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

0538817 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Geletič, Jan - Lehnert, Michal - Krč, Pavel - Resler, Jaroslav - Krayenhoff, E. S.
High-resolution modelling of thermal exposure during a hot spell: A case study using PALM-4U in Prague, Czech Republic.
Atmosphere. Roč. 12, č. 2 (2021), č. článku 175. ISSN 2073-4433
Grant CEP: GA KHP(CZ) UH0383
Grant ostatní:Ga MŠk(CZ) LM2015070; AV ČR(CZ) StrategieAV21/3
Program:StrategieAV
Institucionální podpora: RVO:67985807
Klíčová slova: PALM-4U * biometeorology * mean radiant temperature (MRT) * universal thermal climate index (UTCI) * large-eddy simulation (LES) * urban climate
Kód oboru RIV: DG - Vědy o atmosféře, meteorologie
Obor OECD: Meteorology and atmospheric sciences
Impakt faktor: 2.397, rok: 2019
DOI: 10.3390/atmos12020175

The modelling of thermal exposure in outdoor urban environments is a highly topical challenge in modern climate research. This paper presents the results derived from a new micrometeorological model that employs an integrated biometeorology module to model Universal Thermal Climate Index (UTCI). This is PALM-4U, which includes an integrated human body-shape parameterization, deployed herein for a pilot domain in Prague, Czech Republic. The results highlight the key role of radiation in the spatiotemporal variability of thermal exposure in moderate-climate urban areas during summer days in terms of the way in which this directly affects thermal comfort through radiant temperature and indirectly through the complexity of turbulence in street canyons. The model simulations suggest that the highest thermal exposure may be expected within street canyons near the irradiated north sides of east–west streets and near streets oriented north–south. Heat exposure in streets increases in proximity to buildings with reflective paints. The lowest heat exposure during the day may be anticipated in tree-shaded courtyards. The cooling effect of trees may range from 4 °C to 9 °C in UTCI, and the cooling effect of grass in comparison with artificial paved surfaces in open public places may be from 2 °C to 5 °C UTCI. In general terms, this study illustrates that the PALM modelling system provides a new perspective on the spatiotemporal differentiation of thermal exposure at the pedestrian level; it may therefore contribute to more climate-sensitive urban planning.
Trvalý link: http://hdl.handle.net/11104/0316532

0538773 - ÚTIA 2021 RIV CZ eng C - Konferenční příspěvek (zahraniční konf.)
Papáček, Štěpán - Matonoha, Ctirad - Duintjer Tebbens, Jurjen
Mathematics and Optimal control theory meet Pharmacy: Towards application of special techniques in modeling, control and optimization of biochemical networks.
Proceedings of the SNA'21 Seminar on Numerical Analysis Modelling and Simulation of Challenging Engineering Problems. Ostrava: Institute of Geonics of the Czech Academy of Sciences, 2021 - (Starý, J.; Sysala, S.), s. 60-63. ISBN 978-80-86407-82-1.
[SNA'21 Seminar on Numerical Analysis Modelling and Simulation of Challenging Engineering Problems (SNA'21 2021). Ostrava (CZ), 25.01.2021-29.01.2021]
Grant CEP: GA ČR(CZ) GA19-05872S
Institucionální podpora: RVO:67985556 ; RVO:67985807
Klíčová slova: Dynamical system * Systems pharmacology * Biochemical network * Input-output regulation * Optimization
Kód oboru RIV: BC - Teorie a systémy řízení; BA - Obecná matematika (UIVT-O)
Obor OECD: Automation and control systems; Pure mathematics (UIVT-O)
http://www.ugn.cas.cz/event/2021/sna/files/sna21-sbornik.pdf

Similarly to other scienti c domains, the expenses related to in silico modeling in pharmacology need not be extensively apologized. Vis a vis both in vitro and in vivo experiments, physiologically-based

pharmacokinetic (PBPK) and pharmacodynamic models represent an important tool for the assessment of drug safety before its approval, as well as a viable option in designing dosing regimens. In this contribution, some special techniques related to the mathematical modeling, control and optimization of biochemical networks are presented on a paradigmatic example of enzyme kinetics.
Trvalý link: http://hdl.handle.net/11104/0316506

