7(4) \times 10^{10}$ cm-2 at 90% C.L. assuming energy and time distributions corresponding to the Garching supernova models with masses 9.6(27) M⊙. Under the hypothesis that any given gravitational wave event was caused by a supernova, this corresponds to a distance of r>29(50) kpc at 90% C.L. Weaker limits are set for other gravitational wave events with partial Far Detector data and/or Near Detector data.
Trvalý link: http://hdl.handle.net/11104/0324931

0549074 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Brož, J. - Campbell, M. D. - Urbanová, J. - Nunes, M. A. - Brunerová, L. - Rahelic, D. - Janíčková Žďárská, D. - Taniwall, A. - Brabec, Marek - Berka, V. - Michalec, J. - Polák, J.
Characterization of Individualized Glycemic Excursions during a Standardized Bout of Hypoglycemia-Inducing Exercise and Subsequent Hypoglycemia Treatment—A Pilot Study.
Nutrients. Roč. 13, č. 11 (2021), č. článku 4165. E-ISSN 2072-6643
Institucionální podpora: RVO:67985807
Klíčová slova: type 1 diabetes * exercise * hypoglycemia * insulin therapy * glycemic excursion * hypoglycemia treatment
Obor OECD: Statistics and probability
Impakt faktor: 5.719, rok: 2020
Způsob publikování: Open access
http://dx.doi.org/10.3390/nu13114165
 DOI: 10.3390/nu13114165

The glycemic response to ingested glucose for the treatment of hypoglycemia following exercise in type 1 diabetes patients has never been studied. Therefore, we aimed to characterize glucose dynamics during a standardized bout of hypoglycemia-inducing exercise and the subsequent hypoglycemia treatment with the oral ingestion of glucose. Ten male patients with type 1 diabetes performed a standardized bout of cycling exercise using an electrically braked ergometer at a target heart rate (THR) of 50% of the individual heart rate reserve, determined using the Karvonen equation. Exercise was terminated when hypoglycemia was reached, followed by immediate hypoglycemia treatment with the oral ingestion of 20 g of glucose. Arterialized blood glucose (ABG) levels were monitored at 5 min intervals during exercise and for 60 min during recovery. During exercise, ABG decreased at a mean rate of 0.11 ± 0.03 mmol/L·min−1 (minimum: 0.07, maximum: 0.17 mmol/L·min−1). During recovery, ABG increased at a mean rate of 0.13 ± 0.05 mmol/L·min−1 (minimum: 0.06, maximum: 0.19 mmol/L·min−1). Moreover, 20 g of glucose maintained recovery from hypoglycemia throughout the 60 min postexercise observation window.
Trvalý link: http://hdl.handle.net/11104/0325100

0547193 - ÚI 2022 US eng J - Článek v odborném periodiku
Cakan, C. - Jajcay, Nikola - Obermayer, K.
neurolib: A Simulation Framework for Whole-Brain Neural Mass Modeling.
Cognitive Computation. Online 12 October 2021 (2021). ISSN 1866-9956. E-ISSN 1866-9964
Grant CEP: GA MŠk(CZ) EF19_074/0016209
Institucionální podpora: RVO:67985807
Klíčová slova: Whole-brain model * Neural mass model * Brain networks * Neuroinformatics
Obor OECD: Neurosciences (including psychophysiology
Impakt faktor: 5.418, rok: 2020
Způsob publikování: Open access
http://dx.doi.org/10.1007/s12559-021-09931-9
 DOI: 10.1007/s12559-021-09931-9
neurolib is a computational framework for whole-brain modeling written in Python. It provides a set of neural mass models that represent the average activity of a brain region on a mesoscopic scale. In a whole-brain network model, brain regions are connected with each other based on biologically informed structural connectivity, i.e., the connectome of the brain. neurolib can load structural and functional datasets, set up a whole-brain model, manage its parameters, simulate it, and organize its outputs for later analysis. The activity of each brain region can be converted into a simulated BOLD signal in order to calibrate the model against empirical data from functional magnetic resonance imaging (fMRI). Extensive model analysis is made possible using a parameter exploration module, which allows one to characterize a model's behavior as a function of changing parameters. An optimization module is provided for fitting models to multimodal empirical data using evolutionary algorithms. neurolib is designed to be extendable and allows for easy implementation of custom neural mass models, offering a versatile platform for computational neuroscientists for prototyping models, managing large numerical experiments, studying the structure–function relationship of brain networks, and for performing in-silico optimization of whole-brain models.
Trvalý link: http://hdl.handle.net/11104/0323502

0548897 - FZÚ 2022 RIV US eng J - Článek v odborném periodiku
Acero, M. A. - Adamson, P. - Aliaga, L. - Filip, Peter - Hakl, František - Lokajíček, Miloš - Zálešák, Jaroslav
Search for active-sterile antineutrino mixing using neutral-current interactions with the NOvA experiment.
Physical Review Letters. Roč. 127, č. 20 (2021), s. 1-8, č. článku 201801. ISSN 0031-9007. E-ISSN

1079-7114

This Letter reports results from the first long-baseline search for sterile antineutrinos mixing in an accelerator-based antineutrino-dominated beam. The rate of neutral-current interactions in the two NOvA detectors, at distances of 1 and 810 km from the beam source, is analyzed using an exposure of 12.51×10^{20} protons-on-target from the NuMI beam at Fermilab running in antineutrino mode. A total of 121 of neutral-current candidates are observed at the far detector, compared to a prediction of 122 ± 11(stat.)±15(syst.) assuming mixing only between three active flavors. No evidence for $\bar{\nu}_\mu\to\bar{\nu}_s$ oscillation is observed. Interpreting this result within a 3+1 model, constraints are placed on the mixing angles $\theta_{24}<25°$ and $\theta_{34}<32°$ at the 90% C.L. for 0.05 eV$^2\leq\Delta m^2_{41}\leq0.5$ eV^2, the range of mass splittings that produces no significant oscillations at the near detector. These are the first 3+1 confidence limits set using long-baseline accelerator antineutrinos.

Trvalý link: http://hdl.handle.net/11104/0324934

0548905 - FZÚ 2022 RIV US eng J - Článek v odborném periodiku
Acero, M. A. - Adamson, P. - Aliaga, L. - Filip, Peter - Hakl, František - Lokajíček, Miloš - Zálešák, Jaroslav
Search for slow magnetic monopoles with the NOvA detector on the surface.
Physical Review D. Roč. 103, č. 1 (2021), s. 1-9, č. článku 012007. ISSN 2470-0010. E-ISSN 2470-0029

We report a search for a magnetic monopole component of the cosmic-ray flux in a 95-day exposure of the NOvA experiment's Far Detector, a 14 kt segmented liquid scintillator detector designed primarily to observe GeV-scale electron neutrinos. No events consistent with monopoles were observed, setting an upper limit on the flux of 2×10^{-14} cm^{-2} s^{-1} sr^{-1} at 90% C.L. for monopole speed $6\times10^{-4}<\beta<5\times10^{-3}$ and mass greater than 5×10^8 GeV. Because of NOvA's small overburden of 3 meters-water equivalent, this constraint covers a previously unexplored low-mass region.

Trvalý link: http://hdl.handle.net/11104/0324947

0546601 - ÚI 2022 DE eng J - Článek v odborném periodiku
Kalina, Jan - Tichavský, Jan
The minimum weighted covariance determinant estimator for high-dimensional data.
Advances in Data Analysis and Classification. Online 07 October 2021 (2021). ISSN 1862-5347. E-ISSN 1862-5355

In a variety of diverse applications, it is very desirable to perform a robust analysis of high-dimensional measurements without being harmed by the presence of a possibly larger percentage of outlying measurements. The minimum weighted covariance determinant (MWCD) estimator, based on implicit weights assigned to individual observations, represents a promising and flexible extension of the popular minimum covariance determinant (MCD) estimator of the expectation and scatter matrix of mlutivariate data. In this work, a regularized version of the MWCD denoted as the minimum regularized weighted covariance determinant (MRWCD) estimator is proposed. At the same time, it is accompanied by an outlier detection procedure. The novel MRWCD estimator is able to outperform other available robust estimators in several simulation scenarios, especially in estimating the scatter matrix of contaminated high-dimensional data.
Trvalý link: http://hdl.handle.net/11104/0323054

0547984 - ÚI 2022 NL eng J - Článek v odborném periodiku
Billings, Jacob - Tivadar, R. - Murray, M.M. - Franceschiello, B. - Petri, G.
Topological Features of Electroencephalography are Reference-Invariant.
Electroencephalography (EEG) is among the most widely diffused, inexpensive, and applied neuroimaging techniques. Nonetheless, EEG requires measurements against a reference site(s), which is typically chosen by the experimenter, and specific pre-processing steps precede analysis. It is therefore valuable to obtain quantities that are reference-independent and minimally affected by pre-processing choices. Here, we show that the topological structure of embedding spaces, constructed either from multi-channel EEG timeseries or from their temporal structure, are subject-specific and robust to re-referencing and pre-processing pipelines. By contrast, the shape of correlation spaces, that is, discrete spaces where each point represents an electrode and the distance between them that is in turn related to the correlation between the respective timeseries, were neither significantly subject-specific nor robust to changes of reference. Our results suggest that the shape of spaces describing the observed configurations of EEG signals holds information about the individual specificity of the underlying individual's brain dynamics, and that temporal correlations constrain to a large degree the set of possible dynamics. In turn, these encode the differences between subjects' space of resting state EEG signals. Finally, our results and proposed methodology provide tools to explore the individual topographical landscapes and how they are explored dynamically. We propose therefore to augment conventional topographic analyses with an additional – topological – level of analysis, and to consider them jointly. More generally, these results provide a roadmap for the incorporation of topological analyses within EEG pipelines.
Trvalý link: http://hdl.handle.net/11104/0324118

0547292 - ÚI 2022 RIV US eng J - Článek v odborném periodiku
Arinyo i Prats, Andreu - Moreno Spiegelberg, P. - Matías, M.A. - Gomila, D.
Traveling pulses in type-I excitable media.

