Záznamy vložené do ASEP za UI (1. 11. – 31. 11. 2021)

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
Program: StrategieAV
Institucionální podpora: RVO:67985807
Klíčová slova: Generalised additive mode * lPenalised spline * Semiparametric model * Romania
Obor OECD: Meteorology and atmospheric sciences
Impakt faktor: 7.963, rok: 2020
Způsob publikování: Omezený přístup
 DOI: 10.1016/j.scitotenv.2021.150799

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

Geletič, Jan - Řadová, Jana - Resler, Jaroslav - Krč, Pavel - Eben, Kryštof - Belda, M. - Fuka, V. - Vlček, O.
Assessing the Sensitivies of Urban Climate Model PALM-4U.
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

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
Grant CEP: GA ČR(CZ) GA18-18080S
Institucionální podpora: RVO:67985807
Klíčová slova: VGF-GaAs growth * machine learning * data mining * decision trees * correlation analysis * PCA biplot * k-means clustering
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Impakt faktor: 2.589, rok: 2020
Způsob publikování: Open access
DOI: 10.3390/cryst11101218

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

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)

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) $M_\odot$. 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

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
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

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 $0.05\ \text{eV}^2\leq\Delta m^2_{41}\leq0.5\ \text{eV}^2$, 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.

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 $2\times10^{-14}\ \text{cm}^{-2}\,\text{s}^{-1}\,\text{sr}^{-1}$ 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

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

Vidnerová, Petra - Neruda, Roman
Air Pollution Modelling by Machine Learning Methods.
Modelling. Roč. 2, č. 4 (2021), s. 659-674. ISSN 2673-3951
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, NO_2, and NO_x 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

0548683 - ÚI 2022 RIV CZ eng J - Článek v odborném periodiku
Kalina, Jan - **Soukup, Lubomír**
Bayesovské odhady: přirozený nástroj pro využití apriorní informace.
[Bayesian Estimates: Tool For Processing Prior Information.]
Informační bulletin České statistické společnosti. Roč. 32, č. 3 (2021), s. 3-15. ISSN 1210-8022
Grant CEP: GA ČR(CZ) GA19-05704S; GA ČR GA21-19311S
Institucionální podpora: RVO:67985807 ; RVO:67985556
Klíčová slova: Bayesovské odhady * apriorní informace * předchozí měření * regularizace * Bayesian estimation * prior information * previous measurements * regularization
Obor OECD: Statistics and probability; Statistics and probability (UTIA-B)
Způsob publikování: Open access
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

0548093 - ÚI 2022 RIV GB eng J - Článek v odborném periodiku
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].
Heliyon. Roč. 7, č. 9 (2021), č. článku e07948. ISSN 2405-8440
Grant ostatní: AV ČR(CZ) AP1901
Program: Akademická prémie - Praemium Academiae
Institucionální podpora: RVO:67985807
Způsob publikování: Open access
 DOI: 10.1016/j.heliyon.2021.e07948
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

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

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]
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

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]

Klíčová slova: Color spanning circle * Imprecise points * Algorithms * Computational complexity
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

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]
Klíčová slova: epistemic logic * multi-agent epistemic logic * common knowledge * distributed knowledge * neighbourhood semantics
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
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]
Klíčová slova: Machine learning * Sparsity * Regularization * Robust optimization * Outliers

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

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]

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

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
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]

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

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

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

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

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
Grant ostatní: AV ČR(CZ) StrategieAV21/23; AV ČR(CZ) StrategieAV21/3
Program: StrategieAV; StrategieAV
Institucionální podpora: RVO:67985807
Klíčová slova: turbulence * PALM * large-eddy simulation * thermal comfort
Obor OECD: Meteorology and atmospheric sciences
Trvalý link: http://hdl.handle.net/11104/0325762

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].
Grant CEP: GA ČR(CZ) GJ20-27757Y
Institucionální podpora: RVO:67985807
https://arxiv.org/abs/2012.09280
Trvalý link: http://hdl.handle.net/11104/0325755

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
Institucionální podpora: RVO:67985807
Obor OECD: Meteorology and atmospheric sciences
http://dx.doi.org/10.5194/gmd-2020-168
DOI: 10.5194/gmd-2020-168

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

Klimošová, T. - Reiher, Ch. - Rucinski, A. - <u>Šileikis, Matas</u>
Sandwiching biregular random graphs.

Belda, M. - <u>Resler, Jaroslav</u> - <u>Geletič, Jan</u> - <u>Krč, Pavel</u> - Maronga, B. - Sühring, M. - Kurppa, M. - Kanani-Sühring, F. - Fuka, V. - <u>Eben, Kryštof</u> - Benešová, N. - Auvinen, M.
Sensitivity analysis of the PALM model system 6.0 in the urban environment.

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

0548125 - ÚI 2022 RIV eng L4 - Software

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Epicity.

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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