0538761 - SOÚ 2021 RIV CH eng J - Článek v odborném periodiku
Kesner, L. - Fajnerová, I. - Adámek, P. - Buchtík, Martin - Grygarová, D. - Hlinka, Jaroslav - Kozelka, P. - Nekovářová, T. - Španiel, F. - Tintěra, J. - Alexová, A. - Greguš, D. - Horáček, J.
Fusiform Activity Distinguishes Between Subjects With Low and High Xenophobic Attitudes Toward Refugees.
Frontiers in Behavioral Neuroscience. Roč. 14, September (2020), s. 1-17, č. článku 98. ISSN 1662-5153
Institucionální podpora: RVO:68378025 ; RVO:67985807
Klíčová slova: refugee crisis * xenophobia * attitude * conscientiousness * fMRI
Kód oboru RIV: AO - Sociologie, demografie; FH - Neurologie, neurochirurgie, neurovědy (UIVT-O)
Obor OECD: Sociology; Neurosciences (including psychophysiology (UIVT-O)
Impakt faktor: 2.512, rok: 2019
https://www.frontiersin.org/articles/10.3389/fnbeh.2020.00098/full
DOI: 10.3389/fnbeh.2020.00098

This study analyzes how people's attitudes to the European refugee crisis (ERC) correspond to selected psychological state and trait measures and impact the neural processing of media images of refugees. From a large pool of respondents, who filled in an online xenophobia questionnaire, we selected two groups (total N = 38) with the same socio-demographic background, but with opposite attitudes toward refugees. We found that a negative attitude toward refugees (high xenophobia - HX) was associated with a significantly higher conscientiousness score and with a higher trait aggression and hostility, but there was no group effect connected with empathy, fear, and anxiety measures. At the neural level we found that brain activity during the presentation of ERC stimuli is affected by xenophobic attitudes—with more xenophobic subjects exhibiting a higher BOLD response in the left fusiform gyrus. However, while the fMRI results demonstrate increased attention and vigilance toward ERC-related stimuli in the HX group, they do not show differentiated patterns of brain activity associated with perception of dehumanized outgroup.
Trvalý link: http://hdl.handle.net/11104/0316494

0538524 - ÚI 2021 RIV CZ cze J - Článek v odborném periodiku
Turčičová, Marie - Eben, Kryštof
Odhad varianční matice ve vysoké dimenzi.
[Covariance Matrix Estimation In High-Dimensional Problems.]
Informační bulletin České statistické společnosti. Roč. 31, č. 4 (2020), s. 24-39. ISSN 1210-8022
Grant CEP: GA TA ČR(CZ) TL01000238
Institucionální podpora: RVO:67985807
Klíčová slova: varianční matice * odhad * vysoká dimenze * regularizace * covariance matrix * estimator * high-dimension * regularization
Kód oboru RIV: BB - Aplikovaná statistika, operační výzkum
Obor OECD: Statistics and probability
https://www.statspol.cz/wp-content/uploads/2020/12/IB_4_2020.pdf

V řadě statistických aplikací, kde je dimenze náhodného vektoru vysoká v porovnání s počtem dostupných měření, je velkým problémem odhad varianční matice. Klasická výběrová varianční matice má v takovém případě řadu nežádoucích vlastností, zejména nízkou hodnost a malou spolehlivost odhadu jednotlivých prvků. Tento článek obsahuje přehled metod, které se v tomto případě k odhadu varianční matice používají. Pozornost je nejdříve věnována výpočetně jednoduchým metodám pracujícím po prvcích, mezi které patří například metoda smrštění (shrinkage), posílení diagonály (tapering) a další. Dále je uveden přehled složitějších přístupů, které používají parametrické modely založené na různých dodatečných předpokladech o vlastnostech náhodného vektoru, zejména normality, kovarianční stacionarity nebo markovské vlastnosti. Parametrické modely se používají jak k popisu poklesu vlastních čísel, tak k přímému modelování varianční matice či její inverze. Parametry

příslušných modelů lze odhadovat standardními statistickými postupy

In many statistical applications, where the dimension of a random vector highly exceeds the number of available measurements, the estimation of covariance matrix poses a challenge. The sample covariance matrix has several undesirable properties in this case, specifically low rank and poor accuracy of estimation of its individual elements. This paper provides an overview of methods that are used for covariance matrix estimation in high-dimensional problems. First, we pay attention to computationally simple methods which usually work element-wise, such as shrinkage, tapering, etc. Further, more complex approaches are presented, which employ parametric models based on additional assumptions about the properties of the random vector, especially normality, covariance stationarity and Markov property. Parametric models are used to describe the decay of eigenvalues or to model the covariance matrix or its inverse. Parameters of the corresponding models can be estimated by standard statistical techniques.
Trvalý link: http://hdl.handle.net/11104/0316317