We consider a general model exhibiting type-I excitability mediated by a homoclinic and a saddle node on the invariant circle bifurcations. We show how the distinct properties of type-I with respect to type-II excitability confer unique features to traveling pulses in excitable media. They inherit the characteristic divergence of type-I excitable trajectories at threshold exhibiting analogous scalings in the spatial thickness of the pulses. Our results pave the way to identify basic underlying mechanisms behind type-I excitable pulses based solely on the characteristics of the pulse.
Trvalý link: http://hdl.handle.net/11104/0323558

0547093 - ÚI 2022 RIV NL eng J - Článek v odborném periodiku
Pavez-Signé, M. - Quiroz, D. A. - Sanhueza-Matamala, Nicolás
Universal arrays.
Discrete Mathematics. č. 12 (2021), č. článku 112626. ISSN 0012-365X. E-ISSN 1872-681X
Grant CEP: GA ČR(CZ) GA19-08740S
Institucionální podpora: RVO:67985807
Klíčová slova: Array * Matrix * Subword * Uniformly chosen * Universal structure * Word
Impakt faktor: 0.870, rok: 2020
A word on q symbols is a sequence of letters from a fixed alphabet of size q. For an integer $k \geqslant 1$, we say that a word w is k-universal if, given an arbitrary word of length k, one can obtain it by removing letters from w. It is easily seen that the minimum length of a k-universal word on q symbols is exactly qk. We prove that almost every word of size $(1+o(1))c_q k$ is k-universal with high probability, where c_q is an explicit constant whose value is roughly $q \log_{f_0} q$. Moreover, we show that the k-universality property for uniformly chosen words exhibits a sharp threshold. Finally, by extending techniques of Alon (2017) [1], we give asymptotically tight bounds for every higher dimensional analogue of this problem.
Trvalý link: http://hdl.handle.net/11104/0323428

0548678 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Vidnerová, Petra - Neruda, Roman
Air Pollution Modelling by Machine Learning Methods.
Modelling. Roč. 2, č. 4 (2021), s. 659-674. ISSN 2673-3951
Grant CEP: GA ČR(CZ) GA18-23827S
Institucionální podpora: RVO:67985807
Klíčová slova: machine learning * air pollution * sensors * deep neural networks * regularization networks
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Precise environmental modelling of pollutants distributions represents a key factor for addresing the issue of urban air pollution. Nowadays, urban air pollution monitoring is primarily carried out by employing sparse networks of spatially distributed fixed stations. The work in this paper aims at improving the situation by utilizing machine learning models to process the outputs of multi-sensor devices that are small, cheap, albeit less reliable, thus a massive urban deployment of those devices is

possible. The main contribution of the paper is the design of a mathematical model providing sensor fusion to extract the information and transform it into the desired pollutant concentrations. Multi-sensor outputs are used as input information for a particular machine learning model trained to produce the CO, NO2, and NOx concentration estimates. Several state-of-the-art machine learning methods, including original algorithms proposed by the authors, are utilized in this study: kernel methods, regularization networks, regularization networks with composite kernels, and deep neural networks. All methods are augmented with a proper hyper-parameter search to achieve the optimal performance for each model. All the methods considered achieved vital results, deep neural networks exhibited the best generalization ability, and regularization networks with product kernels achieved the best fitting of the training set.

Trvalý link: http://hdl.handle.net/11104/0324730

Kalina, Jan - Soukup, Lubomír
Bayesovské odhady: přirozený nástroj pro využití apriorní informace.
[Bayesian Estimates: Tool For Processing Prior Information.]
Tento článek studuje některé základní statistické modely a zamýšlí se nad situací, zda a jak bayesovské odhady jejich parametrů odpovídají intuici v případě, že se kombinují naměřená data s výsledky předchozích měření prováděných za stejných podmínek. Konkrétně se věnujeme bayesovským odhadům parametrů pro normální nebo binomické rozdělení, lineární regresi, ale i regularizačním sítím z oblasti strojového učení.

This paper considers some fundamental statistical models and investigates whether Bayesian estimates of their parameters correspond to intuition in the situation, when observed data are combined with results of previous (prior) measurements obtained under the same conditions. Particularly, the paper considers Bayesian estimates of parameters for the normal or binomial distributions, linear regression, or regularization networks from the field of machine learning.

Trvalý link: http://hdl.handle.net/11104/0324733

Chvosteková, Martina - Krakovská, A.
Letter to the editor of Heliyon re: Grassmann, G. „New considerations on the validity of the Wiener-Granger causality test" [Heliyon 6 (2020) e05208].
Dear Editor, a recently published article questions the Wiener-Granger causality test, more commonly referred to as the Granger causality test. Although the abstract of the paper states that the results were obtained by mathematical tools such as the Fourier transform and differential calculus, the presented serious claim that „...not even the most basic requirement underlying any possible

definition of causality is met by the Granger causality test..." is in fact based on a questionable numerical testing of two filtered neural signals (A and B). We will show that the validity of the presented considerations is unfounded for several reasons.
Trvalý link: http://hdl.handle.net/11104/0324209

0547631 - ÚI 2022 NL eng J - Článek v odborném periodiku
Tedder, Andrew - Ferenz, N.
Neighbourhood Semantics for Quantified Relevant Logics.
Journal of Philosophical Logic. Online 15 October 2021 (2021). ISSN 0022-3611
Grant CEP: GA ČR(CZ) GJ18-19162Y
Institucionální podpora: RVO:67985807
Klíčová slova: Relevant logic * Quantified nonclassical logic * Neighbourhood semantics * Substructural logic
Obor OECD: Philosophy, History and Philosophy of science and technology
Způsob publikování: Omezený přístup
 DOI: 10.1007/s10992-021-09637-1

The Mares-Goldblatt semantics for quantified relevant logics have been developed for first-order extensions of R, and a range of other relevant logics and modal extensions thereof. All such work has taken place in the the ternary relation semantic framework, most famously developed by Sylvan (née Routley) and Meyer. In this paper, the Mares-Goldblatt technique for the interpretation of quantifiers is adapted to the more general neighbourhood semantic framework, developed by Sylvan, Meyer, and, more recently, Goble. This more algebraic semantics allows one to characterise a still wider range of logics, and provides the grist for some new results. To showcase this, we show, using some non-augmented models, that some quantified relevant logics are not conservatively extended by connectives the addition of which do conservatively extend the associated propositional logics, namely fusion and the dual implication. We close by proposing some further uses to which the neighbourhood Mares-Goldblatt semantics may be put.
Trvalý link: http://hdl.handle.net/11104/0323828

0546811 - ÚI 2022 RIV SK eng J - Článek v odborném periodiku
Mišík, L. - Porubský, Štefan - Strauch, O.
Uniform distribution of the weighted sum-of-digits functions.
Uniform Distribution Theory. Roč. 16, č. 1 (2021), s. 93-126. ISSN 1336-913X
Institucionální podpora: RVO:67985807
Klíčová slova: uniform distribution modulo one * q-adic sum-of-digits functions * d-dimensional van der Corput-Halton sequence * trigonometric product * distribution function
Obor OECD: Pure mathematics
Způsob publikování: Open access
http://dx.doi.org/10.2478/udt-2021%E2%80%930005
 DOI: 10.2478/udt-2021–0005
The higher-dimensional generalization of the weighted q-adic sum-of-digits functions $s_{q,\gamma}(n)$, n = 0, 1, 2,... , covers several important cases of sequences investigated in the theory of uniformly distributed sequences, e.g., d-dimensional van der Corput-Halton or d-dimensional Kronecker sequences. We prove a necessary and sufficient condition for the higher-dimensional weighted q-adic sum-of-digits functions to be uniformly distributed modulo one in terms of a trigonometric product. As applications of our condition we prove some upper estimates of the extreme discrepancies of such sequences, and that the existence of distribution function g(x) = x implies the uniform distribution modulo one of the weighted q-adic sum-of-digits function $s_{q,\gamma}(n)$, n = 0, 1, 2,... We also prove the uniform distribution modulo one of related sequences $h_1 * s_{q,\gamma}(n) + h_2 * s_{q,\gamma}(n + 1)$, where

h_1 and h_2 are integers such that h1 + h2 does not vanish and that the akin two-dimensional sequence (s_{q,γ}(n), s_{q,γ}(n + 1)) cannot be uniformly distributed modulo one if q ≥ 3. The properties of the two-dimensional sequence (s_{q,γ}(n), s_{q,γ}(n + 1)) , n = 0, 1, 2,... , will be instrumental in the proofs of the final section, where we show how the growth properties of the sequence of weights influence the distribution of values of the weighted sum-of-digits function which in turn imply a new property of the van der Corput sequence.
Trvalý link: http://hdl.handle.net/11104/0323189

0546161 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)
Tumpach, Jiří - Kalina, Jan - Holeňa, Martin
A Comparison of Regularization Techniques for Shallow Neural Networks Trained on Small Datasets.
Proceedings of the 21st Conference Information Technologies – Applications and Theory (ITAT 2021). Aachen: Technical University & CreateSpace Independent Publishing, 2021 - (Brejová, B.; Ciencialová, L.; Holeňa, M.; Mráz, F.; Pardubská, D.; Plátek, M.; Vinař, T.), s. 94-103. ISSN 1613-0073.
[ITAT 2021: Information Technologies - Applications and Theory /21./. Heľpa (SK), 24.09.2021-28.09.2021]
Grant CEP: GA ČR(CZ) GA18-18080S; GA ČR(CZ) GA19-05704S
Grant ostatní: Ministerstvo školství, mládeže a tělovýchovy - GA MŠk(CZ) LM2018140
Institucionální podpora: RVO:67985807
Klíčová slova: artificial neural networks * regularization * robustness * optimization
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://ics.upjs.sk/~antoni/ceur-ws.org/Vol-0000/paper38.pdf
Neural networks are frequently used as regression models. Their training is usually difficult when the model is subject to a small training dataset with numerous outliers. This paper investigates the effects of various regularisation techniques that can help with this kind of problem. We analysed the effects of the model size, loss selection, L2 weight regularisation, L2 activity regularisation, Dropout, and Alpha Dropout. We collected 30 different datasets, each of which has been split by ten-fold cross-validation. As an evaluation metric, we used cumulative distribution functions (CDFs) of L1 and L2 losses to aggregate results from different datasets without a considerable amount of distortion. Distributions of the metrics are shown, and thorough statistical tests were conducted. Surprisingly, the results show that Dropout models are not suited for our objective. The most effective approach is the choice of model size and L2 types of regularisations.
Trvalý link: http://hdl.handle.net/11104/0322710

0546157 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)
Koza, J. - Tumpach, J. - Pitra, Z. - Holeňa, Martin
Combining Gaussian Processes and Neural Networks in Surrogate Modeling for Covariance Matrix Adaptation Evolution Strategy.
Proceedings of the 21st Conference Information Technologies – Applications and Theory (ITAT 2021). Aachen: Technical University & CreateSpace Independent Publishing, 2021 - (Brejová, B.; Ciencialová, L.; Holeňa, M.; Mráz, F.; Pardubská, D.; Plátek, M.; Vinař, T.), s. 29-38. ISSN 1613-0073.
[ITAT 2021: Information Technologies - Applications and Theory /21./. Heľpa (SK), 24.09.2021-28.09.2021]
Grant CEP: GA ČR(CZ) GA18-18080S
Grant ostatní: Ministerstvo školství, mládeže a tělovýchovy - GA MŠk(CZ) LM2018140
Institucionální podpora: RVO:67985807
Klíčová slova: black-box optimization * surrogate modeling * artificial neural networks * Gaussian processes * covariance functions
http://ics.upjs.sk/~antoni/ceur-ws.org/Vol-0000/paper27.pdf

This paper focuses on surrogate models for Covariance Matrix Adaptation Evolution Strategy (CMA-ES) in continuous black-box optimization. Surrogate modeling has proven to be able to decrease the number of evaluations of the objective function, which is an important requirement in some real-world applications where the evaluation can be costly or time-demanding. Surrogate models achieve this by providing an approximation instead of the evaluation of the true objective function. One of the stateof-the-art models for this task is the Gaussian process. We present an approach to combining Gaussian processes with artificial neural networks, which was previously successfully applied to other machine learning domains. The experimental part employs data recorded from previous CMA-ES runs, allowing us to assess different settings of surrogate models without running the whole CMA-ES algorithm. The data were collected using 24 noiseless benchmark functions of the platform for comparing continuous optimizers COCO in 5 different dimensions. Overall, we used data samples from over 2.8 million generations of CMA-ES runs. The results examine and statistically compare six covariance functions of Gaussian processes with the neural network extension. So far, the combined model did not show up to outperform the Gaussian process alone. Therefore, in conclusion, we discuss possible reasons for this and ideas for future research.