0538510 - ÚI 2022 US eng J - Článek v odborném periodiku
Fabián, Zdeněk
Mean, mode or median? The score mean.
Communications in Statistics - Theory and Methods. -, Online: 12 December 2019 (2021). ISSN 0361-0926
Institucionální podpora: RVO:67985807
Klíčová slova: score function of distribution * weight function * estimation * central limit theorem
Kód oboru RIV: BB - Aplikovaná statistika, operační výzkum
Obor OECD: Statistics and probability
Impakt faktor: 0.612, rok: 2019
DOI: 10.1080/03610926.2019.1666142

A continuous random variable can be uniquely represented by the score function of distribution, i.e. a scalar-valued function describing the influence of a data item on the typical value of the distribution. There are at most two relevant scalar-valued scores based on two basic transformations: the "natural" one, useful for estimating parameters of parametric distributions by the generalized moment method; and the "universal" one, which is a basis for the score function of distribution. The score mean, the zero of the score function of distribution, represents the typical value of the distribution in the sense of the value which is most likely to be sampled. Both scores are often identical to each other. The derivative of the score function of distribution is the weight function of this distribution. The main result is that sums of score random variables obey the central limit theorem and can be used for directly estimating the score mean without use of any current estimator.
Trvalý link: http://hdl.handle.net/11104/0316307

0538234 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Moraschini, Tommaso - Raftery, J.G. - Wannenburg, J. J.
Epimorphisms in Varieties of Subidempotent Rresiduated Structures.
Algebra Universalis. Roč. 82, č. 1 (2021), č. článku 6. ISSN 0002-5240
Grant CEP: GA MŠk(CZ) EF17_050/0008361
GRANT EU: European Commission(XE) 689176 - SYSMICS
Institucionální podpora: RVO:67985807
Klíčová slova: Epimorphism * Residuated lattice * Brouwerian algebra * Heyting algebra * De Morgan monoid * Esakia space * Substructural logic * Relevance logic * Beth definability
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics
Impakt faktor: 0.404, rok: 2019
http://dx.doi.org/10.1007/s00012-020-00694-2
DOI: 10.1007/s00012-020-00694-2

A commutative residuated lattice A is said to be subidempotent if the lower bounds of its neutral element e are idempotent (in which case they naturally constitute a Brouwerian algebra A-). It is proved here that epimorphisms are surjective in a variety K of such algebras A (with or without involution), provided that each finitely subdirectly irreducible algebra B∈ K has two properties: (1) B is generated by lower bounds of e, and (2) the poset of prime filters of B- has finite depth. Neither (1)

nor (2) may be dropped. The proof adapts to the presence of bounds. The result generalizes some recent findings of G. Bezhanishvili and the first two authors concerning epimorphisms in varieties of Brouwerian algebras, Heyting algebras and Sugihara monoids, but its scope also encompasses a range of interesting varieties of De Morgan monoids.
Trvalý link: http://hdl.handle.net/11104/0316060

0538225 - ÚI 2021 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
Punčochář, Vít
Inquisitive Dynamic Epistemic Logic in a Non-classical Setting.
Dynamic Logic: New Trends and Applications. Cham: Springer, 2020 - (Martins, M.; Sedlár, I.), s. 205-221. Lecture Notes in Computer Science, 12569. ISBN 978-3-030-65839-7. ISSN 0302-9743.
[DaLí International Workshop /3./. Prague / Online (CZ), 09.10.2020-10.10.2020]
Grant CEP: GA ČR(CZ) GJ18-19162Y
Institucionální podpora: RVO:67985807
Klíčová slova: Dynamic logic * Epistemic logic * Inquisitive logic * Substructural logic * Public announcement * Reduction axioms
Kód oboru RIV: AA - Filosofie a náboženství
Obor OECD: Philosophy, History and Philosophy of science and technology
DOI: 10.1007/978-3-030-65840-3_13

This paper studies the operations of public announcement of statements and public utterance of questions in the context of substructutral inquisitive epistemic logic. It was shown elsewhere that the logical laws governing the modalities of knowing and entertaining from standard inquisitive epistemic logic generalize smoothly to substructural logics. In this paper we show that the situation is different with the reduction axioms that in the standard setting govern the modality of public announcement/utterance. The standard reduction axioms depend on some features of classical logic that are not preserved in substructural logics. Using an additional auxiliary modality, we show how to overcome this obstacle and formulate an alternative set of reduction axioms for the public announcement/utterance modality that can be used even in the context of our general non-classical setting.
Trvalý link: http://hdl.handle.net/11104/0316050

0537946 - ÚI 2021 RIV US eng J - Článek v odborném periodiku
Gerster, M. - Berner, R. - Sawicki, J. - Zakharova, A. - Škoch, A. - Hlinka, Jaroslav - Lehnertz, K. - Schöll, E.
FitzHugh–Nagumo Oscillators on Complex Networks Mimic Epileptic-Seizure-Related Synchronization Phenomena.
Chaos. Roč. 30, č. 12 (2020), č. článku 123130. ISSN 1054-1500
Grant CEP: GA MZd(CZ) NV17-28427A
Grant ostatní:GA MŠk(CZ) LO1611
Institucionální podpora: RVO:67985807
Klíčová slova: epilepsy * synchronization * network * FitzHugh-Nagumo oscillator * topology * structural connectivity
Kód oboru RIV: IN - Informatika
Obor OECD: Applied mathematics
Impakt faktor: 2.832, rok: 2019
http://dx.doi.org/10.1063/5.0021420
DOI: 10.1063/5.0021420

We study patterns of partial synchronization in a network of FitzHugh-Nagumo oscillators with empirical structural connectivity measured in human subjects. We report the spontaneous occurrence of synchronization phenomena that closely resemble the ones seen during epileptic seizures in humans. In order to obtain deeper insights into the interplay between dynamics and network topology, we perform long-term simulations of oscillatory dynamics on different paradigmatic network structures: random networks, regular nonlocally coupled ring networks, ring networks with fractal connectivities, and small-world networks with various rewiring probability. Among these networks, a small-world network with intermediate rewiring probability best mimics the findings achieved with the simulations using the empirical structural connectivity. For the other network topologies, either no spontaneously occurring epileptic-seizure-related synchronization phenomena can be observed in the

simulated dynamics, or the overall degree of synchronization remains high throughout the simulation. This indicates that a topology with some balance between regularity and randomness favors the self-initiation and self-termination of episodes of seizure-like strong synchronization.
Trvalý link: http://hdl.handle.net/11104/0315774

0537597 - ÚI 2021 RIV CZ cze E - Elektronický dokument
Geletič, Jan - Resler, Jaroslav - Krč, Pavel
Mikroklimatické modely a možnosti jejich využití při komplexním hodnocení adaptačních opatření ve městech.
[Prezentace]. - Praha: Akademie věd České republiky, 2020
Grant CEP: GA KHP(CZ) UH0383
Institucionální podpora: RVO:67985807
Klíčová slova: mikroklima * PALM * UTCI * dopravní emise * modelování
Kód oboru RIV: DG - Vědy o atmosféře, meteorologie
Obor OECD: Meteorology and atmospheric sciences

Přednáška byla prezentována v rámci odborného webináře "Klimatická změna: role měst", pořádaného Komisí pro životní prostředí AV ČR, dne 11. listopadu 2020.
Trvalý link: http://hdl.handle.net/11104/0315419

0537596 - FZÚ 2021 RIV US eng J - Článek v odborném periodiku
Acero, M. A. - Adamson, P. - Agam, G. - Filip, Peter - Hakl, František - Lokajíček, Miloš - Zálešák, Jaroslav
Adjusting neutrino interaction models and evaluating uncertainties using NOvA near detector data.
European Physical Journal C. Roč. 80, č. 12 (2020), s. 1-19, č. článku 1119. ISSN 1434-6044
Grant CEP: GA MŠk(CZ) LM2018113
Institucionální podpora: RVO:68378271 ; RVO:67985807
Klíčová slova: NOvA * numerical calculations * neutrino * Monte Carlo
Kód oboru RIV: BF - Elementární částice a fyzika vys. energií; BF - Elementární částice a fyzika vys. energií (UIVT-O)
Obor OECD: Particles and field physics; Particles and field physics (UIVT-O)
Impakt faktor: 4.389, rok: 2019
http://hdl.handle.net/11104/0315418
DOI: 10.1140/epjc/s10052-020-08577-5