Trvalý link: http://hdl.handle.net/11104/0322706

0546853 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Daniel, Milan - Kratochvíl, Václav
Comparison of Shades and Hiddenness of Conflict.
Symbolic and Quantitative Approaches to Reasoning with Uncertainty. 16th European Conference, ECSQARU 2021 Proceedings. Cham: Springer, 2021 - (Vejnarová, J.; Wilson, N.), s. 314-327. Lecture Notes in Computer Science, 12897. ISBN 978-3-030-86771-3. ISSN 0302-9743.
[ECSQARU 2021: European Conference on Symbolic and Quantitative Approaches with Uncertainty /16./. Prague (CZ), 21.09.2021-24.09.2021]
Grant CEP: GA ČR(CZ) GA19-04579S
Institucionální podpora: RVO:67985807 ; RVO:67985556
Klíčová slova: Belief function * Conflict * Hidden conflict * N-consistency * Shades of conflict * Auto-conflict
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
http://dx.doi.org/10.1007/978-3-030-86772-0_23
 DOI: 10.1007/978-3-030-86772-0_23
Conflict, dissonance, inconsistency, entropy. There are many notions related to one phenomenon. When working with uncertainty, there can be different sources of information, and often they are in some level of mutual disagreement. When working with belief functions, one of the approaches how to measure conflict is closely connected with a belief mass assigned by the non-normalized conjunctive rule to the empty set. Recently, we have observed and presented cases where a conflict of belief functions is hidden (there is a zero mass assigned to the empty set by the non-normalized conjunctive rule). Above that, we distinguish several degrees of such a hiddeness. In parallel, Pichon et al. introduced a new family of conflict measures of different strengths, the so-called shades of conflict. In this paper, we compare both approaches not only from the theoretical point of view but also by examples.
Trvalý link: http://hdl.handle.net/11104/0323231

0548662 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Acharyya, Ankush - Keikha, Vahideh - Majumdar, D. - Pandit, S.
Constrained Hitting Set Problem with Intervals.
Computing and Combinatorics: 27th International Conference, COCOON 2021 Proceedings. Cham:

Springer, 2021 - (Chen, C.; Hon, W.; Hung, L.; Lee, C.), s. 604-616. Lecture Notes in Computer Science, 13025. ISBN 978-3-030-89542-6. ISSN 0302-9743.
[COCOON 2021: International Conference on Computing and Combinatorics /27./. Tainan (TW), 24.10.2021-26.10.2021]
Grant CEP: GA ČR(CZ) GJ19-06792Y
Institucionální podpora: RVO:67985807
 DOI: 10.1007/978-3-030-89543-3_50
We study a constrained version of the Geometric Hitting Set problem where we are given a set of points, partitioned into disjoint subsets, and a set of intervals. The objective is to hit all the intervals with a minimum number of points such that if we select a point from a subset then we must select all the points from that subset. In general, when the intervals are disjoint, we prove that the problem is in FPT, when parameterized by the size of the solution. We also complement this result by giving a lower bound in the size of the kernel for disjoint intervals, and we also provide a polynomial kernel when the size of all subsets is bounded by a constant. Next, we consider two special cases of the problem where each subset can have at most 2 and 3 points. If each subset contains at most 2 points and the intervals are disjoint, we show that the problem admits a polynomial-time algorithm. However, when each subset contains at most 3 points and intervals are disjoint, we prove that the problem is NP-Hard and we provide two constant factor approximations for the problem.
Trvalý link: http://hdl.handle.net/11104/0324711

0547122 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Bílková, Marta - Frittella, S. - Kozhemiachenko, D.
Constraint Tableaux for Two-Dimensional Fuzzy Logics.
TABLEAUX 2021: Automated Reasoning with Analytic Tableaux and Related Methods. Cham: Springer, 2021 - (Das, A.; Negri, S.), s. 20-37. Lecture Notes on Computer Science, 12842. ISBN 978-3-030-86058-5. ISSN 0302-9743.
[Tableaux 2021: International Conference on Automated Reasoning with Analytic Tableaux and Related Methods /30./, co-located with FroCoS 2021: International Symposium on Frontiers of Combining Systems /13./. Birmingham / online (GB), 06.09.2021-09.09.2021]
Institucionální podpora: RVO:67985807
Klíčová slova: Constraint tableaux * Lukasiewicz logic * Gödel logic * Two-dimensional logics
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
 DOI: 10.1007/978-3-030-86059-2_2
We introduce two-dimensional logics based on Łukasiewicz and Gödel logics to formalize reasoning with graded, incomplete and inconsistent information. The logics are interpreted on matrices, where the common underlying structure is the bi-lattice (twisted) product of the [0, 1] interval. The first (resp. second) coordinate encodes the positive (resp. negative) information one has about a statement. We propose constraint tableaux that provide a modular framework to address their completeness and complexity.
Trvalý link: http://hdl.handle.net/11104/0323453

0547245 - ÚI 2022 RIV US eng C - Konferenční příspěvek (zahraniční konf.)
Sedlár, Igor
Decidability and Complexity of Some Finitely-valued Dynamic Logics.
Proceedings of the 18th International Conference on Principles of Knowledge Representation and Reasoning. Online: IJCAI Organization, 2021 - (Bienvenu, M.; Lakemeyer, G.; Erdem, E.), s. 570-580. ISBN 978-1-956792-99-7. ISSN 2334-1033.
[KR2021: International Conference on Principles of Knowledge Representation and Reasoning /18./. Hanoi / Online (VN), 03.11.2021-12.11.2021]

Propositional Dynamic Logic, PDL, is a well known modal logic formalizing reasoning about complex actions. We study many-valued generalizations of PDL based on relational models where satisfaction of formulas in states and accessibility between states via action execution are both seen as graded notions, evaluated in a finite Łukasiewicz chain. For each n>1, the logic PDŁn is obtained using the n-element Łukasiewicz chain, PDL being equivalent to PDŁ2. These finitely-valued dynamic logics can be applied in formalizing reasoning about actions specified by graded predicates, reasoning about costs of actions, and as a framework for certain graded description logics with transitive closure of roles. Generalizing techniques used in the case of PDL we obtain completeness and decidability results for all PDŁn. A generalization of Pratt's exponential-time algorithm for checking validity of formulas is given and EXPTIME-hardness of each PDŁn validity problem is established by embedding PDL into PDŁn.
Trvalý link: http://hdl.handle.net/11104/0323528

Experimental Investigation of Neural and Weisfeiler-Lehman-Kernel Graph Representations for Downstream SVM-Based Classification.
Graphs are one of the most ubiquitous kinds of data. However, data analysis methods have been developed primarily for numerical data, and to make use of them, graphs need to be represented as elements of some Euclidean space. An increasingly popular way of representing them in this way are graph neural networks´(GNNs). Because data analysis applications typically require identical results for isomorphic graphs, the representations learned by GNNs also need to be invariant with respect to graph isomorphism. That motivated recent research into the possibilities of recognizing nonisomorphic pairs of graphs by GNNs, primarily based on the Weisfeiler-Lehman (WL) isomorphism test. This paper reports the results of a first experimental comparison of four variants of two important GNNs based on the WL test from the point of view of graph representation for downstream classification by means of a support vector machins (SVM). Those methods are compared not only with each other, but also with a recent generalization of the WL subtree kernel. For all GNN variants, two different representations are included in the comparison. The comparison revealed that the four considered representations of the same kind of GNN never significantly differ. On the other hand, there was always a statistically significant difference between representations originating from different kinds of GNNs, as well as between any representation originating from any of the considered GNNs and the representation originating from the generalized WL kernel.
Trvalý link: http://hdl.handle.net/11104/0322814

0548659 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Acharyya, Ankush - Jallu, Ramesh Kumar - Keikha, Vahideh - Löffler, M. - Saumell, Maria
Minimum Color Spanning Circle in Imprecise Setup.
Computing and Combinatorics: 27th International Conference, COCOON 2021 Proceedings. Cham:
Springer, 2021 - (Chen, C.; Hon, W.; Hung, L.; Lee, C.), s. 257-268. Lecture Notes in Computer
Science, 13025. ISBN 978-3-030-89542-6. ISSN 0302-9743.
[COCOON 2021: International Conference on Computing and Combinatorics /27./. Tainan (TW),
24.10.2021-26.10.2021]

Let R be a set of n colored imprecise points, where each point is colored by one of k colors. Each imprecise point is specified by a unit disk in which the point lies. We study the problem of computing the smallest and the largest possible minimum color spanning circle, among all possible choices of points inside their corresponding disks. We present an O(nklog n) time algorithm to compute a smallest minimum color spanning circle. Regarding the largest minimum color spanning circle, we show that the problem is NP- Hard and present a 13 -factor approximation algorithm. We improve the approximation factor to 12 for the case where no two disks of distinct color intersect.
Trvalý link: http://hdl.handle.net/11104/0324709

0546143 - ÚI 2022 RIV CZ eng C - Konferenční příspěvek (zahraniční konf.)
Kalina, Jan
Multifractal approaches in econometrics and fractal-inspired robust regression.
*MME 2021, 39th International Conference on Mathematical Methods in Economics. Conference
Proceedings.* Prague: Faculty of Economics and Management, Czech University of Life Sciences
Prague, 2021 - (Hlavatý, R.), s. 238-243. ISBN 978-80-213-3126-6.
[MME 2021: International Conference on Mathematical Methods in Economics /39./. Prague (CZ),
08.09.2021-10.09.2021]