The two-detector design of the NOvA neutrino oscillation experiment, in which two functionally identical detectors are exposed to an intense neutrino beam, aids in canceling leading order effects of cross-section uncertainties. However, limited knowledge of neutrino interaction cross sections still gives rise to some of the largest systematic uncertainties in current oscillation measurements. We show contemporary models of neutrino interactions to be discrepant with data from NOvA, consistent with discrepancies seen in other experiments. Adjustments to neutrino interaction models in GENIE are presented, creating an effective model that improves agreement with our data. We also describe systematic uncertainties on these models, including uncertainties on multi-nucleon interactions from a newly developed procedure using NOvA near detector data.

Trvalý link: http://hdl.handle.net/11104/0315418

0537595 - FZÚ 2021 RIV GB eng J - Článek v odborném periodiku
Acero, M. A. - Adamson, P. - Agam, G. - Filip, Peter - Hakl, František - Lokajíček, Miloš - Zálešák, Jaroslav
Supernova neutrino detection in NOvA.
Journal of Cosmology and Astroparticle Physics. Roč. 2020, č. 10 (2020), s. 1-34, č. článku 014. ISSN 1475-7516
Grant CEP: GA MŠk(CZ) LM2018113
Institucionální podpora: RVO:68378271 ; RVO:67985807
Klíčová slova: NOvA * neutrino * supernova * calorimeter * scintillation counter * liquid * trigger
Kód oboru RIV: BF - Elementární částice a fyzika vys. energií; BF - Elementární částice a fyzika vys. energií (UIVT-O)
Obor OECD: Particles and field physics; Particles and field physics (UIVT-O)

Impakt faktor: 5.210, rok: 2019
DOI: 10.1088/1475-7516/2020/10/014

The NOvA long-baseline neutrino experiment uses a pair of large, segmented, liquid-scintillator calorimeters to study neutrino oscillations, using GeV-scale neutrinos from the Fermilab NuMI beam. These detectors are also sensitive to the flux of neutrinos which are emitted during a core-collapse supernova through inverse beta decay interactions on carbon at energies of &calO,(10 MeV). This signature provides a means to study the dominant mode of energy release for a core-collapse supernova occurring in our galaxy. We describe the data-driven software trigger system developed and employed by the NOvA experiment to identify and record neutrino data from nearby galactic supernovae. This technique has been used by NOvA to self-trigger on potential core-collapse supernovae in our galaxy, with an estimated sensitivity reaching out to 10 kpc distance while achieving a detection efficiency of 23% to 49% for supernova from progenitor stars with masses of 9.6 M⊙ to 27 M⊙, respectively.

Trvalý link: http://hdl.handle.net/11104/0315417

0537592 - ÚI 2021 RIV AU eng G - Konferenční sborník (zahraniční konf.)
Dang, T. - Ratschan, Stefan (ed.)
Proceedings 6th International Workshop on Symbolic-Numeric methods for Reasoning about CPS and IoT.
Waterloo: Open Publishing Association, 2020. 55 s. Electronic Proceedings in Theoretical Computer Science, 331. ISSN 2075-2180.
[SNR 2020: International Workshop on Symbolic-Numeric Methods for Reasoning /6./. Vienna / Online (AT), 31.08.2020-31.08.2020]
Institucionální podpora: RVO:67985807
Klíčová slova: formal verification * automated reasoning * cyber-physical systems
Kód oboru RIV: IN - Informatika
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
http://eptcs.web.cse.unsw.edu.au/content.cgi?SNR2020#EPTCS331.0
DOI: 10.4204/EPTCS.331

Welcome to the proceedings of the 6th International Workshop on Symbolic-Numeric Methods for Reasoning about CPS and IoT (SNR 2020). The workshop was planned to take place in Vienna, Austria as a satellite event of QONFEST'20. Due to the COVID-19 pandemic, the whole event took place online. SNR focuses on the combination of symbolic and numeric methods for reasoning about Cyber-Physical Systems and the Internet of Things to facilitate model identification, specification, verification, and control synthesis for these systems. The synergy between symbolic and numerical approaches is fruitful thanks to their complementarity: - Symbolic methods operate on exact and discrete representations of systems, the set of reachable states, the distribution of model parameters or the possible gains for controller parameters. - Numeric methods operate on various forms of numerical approximations and continuous transformations of the systems, as developed in the area of continuous dynamical systems and control theory.
Trvalý link: http://hdl.handle.net/11104/0315415