While the mainstream economic theory is based on the concept of general economic equilibrium, the economies throughout the world have recently been facing serious transformations and challenges. Thus, instead of a convergence to equilibrium, the economies can be regarded as unstable, turbulent or chaotic with properties characteristic for fractal or multifractal processes. This paper starts with a discussion of recent data analysis tools inspired by fractal or multifractal concepts. We pay special attention to available data analysis tools based on reciprocal weights assigned to individual observations - these are inspired by an assumed fractal structure of multivariate data. As an extension, we consider here a novel version of the least weighted squares estimator of parameters for the linear regression model, which exploits reciprocal weights. Finally, we perform a statistical analysis of 31 datasets with economic motivation and compare the performance of the least weighted squares estimator with various weights. It turns out that the reciprocal weights, inspired by the fractal theory, are not superior to other choices of weights. In fact, the best prediction results are obtained with trimmed linear weights.
Trvalý link: http://hdl.handle.net/11104/0322694

0546279 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)
Plátek, M. - Mráz, F. - Pardubská, D. - Průša, D. - Šíma, Jiří
On Separations of LR(0)-Grammars by Two Types of Pumping Patterns.
Proceedings of the 21st Conference Information Technologies – Applications and Theory (ITAT 2021). Aachen: Technical University & CreateSpace Independent Publishing, 2021 - (Brejová, B.; Ciencialová, L.; Holeňa, M.; Mráz, F.; Pardubská, D.; Plátek, M.; Vinař, T.), s. 140-146. ISSN 1613-0073.
[ITAT 2021: Information Technologies - Applications and Theory /21./. Heľpa (SK), 24.09.2021-28.09.2021]

We present two types of pumping patterns that allow a total separation inside the class of LR(0)-grammars. Using the same type of pumping patterns, we obtain a total separation inside of linear LR(0)-grammars. This type of study has a long-term motivation from computational linguistics and the area of syntactic error localization. A recent motivation also comes from the field of formal models of neural networks.
Trvalý link: http://hdl.handle.net/11104/0322818

0547235 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)
Punčochář, Vít - Sedlár, Igor
Relevant Epistemic Logic with Public Announcements and Common Knowledge.
Logic and Argumentation: 4th International Conference, CLAR 2021, Hangzhou, China, October 20–22, 2021, Proceedings. Cham: Springer, 2021 - (Baroni, P.; Benzmüller, C.; Wáng, Y.), s. 342-361. Lecture Notes in Artificial Intelligence, 13040. ISBN 978-3-030-89390-3.
[CLAR 2021: International Conference on Logic and Argumentation /4./. online (CN), 20.10.2021-22.10.2021]

Building on our previous work in non-classical dynamic epistemic logic, we add common knowledge operators to a version of public announcement logic based on the relevant logic R . We prove a completeness result with respect to a relational semantics, and we show that an alternative semantics based on information states is dual to the relational one. We add a question-forming inquisitive disjunction operator to the language and prove a completeness result with respect to the information semantics. It is argued that relevant public announcements are particularly suitable for modelling public argumentation.
Trvalý link: http://hdl.handle.net/11104/0323522

0547636 - ÚI 2022 RIV AU eng C - Konferenční příspěvek (zahraniční konf.)
Bílková, Marta - Christoff, Z. - Roy, O.
Revisiting Epistemic Logic with Names.

Proceedings Eighteenth Conference on Theoretical Aspects of Rationality and Knowledge. Open Publishing Association, 2021 - (Halpern, J.; Perea, A.), s. 39-54. Electronic Proceedings in Theoretical Computer Science, 335. ISSN 2075-2180.
[TARK 2021: Theoretical Aspects of Rationality and Knowledge /18./. Beijing (CN), 25.06.2021-27.06.2021]

This paper revisits the multi-agent epistemic logic presented in [10], where agents and sets of agents are replaced by abstract, intensional „names". We make three contributions. First, we study its model theory, providing adequate notions of bisimulation and frame morphisms, and use them to study the logic's expressive power and definability. Second, we show that the logic has a natural neighborhood semantics, which in turn allows to show that the axiomatization in [10] does not rely on possibly controversial introspective properties of knowledge. Finally, we extend the logic with common and distributed knowledge operators, and provide a sound and complete axiomatization for each of these extensions. These results together put the original epistemic logic with names in a more modern context and opens the door for a logical analysis of epistemic phenomena where group membership is uncertain or variable.
Trvalý link: http://hdl.handle.net/11104/0323830

0547523 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Kalina, Jan - Matonoha, Ctirad
Robustness of Supervised Learning Based on Combined Centroids.
Artificial Intelligence and Soft Computing. ICAISC 2021 Proceedings, Part II. Cham: Springer, 2021 - (Rutkowski, L.; Scherer, R.; Korytkowski, M.; Pedrycz, W.; Tadeusiewicz, R.; Zurada, J.), s. 171-182. Lecture Notes in Artificial Intelligence, 12855. ISBN 978-3-030-87896-2. ISSN 0302-9743.
[ICAISC 2021: The International Conference on Artificial Intelligence and Soft Computing /20./. Zakopane / Virtual (PL), 20.06.2021-24.06.2021]

Recently, we proposed a novel sparse centroid-based supervised learning method, allowing to optimize a single centroid and its corresponding weights. The method is especially useful for localizing objects in images. Here, we extend the method to the task of joint localization of several objects in a 2D-image by means of combining several centroids. The novel approach, i.e. joint optimization of several centroids and a subsequent optimization of their weights, is illustrated on the task of localizing the mouth and both eyes in facial images. Because we are particularly interested in studying the robustness of the method to various modifications of the images, we evaluate the performance of the methods also over images artificially modified by additional noise, occlusion, changed illumination, or rotation. The novel centroid-based method is successful in the localization task, and the optimization turns out to ensure robustness with respect to the presence of noise or occlusion in the images. Moreover, combining the optimized centroids yields more robust results than a method using simple centroids with a highly robust correlation coefficient (with a high breakdown point).
Trvalý link: http://hdl.handle.net/11104/0323741

0546282 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)

Vidnerová, Petra - Neruda, Roman - Suchopárová, Gabriela - Berec, L. - Diviák, T. - **Kuběna, Aleš Antonín - Levínský, René** - Šlerka, J. - **Šmíd, Martin** - Trnka, J. - Tuček, V. - **Vrbenský, Karel - Zajíček, Milan**

Simulation of non-pharmaceutical interventions in an agent based epidemic model.

Proceedings of the 21st Conference Information Technologies – Applications and Theory (ITAT 2021). Aachen: Technical University & CreateSpace Independent Publishing, 2021 - (Brejová, B.; Ciencialová, L.; Holeňa, M.; Mráz, F.; Pardubská, D.; Plátek, M.; Vinař, T.), s. 263-268. ISSN 1613-0073.

[ITAT 2021: Information Technologies - Applications and Theory /21./. Heľpa (SK), 24.09.2021-28.09.2021]

Grant CEP: GA TA ČR(CZ) TL04000282

Institucionální podpora: RVO:67985807 ; RVO:67985556 ; RVO:67985998

Klíčová slova: agent based modelling * epidemic modelling * non-pharmaceutical interventions

Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8); Urban studies (planning and development) (NHU-N)

https://ics.upjs.sk/~antoni/ceur-ws.org/Vol-0000/paper12.pdf

The standard SEIR equation-based models represent the state-of-the-art approach in epidemiological modelling. Their drawbacks include unrealistic infectionrelated contact estimates and difficulties in modelling nonpharmaceutical interventions, such as contact reductions or partial closures. In this paper, we present our agent-based model that addresses the above-mentioned issues. It works with a population of individuals (agents) and their contacts are modelled as a multi-graph social network according to real data based on a Czech county. Custom algorithmic procedures simulating testing, quarantine and partial closures of various contact types are implemented. The model can serve as a tool for relative comparison of the efficacy of various policies. It was also used for a study comparing various interventions in Czech primary and secondary schools, using a graph based on real data from a selected Czech school.

Trvalý link: http://hdl.handle.net/11104/0322820

0547241 - ÚI 2022 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)

Sedlár, Igor - Tedder, Andrew

Situated Epistemic Updates.

Logic, Rationality, and Interaction. 8th International Workshop, LORI 2021, Proceedings. Cham: Springer, 2021 - (Ghosh, S.; Icard, T.), s. 192-200. Lecture Notes in Computer Science, 13039. ISBN 978-3-030-88707-0. ISSN 0302-9743.

[LORI 2021: Logic, Rationality, and Interaction /8./. Xi'an (CN), 16.10.2021-18.10.2021]

Grant CEP: GA ČR(CZ) GJ18-19162Y

Institucionální podpora: RVO:67985807

Klíčová slova: Epistemic update * Public announcement logic * Relevant logic * Non-classical logic

Obor OECD: Pure mathematics

DOI: 10.1007/978-3-030-88708-7_16

One way to model epistemic states of agents more realistically is to represent these states by sets of situations rather than possible worlds. In this paper we discuss representations of epistemic update in terms of situations. After linking epistemic update based on deleting epistemic accessibility arrows with update of situations, we discuss two specific kinds of public epistemic update: monotonic update in intuitionistic dynamic epistemic logic, and non-monotonic update in substructural dynamic epistemic logic. Our investigation is mainly conceptual, but leads to completeness results using reduction axioms, and lays the groundwork for future investigation into the concept of situated epistemic update.

Trvalý link: http://hdl.handle.net/11104/0323526

0548611 - ÚI 2022 RIV DE eng C - Konferenční příspěvek (zahraniční konf.)
Acharyya, Ankush - Jallu, Ramesh Kumar - Löffler, M. - Meijer, G.G.T. - Saumell, Maria - Silveira, R.I. - Staals, F.
Terrain prickliness: Theoretical grounds for high complexity viewsheds.
11th International Conference on Geographic Information Science (GIScience 2021) - Part II. Dagstuhl: Schloss Dagstuhl -- Leibniz-Zentrum für Informatik, 2021 - (Janowicz, K.; Verstegen, J.), č. článku 10. Leibniz International Proceedings in Informatics (LIPIcs), 208. ISBN 978-3-95977-208-2. ISSN 1868-8969.
[GIScience 2021: International Conference on Geographic Information Science /11./. Poznan / Online (PL), 27.09.2021-30.09.2021]
Grant CEP: GA ČR(CZ) GJ19-06792Y
Institucionální podpora: RVO:67985807
Klíčová slova: Digital elevation model * Triangulated irregular network * Viewshed complexity
DOI: 10.4230/LIPIcs.GIScience.2021.II.10
An important task in terrain analysis is computing viewsheds. A viewshed is the union of all the parts of the terrain that are visible from a given viewpoint or set of viewpoints. The complexity of a viewshed can vary significantly depending on the terrain topography and the viewpoint position.
In this work we study a new topographic attribute, the prickliness, that measures the number of local maxima in a terrain from all possible angles of view. We show that the prickliness effectively captures the potential of terrains to have high complexity viewsheds. We present near-optimal algorithms to compute it for TIN terrains, and efficient approximate algorithms for raster DEMs. We validate the usefulness of the prickliness attribute with experiments in a large set of real terrains.
Trvalý link: http://hdl.handle.net/11104/0324652

0548651 - ÚI 2022 RIV US eng C - Konferenční příspěvek (zahraniční konf.)
Pulc, P. - Holeňa, Martin
Unsupervised construction of task-specific datasets for object re-identification.
ICCTA 2021: 2021 7th International Conference on Computer Technology Applications. 2021 Proceedings. New York: Association for Computing Machinery, 2021, s. 66-72. ACM International Conference Proceeding Series. ISBN 978-1-4503-9052-1.
[ICCTA 2021: International Conference on Computer Technology Applications /7./. Vienna / Online (AT), 13.07.2021-15.07.2021]
Grant CEP: GA ČR(CZ) GA18-18080S
Grant ostatní: Ministerstvo školství, mládeže a tělovýchovy - GA MŠk(CZ) LM2018140
Institucionální podpora: RVO:67985807
Klíčová slova: Fine-tuning of Object Re-identification * Multiple Object Tracking * Hierarchical Sparse Feature Tracking
DOI: 10.1145/3477911.3477922
In the last decade, we have seen a significant uprise of deep neural networks in image processing tasks and many other research areas. However, while various neural architectures have successfully solved numerous tasks, they constantly demand more and more processing time and training data. Moreover, the current trend of using existing pre-trained architectures just as backbones and attaching new processing branches on top not only increases this demand but diminishes the explainability of the whole model. Our research focuses on combinations of explainable building blocks for the image processing tasks, such as object tracking. We propose a combination of Mask R-CNN, state-of-the-art object detection and segmentation neural network, with our previously published method of sparse feature tracking [16]. Such a combination allows us to track objects by connecting detected masks using the proposed sparse feature tracklets. However, this method cannot recover from complete object occlusions and has to be assisted by an object re-identification. To this end, this

paper uses our feature tracking method for a slightly different task: an unsupervised extraction of object representations that we can directly use to fine-tune an object re-identification algorithm, see Fig. 1 for visualisation. As we have to use objects masks already in the object tracking, our approach utilises the additional information as an alpha channel of the object representations, which further increases the precision of the re-identification. An additional benefit is that our fine-tuning method can be employed even in a fully online scenario.
Trvalý link: http://hdl.handle.net/11104/0324702

0550068 - ÚI 2022 GB eng A - Abstrakt
De Caterina, R. - De Groot J. R. - Weiss, T. W. - Kelly, P. - Monteiro, P. - Deharo J. C. - De Asmundis, C. - Lopez-De-Sa, E. - Waltenberger, J. - Steffel, J. - Levy, P. - Bakhai, A. - Pecen, Ladislav - Kirchhof, P.
Age-adjusted risk factors are independently associated with an increased risk of ischaemic stroke, transient ischaemic stroke and systemic embolism in the ETNA-AF-Europe registry.
European Heart Journal. Roč. 42, Suppl. 1 (2021), s. 474-474. ISSN 0195-668X. E-ISSN 1522-9645
Trvalý link: http://hdl.handle.net/11104/0325919

0549014 - ÚI 2022 NL eng A - Abstrakt
Bandari, D. K. - Bhagavathula, A. S. - Areman, B. S. - Chhabra, M. - Brkić, J. - Reissigová, Jindra - Fialová, D.
Ageing in developing countries and appropriateness of geriatric prescribing: physicians' knowledge of the explicit criteria of potentially inappropriate medications.
International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 804-805. ISSN 2210-7703. E-ISSN 2210-7711
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0325047

0548702 - ÚI 2022 CZ eng A - Abstrakt
Kalina, Jan - Vidnerová, Petra
Application Of Implicitly Weighted Regression Quantiles: Analysis Of The 2018 Czech Presidential Election.
14th International Scientific Conference RELIK 2021. Book of Abstracts. Prague: Prague University of Economics and Business, 2021 - (Vrabcová, J.; Langhamrová, J.). s. 33-33
[RELIK 2021: Reproduction of Human Capital - mutual links and connections. 04.11.2021-05.11.2021, Praha]
Institucionální podpora: RVO:67985807
Klíčová slova: linear regression * quantile regression * robustness * outliers * elections results
Regression quantiles can be characterized as popular tools for a complex modeling of a continuous response variable conditioning on one or more given independent variables. Because they are however vulnerable to leverage points in the regression model, an alternative approach denoted as implicitly weighted regression quantiles have been proposed. The aim of current work is to apply them to the results of the second round of the 2018 presidential election in the Czech Republic. The election results are modeled as a response of 4 demographic or economic predictors over the 77 Czech counties. The analysis represents the first application of the implicitly weighted regression quantiles to data with more than one regressor. The results reveal the implicitly weighted regression quantiles to be indeed more robust with respect to leverage points compared to standard regression quantiles. If however the model does not contain leverage points, both versions of the regression quantiles yield very similar results. Thus, the election dataset serves here as an illustration of the usefulness of the implicitly weighted regression quantiles.
Trvalý link: http://hdl.handle.net/11104/0324755

0548995 - ÚI 2022 NL eng A - Abstrakt

Antonenko, O. - Vaculová, G. - Puldová, K. - Halačová, M. - Grešáková, S. - [Reissigová, Jindra](#) - Fialová, D.

Appropriateness of hypnosedative drug use in seniors in ambulatory care in the Czech Republic: results from the InoMed and EUROAGEISM H2020 projects.

International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 804-804. ISSN 2210-7703. E-ISSN 2210-7711

Institucionální podpora: RVO:67985807

Trvalý link: http://hdl.handle.net/11104/0325028

0546985 - ÚI 2022 CZ eng A - Abstrakt

[Wannenburg, Johann Joubert](#)

Beth definability in relevance logics with the Göodel-Dummett axiom.

Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. Abstracts. Brno, 2021. s. 36-37.

[Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. 25.06.2021-26.06.2021, Brno]

Grant CEP: GA MŠk(CZ) EF18_053/0017594

Institucionální podpora: RVO:67985807

Trvalý link: http://hdl.handle.net/11104/0323355

0549016 - ÚI 2022 NL eng A - Abstrakt

Kummer, I. - Brkić, J. - Lukačišinová, A. - [Reissigová, Jindra](#) - Fialová, D.

CVS drug-disease interactions, the prevalence and risk factors in the Czech Republic: results from the InoMed and EUROAGEISM H2020 projects.

International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 809-809. ISSN 2210-7703. E-ISSN 2210-7711

Institucionální podpora: RVO:67985807

Trvalý link: http://hdl.handle.net/11104/0325049

0549017 - ÚI 2022 NL eng A - Abstrakt

Kummer, I. - Lukačišinová, A. - Brkić, J. - Příhodová, V. - [Reissigová, Jindra](#) - Fialová, D.

Drug-disease interactions' prevalence in nursing homes in the Czech Republic: findings from the InoMed and EU shelter projects.

International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 809-809. ISSN 2210-7703. E-ISSN 2210-7711

Institucionální podpora: RVO:67985807

Trvalý link: http://hdl.handle.net/11104/0325051

0549046 - ÚI 2022 US eng A - Abstrakt

[Hlinka, Jaroslav](#) - [Perez-Cervera, Alberto](#)

Dual role of stimulation and discharges in seizure dynamics is a generic phenomenon.

Epilepsia. Roč. 62, Suppl. 3 (2021), s. 106-106. ISSN 0013-9580. E-ISSN 1528-1167

Institucionální podpora: RVO:67985807

DOI: 10.1111/epi.17079

Trvalý link: http://hdl.handle.net/11104/0325085

0550757 - ÚI 2022 DE cze A - Abstrakt
Sühring, M. - [Resler, Jaroslav](#) - [Krč, Pavel](#)
Evaluation of surface processes in the PALM model system 6.0 for a real urban environment: a case study in Dejvice, Prague.
Kurzfassungen der Meteorologentagung DACH. Leipzig: Copernicus, 2021.
[DACH 2022: D-A-CH MeteorologieTagung. 21.03.2022-25.03.2022, Leipzig]
Grant CEP: GA KHP(CZ) UH0383; GA TA ČR(CZ) TO01000219
Institucionální podpora: RVO:67985807
Obor OECD: Meteorology and atmospheric sciences
[DOI: 10.5194/dach2022-10](#)

In recent years, the the Large-eddy simulation (LES) model PALM has been rapidly developed its capability to simulate physical processes within urban environments. For example, this includes energy-balance solvers for building and land surfaces, a radiative transfer model to account for multiple reflections and shading, a plant-canopy model to consider the effects of plants on flow (thermo-)dynamics, and a chemistry transport model, as well as nesting capabilities that enable "hot-spot" analysis, to name a few. This contribution provides an evaluation of modeled meteorological as well as ground and wall-surface quantities against dedicated in-situ measurements taken in an urban environment in Dejvice, Prague. Measurements included monitoring of surface temperature and wall heat fluxes. Simulations were performed for multiple days during several summer and winter episodes, characterized by different atmospheric conditions. To consider time-evolving synoptic conditions, boundary conditions were obtained from mesoscale WRF simulations. For the simulated episodes, the resulting temperature and wind speed within street canyons show a realistic representation of the observed state, except that the LES did not adequately capture night-time cooling near the surface in some scenarios. At most of the evaluation points, the simulated surface temperature reproduces the observed surface temperature reasonably well, for both, absolute and daily amplitude values. However, especially for the winter episodes and for modern buildings with multi-layer wall structure, the heat transfer through the walls is not well captured in some cases, leading to discrepancies between the modeled and observed wall-surface temperature. Moreover, we also show that the model performance with respect to the observations strongly depends on the accuracy of the input data. To name a few, this includes e.g. the prescribed initial soil moisture, the given leaf-area densities to account for correct shading, or if a facade is insulated or not. Additionally, we will point out current model limitations, particularly implications accompanied by the step-like topography on the Cartesian grid, or wide glass facades that are not fully represented in terms of radiative processes. With our findings we are able to evaluate the representation of physical processes in PALM, while also pointing out specific shortcomings.
Trvalý link: http://hdl.handle.net/11104/0326059

0549043 - ÚI 2022 US eng A - Abstrakt
[Kopal, Jakub](#) - [Dallmer-Zerbe, Isa](#) - Curot, J. - [Pidnebesna, Anna](#) - Denuelle, M. - Sol, J.-Ch. - Valton, L. - [Hlinka, Jaroslav](#) - Barbeau, E.
Factors influencing the daily evolution of preictal connectivity dynamics in epilepsy.
Epilepsia. Roč. 62, Suppl. 3 (2021), s. 29-29. ISSN 0013-9580. E-ISSN 1528-1167
Institucionální podpora: RVO:67985807
[DOI: 10.1111/epi.17079](#)
Trvalý link: http://hdl.handle.net/11104/0325082