0537581 - ÚI 2022 RIV CH eng J - Článek v odborném periodiku
Punčochář, Vít - Sedlár, Igor
Inquisitive Propositional Dynamic Logic.
Journal of Logic, Language, and Information. Online 08 January 2021 (2021). ISSN 0925-8531
Grant CEP: GA ČR(CZ) GJ18-19162Y
Institucionální podpora: RVO:67985807
Klíčová slova: Inquisitive semantics * Propositional dynamic logic * Logic of programs * Logic of questions
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics
Impakt faktor: 0.440, rok: 2019
http://dx.doi.org/10.1007/s10849-020-09326-3
DOI: 10.1007/s10849-020-09326-3

This paper combines propositional dynamic logic (PDL) with propositional inquisitive logic (InqB). The result of this combination is a logical system InqPDL that conservatively extends both PDL and InqB, and, moreover, allows for an interaction of the question-forming operator from InqB with the structured modalities from PDL. We study this system from a semantic as well as a syntactic point of view. These two perspectives are linked via a completeness proof, which also shows that InqPDL is decidable.
Trvalý link: http://hdl.handle.net/11104/0315403

0537567 - ÚI 2021 RIV US eng C - Konferenční příspěvek (zahraniční konf.)
Suchopárová, Gabriela - Neruda, Roman
Genens: An AutoML System for Ensemble Optimization Based on Developmental Genetic Programming.
2020 IEEE Symposium Series on Computational Intelligence (SSCI). New York: IEEE, 2020, s. 631-638. ISBN 978-1-7281-2548-0.
[IEEE SSCI 2020: IEEE Symposium Series on Computational Intelligence. Canberra / Online (AU), 01.12.2020-04.12.2020]
Grant CEP: GA ČR(CZ) GA18-23827S
Institucionální podpora: RVO:67985807
Klíčová slova: Machine learning * AutoML * Genetic programming * Developmental methods * Pipelines * Vegetation * Optimization * Task analysis * Machine learning algorithms * Computational modeling * Benchmark testing
Kód oboru RIV: IN - Informatika
Obor OECD: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
DOI: 10.1109/SSCI47803.2020.9308582

We propose an AutoML system for pipeline optimization based on developmental genetic programming — genens. It is built atop of scikit-learn pipelines, and it focuses on both hyperparameter and architecture optimization. Compared to existing systems, it enables to optimize more complex ensembles, while exploring simpler models at the same time. The system has been evaluated on selected benchmark datasets from the AutoML benchmark, producing competitive results.
Trvalý link: http://hdl.handle.net/11104/0315396

0537321 - ÚI 2021 RIV GB eng J - Článek v odborném periodiku
Martinková, P. - Hladká, Adéla - Potužníková, E.
Is academic tracking related to gains in learning competence? Using propensity score matching and differential item change functioning analysis for better understanding of tracking implications.
Learning and Instruction. Roč. 66, April 2020 (2020), č. článku 101286. ISSN 0959-4752
Grant CEP: GA ČR(CZ) GBP402/12/G130
Institucionální podpora: RVO:67985807
Klíčová slova: Academic tracking * Learning competence * Propensity score matching * Differential item functioning in change * Instructional sensitivity
Kód oboru RIV: BB - Aplikovaná statistika, operační výzkum
Obor OECD: Statistics and probability
Impakt faktor: 3.323, rok: 2019
http://hdl.handle.net/11104/0315047
DOI: 10.1016/j.learninstruc.2019.101286

This study analyzes gains in cognitive components of learning competence with respect to cohorts based on ability tracking in a Czech longitudinal study. Propensity score matching is used to form parallelized samples of academic and non-academic track students and to eliminate the effect of selective school intake. We applied regression models on the total scores to test for the overall track effect. Furthermore, we analyze scores and gains on the subscores and check for differential item functioning in Grade 6 and in change to Grade 9. While after 3 years, no significant difference between the two tracks was apparent in the total learning competence score, we did, however, find significant differences in some subscores and in the functioning of some items. We argue that item-level analysis is important for deeper understanding of the tracking implications and may provide the

basis for more precise evidence-based decisions regarding the tracking policy.
Trvalý link: http://hdl.handle.net/11104/0315047

0537320 - ÚI 2021 RIV GB eng J - Článek v odborném periodiku
Aranda, A. - Hartman, David
The independence number of HH-homogeneous graphs and a classification of MB-homogeneous graphs.
European Journal of Combinatorics. Roč. 85, March 2020 (2020), č. článku 103063. ISSN 0195-6698
Institucionální podpora: RVO:67985807
Klíčová slova: homomorphism-homogeneity * morphism-extension classes * HH-homogeneity * MB-homogeneity
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics
Impakt faktor: 0.848, rok: 2019
http://dx.doi.org/10.1016/j.ejc.2019.103063
DOI: 10.1016/j.ejc.2019.103063

We show that the independence number of a countably infinite connected HH-homogeneous graph that does not contain the Rado graph as a spanning subgraph is finite and present a classification of MB-homogeneous graphs up to bimorphism-equivalence as a consequence.
Trvalý link: http://hdl.handle.net/11104/0315046

0537319 - ÚI 2021 RIV NL eng J - Článek v odborném periodiku
Duintjer Tebbens, Jurjen - Meurant, G.
On the residual norms, the Ritz values and the harmonic Ritz values that can be generated by restarted GMRES.
Numerical Algorithms. Roč. 84, č. 4 (2020), s. 1329-1352. ISSN 1017-1398
Institucionální podpora: RVO:67985807
Klíčová slova: Restarted GMRES * (harmonic) Ritz values * GMRES stagnation * Prescribed convergence
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Applied mathematics
Impakt faktor: 2.064, rok: 2019
http://dx.doi.org/10.1007/s11075-019-00846-z
DOI: 10.1007/s11075-019-00846-z

The paper gives a characterization of all linear systems such that when restarted GMRES is applied, prescribed admissible residual norms and (harmonic) Ritz values for all iterations inside the individual cycles are generated. Additionally, the system matrices can have any nonzero eigenvalues. The total number of GMRES iterations inside all cycles considered is assumed to be smaller than the system size. It is shown that stagnation at the end of a restart cycle must be mirrored at the beginning of the next cycle and that this is the only restriction for prescribed residual norms of restarted GMRES. The relation between prescribed residual norms of restarted GMRES and those of the corresponding full GMRES process is studied and linear systems are given where full and restarted GMRES give the same convergence history.
Trvalý link: http://hdl.handle.net/11104/0315045

0537206 - ÚI 2021 US eng V - Výzkumná zpráva
Perez-Cervera, Alberto - Hlinka, Jaroslav
Perturbations both trigger and delay seizures due to generic properties of slow-fast relaxation oscillators.
Cold Spring Harbor Laboratory, 2020. bioRxiv, 2020.12.02.407965.
Grant ostatní:GA MŠk(CZ) LO1611
Institucionální podpora: RVO:67985807
https://www.biorxiv.org/content/10.1101/2020.12.02.407965v1
DOI: 10.1101/2020.12.02.407965

The mechanism underlying the emergence of seizures is one of the most important unresolved issues in epilepsy research. In this paper, we study how perturbations, exogenous of endogenous, may

promote or delay seizure emergence. To this aim, due to the increasingly adopted view of epileptic dynamics in terms of slow-fast systems, we perform a theoretical analysis of the phase response of a generic relaxation oscillator. As relaxation oscillators are effectively bistable systems at the fast time scale, it is intuitive that perturbations of the non-seizing state with a suitable direction and amplitude may cause an immediate transition to seizure. By contrast, and perhaps less intuitively, smaller amplitude perturbations have been found to delay the spontaneous seizure initiation. By studying the isochrons of relaxation oscillators, we show that this is a generic phenomenon, with the size of such delay depending on the slow flow component. Therefore, depending on perturbation amplitudes, frequency and timing, a train of perturbations causes an occurrence increase, decrease or complete suppression of seizures. This dependence lends itself to analysis and mechanistic understanding through methods outlined in this paper. We illustrate this methodology by computing the isochrons, phase response curves and the response to perturbations in several epileptic models possessing different slow vector fields. While our theoretical results are applicable to any planar relaxation oscillator, in the motivating context of epilepsy they elucidate mechanisms of triggering and abating seizures, thus suggesting stimulation strategies with effects ranging from mere delaying to full suppression of seizures. Author summary: Despite its simplicity, the modelling of epileptic dynamics as a slow-fast transition between low and high activity states mediated by some slow feedback variable is a relatively novel albeit fruitful approach. This study is the first, to our knowledge, characterizing the response of such slow-fast models of epileptic brain to perturbations by computing its isochrons. Besides its numerical computation, we theoretically determine which factors shape the geometry of isochrons for planar slow-fast oscillators. As a consequence, we introduce a theoretical approach providing a clear understanding of the response of perturbations of slow-fast oscillators. Within the epilepsy context, this elucidates the origin of the contradictory role of interictal epileptiform discharges in the transition to seizure, manifested by both pro-convulsive and anti-convulsive effect depending on the amplitude, frequency and timing. More generally, this paper provides theoretical framework highlighting the role of the of the slow flow component on the response to perturbations in relaxation oscillators, pointing to the general phenomena in such slow-fast oscillators ubiquitous in biological systems.
Trvalý link: http://hdl.handle.net/11104/0314943