0546685 - ÚI 2022 CH eng A - Abstrakt
Billings, Jacob - Petri, G. - **Hlinka, Jaroslav**
Flexible and Efficient Analysis of Dynamic Brain Topology. Poster 179.
EBBS 2021. Abstract Book Part I presented on-site & virtually. Lausanne, 2021. s. 129.
[EBBS 2021. Meeting of the European Brain and Behavior Society /49./. 04.09.2021-07.09.2021, Lausanne]
https://www.ebbs2021.org/
Trvalý link: http://hdl.handle.net/11104/0323095

0546688 - ÚI 2022 eng A - Abstrakt
Billings, Jacob - Petri, G. - **Hlinka, Jaroslav**
Flexible and Efficient Segmentation of Dynamic Brain Topologies. Poster 2756.
OHMB 2021 Abstract Book. 2021. 116.
[OHBM 2021. Annual Meeting of the Organization for Human Brain Mapping /27./. 21.06.2021-25.06.2021, Online]
https://www.humanbrainmapping.org/i4a/pages/index.cfm?pageid=4041
Trvalý link: http://hdl.handle.net/11104/0323096

0546895 - ÚI 2022 DE eng A - Abstrakt
Brož, J. - Campbell, M. - Urbanová, J. - Nunes, M. - Rahelic, D. - Janíčková Žďárská, D. - Taniwall, A. - Brabec, Marek - Berka, V. - Michalec, J. - Polák, J.
Glycaemic excursions during a standardised bout of hypoglycaemiainducing physical activity and subsequent hypoglycaemia treatment in adult type 1 diabetes patients.
Diabetologia. Roč. 64, Suppl. 1 (2021), S183-S184. ISSN 0012-186X. E-ISSN 1432-0428.
[Annual Meeting of the European Association for the Study of Diabetes (EASD) /57./. 27.09.2021-01.10.2021, Online]
Grant CEP: GA MZd 00064203
Institucionální podpora: RVO:67985807
DOI: 10.1007/s00125-021-05519-y

Background and aims: To characterize glucose dynamics during a standardized bout of hypoglycemia-inducing exercise and subsequent hypoglycemia treatment with oral ingestion of glucose in type 1 diabetes patients. Materials and methods: 10 male patients with type 1 diabetes (mean ±SD: age 34.4±3.9 years, diabetes duration 7.7±1,7 years, BMI 23.4±0.8 kg/m2, and HbA1c 7.4±0.62% (57±4.8 mmol/mol)) performed a standardized bout of cycling exercise using an electrically braked ergometer at a target heart rate (THR) of 50% of individual heart rate reserve, determined using the Karvonen equation. The exercise was terminated when hypoglycemia was reached, followed by immediate hypoglycemia treatment with oral ingestion of 20g glucose. Arterialized blood glucose (ABG) levels were monitored at 5-min intervals during exercise and for 60-min during recovery. A generalized additive model with smoothing spline was fitted to the ABG data against time to determine glucose dynamics during exercise and in recovery. Results: ThemeanABGvalue at the end of exercise was 3.63±1.00 mmol/l. During exercise, ABG decreased at a mean rate of 0.11±0.03 mmol/l.min-1 (minimum: 0.07, maximum: 0.17 mmol/l.min-1). During recovery, ABG increased at a mean rate of 0.13±0.05 mmol/l.min-1 (minimum: 0.06, maximum: 0.19 mmol/l.min-1). An example of glucose excursions during the study (Patients 1) is shown in Figure. Conclusion: We showed that at a defined level of hypoglycemicinducing steady-state exercise, glucose concentrations decrease on average by 1mmol/l every ten minutes, and is comparable to the rate of glucose restoration following oral ingestion of glucose. As also substantial variability was found more patients must be examined to analyse glucose changes with respect to the potential "speed group" characteristics.
Trvalý link: http://hdl.handle.net/11104/0323281

0548721 - ÚI 2022 eng A - Abstrakt
Porubský, Štefan
Hydrostatische Gleichungsmaschinen (Archimedisches Gesetz und algebraische Gleichungen).
[Hydrostatic equation engines (Archimedes' Principle and Algebraic Equations).]
Minisymposium 22: Historische Aspekte numerischer Methoden in Theorie und Praxis. Passau: University of Passau, 2021.
[DMV-ÖMG 2021: Joint Annual Conference of the German Mathematical Society and Austrian Mathematical Society. 27.09.2021-01.10.2021, Passau / Virtual]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0324768

0547053 - ÚI 2022 US eng A - Abstrakt
McDonald, J. - Yamamoto, Kentarô
Choice-free duality for orthocomplemented lattices by means of spectral spaces.
BLAST 2021. Volume of Abstracts. New Mexico State University, 2021. s. 139.
[BLAST 2021. 09.06.2021-13.06.2021, online]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323405

0547056 - ÚI 2022 CZ eng A - Abstrakt
Yamamoto, Kentarô - McDonald, J.
Choice-Free Duality for Ortholattices by Means of Spectral Spaces.
LOGICA 2021. Abstracts. Prague: Institute of Philosophy AS CR, 2021. s. 77-78.
[Logica 2021. 27.09.2021-01.10.2021, Hejnice]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323407

0547263 - ÚI 2022 eng A - Abstrakt
Šípek, A. - Gregor, V. - Klaschka, Jan - Malý, Marek - Šípek jr., A.
Incidence of anencephaly in the Czech Republic: Long-term population based study.
International Journal of Epidemiology. Roč. 50, Suppl. 1 (2021), s. 219-219. ISSN 0300-5771. E-ISSN 1464-3685
Institucionální podpora: RVO:67985807
DOI: 10.1093/ije/dyab168.618

Background: Anencephaly is a lethal anomaly of the central nervous system from the group of neural tube defects. The main goal of our study was to evaluate the incidence of anencephaly (and its possible trends) during the 53 years period. Methods: For this study, we used data from the National Registry of Congenital Anomalies of the Czech Republic. We analysed the incidence of anencephaly in births and in prenatally diagnosed cases during the 1964-2016 period. We also evaluated maternal age in these cases. The statistical analysis was performed by Poisson regression and Fisher's exact test. Results: During the study period there were 6 891 062 children born in the Czech Republic. Among those, 1232 children were born with anencephaly. Another 966 cases of anencephaly were diagnosed during prenatal diagnosis and these pregnancies were electively terminated, the total number of anencephaly cases was 2198. The total incidence of anencephaly significantly decreased during the study period ($p = 0.0136$). The incidence in births decreased significantly as well ($p < 0.001$). We found statistically higher incidence of anencephaly in elder mothers (42 years and over). Conclusions: Gradual implementation of ultrasound prenatal diagnostics started in the 80s of

the last century and lead to a very significant decrease in the incidence of anencephaly cases in births. Additionally, the total incidence of anencephaly decreased significantly as well. Key messages: Incidence of anencephaly in births decreased rapidly with gradual implementation of population wide ultrasound screening.
Trvalý link: http://hdl.handle.net/11104/0323540

0547262 - ÚI 2022 eng A - Abstrakt
Šípek, A. - Gregor, V. - Klaschka, Jan - Malý, Marek - Šípek jr., A.
Incidence of congenital anomalies in children born after assisted reproduction in the Czech Republic.
International Journal of Epidemiology. Roč. 50, Suppl. 1 (2021), s. 219-220. ISSN 0300-5771. E-ISSN 1464-3685
Institucionální podpora: RVO:67985807
DOI: 10.1093/ije/dyab168.619
Background: The number of children conceived by assisted reproduction techniques (ART) is increasing in the Czech Republic. However, several studies reported increased incidence of congenital anomalies in ART conceived children. The main goal of this study was to evaluate this theoretical risk using population-based data from Czech medial registries. Methods: The retrospective epidemiological analysis was performed using data from the National Registry of Congenital Anomalies and National Registry of Newborns, run by the Institute of Health Information and Statistics of the Czech Republic. All diagnoses of congenital anomalies (Q00-Q99) were included. We compared the incidences of congenital anomalies in naturally conceived children and ART conceived children born in the Czech Republic during 5 years period (2013-2017). Statistical analysis was performed by Fisher's exact test. Results: During the selected period there were 547 675 children born in the Czech Republic (531 064 were naturally conceived children and 16 611 were ART conceived children). The incidence of congenital anomalies was 3.90% in naturally conceived children group and 4.35% in ART conceived children. This difference is statistically significant ($p = 0.003$). Conclusions: In our population-based study, we confirmed a significantly higher general incidence of congenital anomalies in ART conceived children. Key messages: The general incidence of congenital anomalies in ART conceived children is higher (compared to the incidence of congenital anomalies in naturally conceived children). Possible causes of this phenomenon shall be further analysed.
Trvalý link: http://hdl.handle.net/11104/0323539

0546819 - ÚI 2022 RIV CZ cze A - Abstrakt
Geletič, Jan - Resler, Jaroslav - Krč, Pavel
Kvalita a funkce zeleně v silně urbanizovaných oblastech.
Město jako laboratoř změny, 1. fórum Strategie AV ČR. Program. Praha: Akademie věd České republiky, 2021. s. 2-2.
[Město jako laboratoř změny - 1. fórum Strategie AV 21. 09.09.2021-09.09.2021, Praha]
Grant ostatní: AV ČR(CZ) StrategieAV21/23
Program: StrategieAV
Institucionální podpora: RVO:67985807
Klíčová slova: PALM * urban climate * biometeorology * UTCI * microclimate
Obor OECD: Meteorology and atmospheric sciences
Urban environment is a complex living system with many synergic effects. Some of these effects are usually known, but some of them can be surprising. This presentation represents an example, how planting of trees in urban canyon can modify the current state - and make it better of worth. It is important to discuss the effects of urban greenery and its impact on urban population.
Trvalý link: http://hdl.handle.net/11104/0323192

0546952 - ÚI 2022 IT eng A - Abstrakt
Billings, Jacob
Lightning Talk - Structure of Brain Activity.
PyFest 2021. Schedule. 2021.
[PyFest 2021. 16.06.2021-18.06.2021, Online]
Institucionální podpora: RVO:67985807
https://www.facebook.com/pythonitalia/posts/3935834569878408?__cft__[0]=AZVPmXAGL_dhvoP4v
vRNvItGXvHFKwTz1cJTyYXUKmwTKmctYXmFnGRH65U0I38lrF_ftEwcT77QNnn1fpJcE4Cvd6ZIfOD-
B6MfpVx5kU5SHGu6bpCz_TEm1iaI6y_wfd7FT0jZF3kgXy8WVpWUeE0w&__tn__=%2CO%2CP-R
Trvalý link: http://hdl.handle.net/11104/0323332

0549865 - ÚI 2022 CZ cze A - Abstrakt
Geletič, Jan - Krč, Pavel - Resler, Jaroslav - Bureš, M. - Řezníček, H. - Belda, M.
Modelování realistického městského mikroklimatu a potenciálních adaptačních opatření.
Konzultační setkání řešitelů vybraných výzkumných projektů v oblasti adaptace hl. m. Prahy na klimatickou změnu. Prezentace.. Praha, 2021.
[Konzultační setkání řešitelů vybraných výzkumných projektů v oblasti adaptace hl. m. Prahy na klimatickou změnu. 02.12.2021-02.12.2021, Praha]
Grant CEP: GA KHP(CZ) UH0383; GA TA ČR(CZ) TO01000219; GA TA ČR(CZ) TN01000024
Grant ostatní: AV ČR(CZ) StrategieAV21/23; AV ČR(CZ) StrategieAV21/3
Program: StrategieAV; StrategieAV
Institucionální podpora: RVO:67985807
Klíčová slova: thermal comfort * air pollution * urban canyon * PALM * adaptation
Obor OECD: Meteorology and atmospheric sciences
Trvalý link: http://hdl.handle.net/11104/0325760

0549012 - ÚI 2022 NL eng A - Abstrakt
Antonenko, O. - Vaculová, G. - Puldová, K. - Halačová, M. - Grešáková, S. - Reissigová, Jindra - Fialová, D.
Patterns of potentially inappropriate hypnosedative use in Czech acute care seniors: outputs from the inomed and EUROAGEISM H2020 projects.
International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 804-804. ISSN 2210-7703. E-ISSN 2210-7711
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0325042

0549003 - ÚI 2022 NL eng A - Abstrakt
Brkić, J. - Okuyan, B. - Kummer, I. - Reissigová, Jindra - Sesto, S. - Capiau, A. - Hadziabdic, M. O. - Tadic, I. - Tachkov, K. - Bobrova, V. - Fialová, D.
Potentially inappropriate prescribing in older adults in central and Eastern Europe: systematic literature review.
International Journal of Clinical Pharmacy. Roč. 43, č. 3 (2021), s. 806-806. ISSN 2210-7703. E-ISSN 2210-7711
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0325040

0549044 - ÚI 2022 US eng A - Abstrakt
Barbeau, E. - Dallmer-Zerbe, Isa - Jajcay, Nikola - Chvojka, J. - Jiruška, P. - Hlinka, Jaroslav
Predicting excitation and inhibition changes underlying epileptic state transitions in hippocampal rodent slices with and without stimulation.
Epilepsia. Roč. 62, Suppl. 3 (2021), s. 86-86. ISSN 0013-9580. E-ISSN 1528-1167
Institucionální podpora: RVO:67985807
 DOI: 10.1111/epi.17079
Trvalý link: http://hdl.handle.net/11104/0325084

0549741 - ÚI 2022 NL eng A - Abstrakt
Magátová, A. - Slaná, A. - Reissigová, Jindra - Lukačišinová, A. - Brkić, J. - Fialová, D.
Prescription of sedatives and sedative burden of drug regimens in seniors in Spain and the Czech Republic: results from the INOMED and the EUROAGEISM H2020 projects.
International Journal of Clinical Pharmacy. Roč. 43, č. 6 (2021), s. 1756-1757. ISSN 2210-7703. E-ISSN 2210-7711
Trvalý link: http://hdl.handle.net/11104/0325663

0549733 - ÚI 2022 NL eng A - Abstrakt
Brkić, J. - Reissigová, Jindra - Fialová, D.
Prevalence and correlates of potentially inappropriate medication use in older adults in different settings of care in the Czech Republic.
International Journal of Clinical Pharmacy. Roč. 43, č. 6 (2021), s. 1745-1745. ISSN 2210-7703. E-ISSN 2210-7711
Trvalý link: http://hdl.handle.net/11104/0325660

0549734 - ÚI 2022 NL eng A - Abstrakt
Brkić, J. - Reissigová, Jindra - Sesto, S. - Altiparmak, O. - Držaić, M. - Kummer, I. - Magátová, A. - Bobrova, V. - Tachkov, K. - Capiau, A.
Prevalence and risk factors of potentially inappropriate medication use in community-residing older adults: preliminary results from the EUROAGEISM H2020 project.
International Journal of Clinical Pharmacy. Roč. 43, č. 6 (2021), s. 1797-1798. ISSN 2210-7703. E-ISSN 2210-7711
Trvalý link: http://hdl.handle.net/11104/0325661

0549743 - ÚI 2022 NL eng A - Abstrakt
Slaná, A. - Magátová, A. - Vaculová, G. - Reissigová, Jindra - Brkić, J. - Fialová, D.
Prevalence of pain and rationality of use of analgesics in community-residing and acutely hospitalized seniors in the Czech Republic: results from the EUROAGEISM H2020 ESR7 and the INOMED projects.
International Journal of Clinical Pharmacy. Roč. 43, č. 6 (2021), s. 1791-1791. ISSN 2210-7703. E-ISSN 2210-7711
Trvalý link: http://hdl.handle.net/11104/0325666

0546989 - ÚI 2022 CZ eng A - Abstrakt
Sedlár, Igor
Reasoning About Graded While Programs.
Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. Abstracts. Brno, 2021. s. 35-35.
[Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. 25.06.2021-26.06.2021, Brno]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323357

0548703 - ÚI 2022 CZ eng A - Abstrakt
Kalina, Jan
The 2020 Election In The United States: Beta Regression Versus Regression Quantiles.
14th International Scientific Conference RELIK 2021. Book of Abstracts. Prague: Prague University of Economics and Business, 2021 - (Vrabcová, J.; Langhamrová, J.). s. 34-34
[RELIK 2021: Reproduction of Human Capital - mutual links and connections. 04.11.2021-05.11.2021, Praha]
Institucionální podpora: RVO:67985807
Klíčová slova: elections results * electoral demography * quantile regression * heteroscedasticity, outliers

The results of the presidential election in the United States in 2020 desire a detailed statistical analysis by advanced statistical tools, as they were much different from the majority of available prognoses as well as from the presented opinion polls. We perform regression modeling for explaining the election results by means of three demographic predictors for individual 50 states: weekly attendance at religious services, percentage of Afroamerican population, and population density. We compare the performance of beta regression with linear regression, while beta regression performs only slightly better in terms of predicting the response. Because the United States population is very heterogeneous and the regression models are heteroscedastic, we focus on regression quantiles in the linear regression model. Particularly, we develop an original quintile regression map; such graphical visualization allows to perform an interesting interpretation of the effect of the demographic predictors on the election outcome on the level of individual states.
Trvalý link: http://hdl.handle.net/11104/0324756

0546988 - ÚI 2022 CZ eng A - Abstrakt
Yamamoto, Kentarô
The automorphism group of the Fraïssé limit of finite Heyting algebras.
Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. Abstracts. Brno, 2021. s. 38-39.
[Kurt Gödel Day 2021 & Czech Gathering of Logicians 2021. 25.06.2021-26.06.2021, Brno]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323356

0547051 - ÚI 2022 US eng A - Abstrakt
Yamamoto, Kentarô
The automorphism group of the Fraïssé limit of finite Heyting algebras.
BLAST 2021. Volume of Abstracts. New Mexico State University, 2021. s. 84.
[BLAST 2021. 09.06.2021-13.06.2021, online]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323404

0549866 - ÚI 2022 RIV CZ cze A - Abstrakt
Resler, Jaroslav
TURBAN: Modelování kvality ovzduší a tepelného komfortu s rozlišenou turbulencí v městském prostředí.
Konzultační setkání řešitelů vybraných výzkumných projektů v oblasti adaptace hl. m. Prahy na klimatickou změnu. Prezentace.. Praha, 2021.
[Konzultační setkání řešitelů vybraných výzkumných projektů v oblasti adaptace hl. m. Prahy na klimatickou změnu. 02.12.2021-02.12.2021, Praha]
Grant CEP: GA TA ČR(CZ) TO01000219

0547160 - ÚI 2022 eng V - Výzkumná zpráva
Jajcay, Nikola - Cakan, C. - Obermayer, K.
Cross-frequency slow oscillation–spindle coupling in a biophysically realistic thalamocortical neural mass model.
2021. 28 s. bioRxiv, 2021.08.29.458101.

Sleep manifests itself by the spontaneous emergence of characteristic oscillatory rhythms, which often time-lock and are implicated in the memory formation. Here, we analyze a neural mass model of the thalamocortical loop of which the cortical node can generate slow oscillations (approx. 1 Hz) while its thalamic component can generate sleep spindles of σ-band activity (12–15 Hz). We study the dynamics for different coupling strengths between the thalamic and cortical nodes, for different conductance values of the thalamic node's potassium leak and anomalous rectifying currents, and for different parameter regimes of the cortical node. The latter are: (1) a low activity (DOWN) state with noise-induced, transient excursions into a high activity (UP) state, (2) an adaptation induced slow oscillation limit cycle with alternating UP and DOWN states, and (3) a high activity (UP) state with noise-induced, transient excursions into the low activity (DOWN) state. During UP states, thalamic spindling is abolished or reduced. During DOWN states, the thalamic node generates sleep spindles, which in turn can cause DOWN to UP transitions in the cortical node. Consequently, this leads to spindle-induced UP state transitions in parameter regime (1), thalamic spindles induced in some but not all DOWN states in regime (2), and thalamic spindles following UP to DOWN transitions in regime (3). The spindle-induced σ-band activity in the cortical node, however, is typically strongest during the UP state, which follows a DOWN state "window of opportunity" for spindling. When the cortical node is parametrized in regime (3), the model well explains the interactions between slow oscillations and sleep spindles observed experimentally during Non-Rapid Eye Movement sleep. The model is computationally efficient and can be integrated into large-scale modeling frameworks to study spatial aspects like sleep wave propagation.
Trvalý link: http://hdl.handle.net/11104/0323483

0549859 - ÚI 2022 US eng V - Výzkumná zpráva
Griffiths, S. - Koch, Ch. - Secco, Matheus
Deviation probabilities for arithmetic progressions and irregular discrete structures.
Cornell University, 2021. 32 s. arXiv.org e-Print archive, arXiv:2012.09280 [math.CO].

Trvalý link: http://hdl.handle.net/11104/0325755

0547162 - ÚI 2022 eng V - Výzkumná zpráva
Cakan, C. - [Jajcay, Nikola](#) - Obermayer, K.
neurolib: a simulation framework for whole-brain neural mass modeling.
2021. 17 s. bioRxiv, 2021.02.18.431886.
Institucionální podpora: RVO:67985807
Obor OECD: Neurosciences (including psychophysiology

neurolib is a computational framework for whole-brain modeling written in Python. It provides a set of neural mass models that represent the average activity of a brain region on a mesoscopic scale. In a whole-brain network model, brain regions are connected with each other based on biologically informed structural connectivity, i.e. the connectome of the brain. neurolib can load structural and functional datasets, set up a whole-brain model, manage its parameters, simulate it, and organize its outputs for later analysis. The activity of each brain region can be converted into a simulated BOLD signal in order to calibrate the model against empirical data from functional magnetic resonance imaging (fMRI). Extensive model analysis is possible using a parameter exploration module, which allows one to characterize the model's behavior given a set of changing parameters. An optimization module can fit a model to multimodal empirical data using an evolutionary algorithm. neurolib is designed to be extendable such that custom neural mass models can be implemented easily, offering a versatile platform for computational neuroscientists for prototyping models, managing large numerical experiments, studying the structure-function relationship of brain networks, and for performing in-silico optimization of whole-brain models.
Trvalý link: http://hdl.handle.net/11104/0323485

0549835 - ÚI 2022 US eng V - Výzkumná zpráva
Blažej, V. - Opler, M. - [Šileikis, Matas](#) - Valtr, P.
Non-homotopic Loops with a Bounded Number of Pairwise Intersections.
Cornell University, 2021. 27 s. arXiv.org e-Print archive, arXiv:2108.13953v1 [math.CO].
Grant CEP: GA ČR(CZ) GJ20-27757Y
Institucionální podpora: RVO:67985807
https://arxiv.org/abs/2108.13953
Trvalý link: http://hdl.handle.net/11104/0325731

0547554 - ÚI 2022 US eng V - Výzkumná zpráva
[Davoodi, Akbar](#) - Javadi, R. - Raeisi, G.
On a Conjecture of Erdős on Size Ramsey Number of Star Forests.
Cornell University, 2021. 10 s. arXiv.org e-Print archive, arXiv:2111.02065 [math.CO].
Institucionální podpora: RVO:67985807
https://arxiv.org/abs/2111.02065
Trvalý link: http://hdl.handle.net/11104/0323762

0549609 - ÚI 2022 DE eng V - Výzkumná zpráva
[Krč, Pavel](#) - [Resler, Jaroslav](#) - Sühring, M. - Schubert, S. - Salim, M. - Fuka, V.
Radiative Transfer Model 3.0 integrated into the PALM model system 6.0.
Mnichov: European Geosciences Union, 2021. 57 s. Geoscientific Model Development Discussions, gmd-2020-168. *Geoscientific Model Development*. -, Accepted for review Aug 2020 (2021). ISSN 1991-959X. E-ISSN 1991-9603
Grant CEP: GA KHP(CZ) UH0383
Grant ostatní: Ga MŠk(CZ) LM2015070

The Radiative Transfer Model (RTM) is an explicitly resolved three-dimensional multi-reflection radiation model integrated into the PALM modelling system. It is responsible for modelling complex radiative interactions within the urban canopy. It represents a key component in modelling energy transfer inside the urban layer and consequently PALM's ability to provide explicit simulations of the urban canopy at metre-scale resolution. This paper presents RTM version 3.0, which is integrated into the PALM modelling system version 6.0. This version of RTM has been substantially improved over previous versions. A more realistic representation is enabled by the newly simulated processes, e.g. the interaction of longwave radiation with the plant canopy, evapotranspiration and latent heat flux, calculation of mean radiant temperature, and bidirectional interaction with the radiation forcing model. The new version also features novel discretization schemes and algorithms, namely the angular discretization and the azimuthal ray tracing, which offer significantly improved scalability and computational efficiency, enabling larger parallel simulations. It has been successfully tested on a realistic urban scenario with a horizontal size of over 6 million grid points using 8192 parallel processes.
Trvalý link: http://hdl.handle.net/11104/0325581
Vědecká data v ASEP:
Sensitivity Analysis of the PALM Model System 6.0 in the Urban Environment

0549836 - ÚI 2022 US eng V - Výzkumná zpráva
Klimošová, T. - Reiher, Ch. - Rucinski, A. - Šileikis, Matas
Sandwiching biregular random graphs.
Cornell University, 2021. 45 s. arXiv.org e-Print archive, arXiv:2010.15751 [math.CO].
Trvalý link: http://hdl.handle.net/11104/0325732

0549625 - ÚI 2022 DE eng V - Výzkumná zpráva
Belda, M. - Resler, Jaroslav - Geletič, Jan - Krč, Pavel - Maronga, B. - Sühring, M. - Kurppa, M. - Kanani-Sühring, F. - Fuka, V. - Eben, Kryštof - Benešová, N. - Auvinen, M.
Sensitivity analysis of the PALM model system 6.0 in the urban environment.
Mnichov: European Geosciences Union, 2020. 32 s. Geoscientific Model Development Discussions, gmd-2020-126. *Geoscientific Model Development*. -, Accepted for review Aug 2020 (2021). ISSN 1991-959X. E-ISSN 1991-9603
The PALM 6.0 model system has been rapidly developed in the recent years with respect to its capability to simulate physical processes within urban environments. In this regard, it includes e.g. energy-balance solvers for building and land surfaces, a radiative transfer model to account for multiple reflections and shading, as well as a plant-canopy model to consider the effects of plants on the (thermo)dynamics of the flow. This study provides a thorough evaluation of modelled meteorological, air chemistry and wall-surface quantities against dedicated in-situ measurements

taken in an urban environment in Prague, Dejvice, Czech Republic. Measurements included e.g. monitoring of air quality and meteorology in street canyons, surface temperature scanning with infrared camera and monitoring of wall heat fluxes. Large-eddy simulations (LES) for multiple days within two summer and three winter episodes that are characterized by different atmospheric conditions were performed with the PALM model driven by boundary conditions obtained from a mesoscale model. For the simulated episodes, the resulting temperature, wind speed and concentrations of chemical compounds within street canyons agreed well with the observations, except the LES did not adequately capture nighttime cooling near the surface at certain meteorological conditions. In some situations, less turbulent mixing was modelled resulting in higher near-surface concentrations. At most of the surface evaluation points the simulated wall-surface temperature agreed fairly well with the observed one regarding its absolute value as well as daily amplitude. However, especially for the winter episodes and for modern buildings with multi-layer walls, the heat transfer through the wall is partly not well captured leading to discrepancies between the modelled and observed wall-surface temperature. Furthermore, we show that model results depend on the accuracy of the input data, particularly the temperatures of surfaces affected by nearby trees strongly depend on the spatial distribution of the leaf area density, land-surface temperatures at grass surfaces strongly depend on the initial soil moisture, or wall-surface temperatures depend on the correct prescription of wall material parameters, though these parameters are often not available with sufficient accuracy. Moreover, we also point out current model limitations, here we particularly focus on implications with respect to the discrete representation of topography on a Cartesian grid, complex heterogeneous facades, as well as glass facades that are not well represented in terms of radiative processes. With these findings presented, we aim to validate the representation of physical processes in PALM as well as to point out specific shortcomings. This will help to build a baseline for future developments of the model and for improvements of simulations of physical processes in an urban environment.

Trvalý link: http://hdl.handle.net/11104/0325586

Vědecká data v ASEP:

Sensitivity Analysis of the PALM Model System 6.0 in the Urban Environment

0547293 - ÚI 2022 US eng V - Výzkumná zpráva

Arinyo i Prats, Andreu - Moreno Spiegelberg, P. - Matías, M.A. - Gomila, D.

Traveling pulses in Class-I excitable media.

Cornell University, 2021. 5 s. arXiv.org e-Print archive, arXiv:2101.01071 [nlin.PS].

Institucionální podpora: RVO:67985807

https://arxiv.org/abs/2101.01071

Trvalý link: http://hdl.handle.net/11104/0323559

0548125 - ÚI 2022 RIV eng L4 - Software

Berec, Luděk - Diviák, T. - Kuběna, Aleš Antonín - Levínský, René - Neruda, Roman - Suchopárová, Gabriela - Šlerka, J. - Šmíd, M. - Trnka, Jan - Tuček, Vít - Vidnerová, Petra - Vrbenský, Karel - Zajíček, Milan - Zapletal, František

Epicity.

Interní kód: Epicity ; 2021

Grant CEP: GA TA ČR(CZ) TL04000282

Institucionální podpora: RVO:67985807 ; RVO:67985556 ; RVO:67985998

Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)

https://github.com/epicity-cz/model-m/releases/tag/v1.0

Model M is an agent-based epidemic model for COVID-19 computational experiments on realistic multi-graph social networks. It allows to simulate projections of main epidemic indicators with respect to various interventions. These include lockdowns, closures of different contact layers (leisure, schools, etc.), social distancing, testing and quarantine, contact tracing, and vaccination.
Trvalý link: http://hdl.handle.net/11104/0324239

0546893 - ÚI 2022 ZA eng A - Abstrakt
Moraschini, Tommaso - Raftery, J.G. - Wannenburg, J. J.
Irreducible DeMorgan Monoids and Strong Relevance Logics.
SAMS 2017. Congress booklet. Potchefstroom: North/West University, 2017. s. 16.
[SAMS 2017. Annual Congress of the South African Mathematical Society /60./. 20.11.2017-22.11.2017, Potchefstroom]
Trvalý link: http://hdl.handle.net/11104/0323279

0546891 - ÚI 2022 ZA eng A - Abstrakt
Moraschini, Tommaso - Raftery, J.G. - Wannenburg, J. J.
Pre-Maximal Relevance Logics via DeMorgan Monoids.
SAMS 2017. Congress booklet. Potchefstroom: North/West University, 2017. s. 17.
[SAMS 2017. Annual Congress of the South African Mathematical Society /60./. 20.11.2017-22.11.2017, Potchefstroom]
Trvalý link: http://hdl.handle.net/11104/0323278

0546980 - ÚI 2022 CZ eng A - Abstrakt
Moraschini, Tommaso - Raftery, J.G. - Wannenburg, J. J.
Varieties of De Morgan Monoids I: Minimality and Irreducible Algebras.
Tacl - Abstracts. Prague: Institute of Computer Science, Czech Academy of Sciences & Faculty of Arts, Charles University, 2017.
[TACL 2017. Topology, Algebra and Categories in Logic. 26.06.2017-30.06.2017, Prague]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323351

0546982 - ÚI 2022 CZ eng A - Abstrakt
Moraschini, Tommaso - Raftery, J.G. - Wannenburg, J. J.
Varieties of De Morgan Monoids II: Covers of Atoms.
Tacl - Abstracts. Prague: Institute of Computer Science, Czech Academy of Sciences & Faculty of Arts, Charles University, 2017.
[TACL 2017. Topology, Algebra and Categories in Logic. 26.06.2017-30.06.2017, Prague]
Institucionální podpora: RVO:67985807
Trvalý link: http://hdl.handle.net/11104/0323352