0537185 - ÚI 2022 NL eng J - Článek v odborném periodiku
Hůnová, I. - Brabec, Marek - Malý, Marek - Dumitrescu, A. - Geletič, Jan
Terrain and its Effects on Fog Occurrence.
Science of the Total Environment. Roč. 768, 10 May 2021 (2021), č. článku 144359. ISSN 0048-9697
Institucionální podpora: RVO:67985807
Klíčová slova: fog * terrain * Romania * generalized additive model * trend * seasonality * seasonality deformation * 1981–2017 * altitude * slope * curvature
Kód oboru RIV: DG - Vědy o atmosféře, meteorologie
Obor OECD: Meteorology and atmospheric sciences
Impakt faktor: 6.551, rok: 2019
http://dx.doi.org/10.1016/j.scitotenv.2020.144359
DOI: 10.1016/j.scitotenv.2020.144359

Fog is a very complex phenomenon, relevant to both atmospheric physics and chemistry, contributing to the atmospheric inputs of both nutrients and pollutants to the environment. Fog occurrence is affected by numerous factors. The aim of this study is to examine the effects of terrain on fog occurrence. Namely, we studied in detail how altitude, slope and landform influence the probability of fog occurrence using the generalized additive model. In particular, we investigated how different explanatory variables might modify (deform) the trend and the seasonal component of the probability of fog occurrence. We used long-term records of daily fog occurrence measured in 1981–2017 at 56 professional meteorological stations in Romania, reflecting different environments and geographical areas. The altitude of the sites under review ranged between 13 and 2,504 metres above sea level, the coverage of localities at different altitudes being highly uneven. Out of the terrain variables considered, the most decisive influence was found to be altitude. We have included information on slope and landform, which refined and bettered the basic model. Our model results indicated a significant decrease in the probability of fog occurrence over the examined period. The behaviour of fog differed according to the altitude, the most profound effects being observed for ground-level fog and fog above flat terrain. The probability of fog occurrence at different altitudes varied mostly in summer and autumn, whereas it was very similar in winter.

Trvalý link: http://hdl.handle.net/11104/0314928

0537176 - ÚI (2021) **DATA Vědecká data**
Resler, Jaroslav - Eben, Kryštof - Geletič, Jan - Krč, Pavel - Rosecký, Martin - Sühring, M. - Belda, M. - Fuka, V. - Halenka, T. - Huszár, P. - Karlický, J. - Benešová, N. - Ďoubalová, J. - Honzáková, K. - Keder, J. - Nápravníková, Š. - Vlček, O.
Validation of the PALM model system 6.0 in real urban environment; case study of Prague-Dejvice, Czech Republic.

This archive contains drivers and configurations for the PALM model validation study done with observation campaign done in Prague-Dejvice in 2018 and described in GMD paper https://gmd.copernicus.org/preprints/gmd-2020-175/. The input drivers follow PALM input data standard which is described on the model website (https://palm.muk.uni-hannover.de/trac/wiki/doc/app/iofiles/pids). The simulations are configured with two nested domains, the files for the parent domain are without a sufix, the child domain related files have a sufix "_N02". The static input files (*static*) contain all static information, such as topography, geographical coordinates, surface and vegetation information. The dynamic input files (*dynamic*) contain information on the initial state of the atmosphere and on time-dependent boundary conditions. The chemistry input files (*emission*) contain information on temporally and spatially dependent emission of chemical species. The *p3d* files contain configuration of the model.
Klíčová slova: drivers * static * dynamic * emission * radiation * PALM * input data
Grant CEP: GA KHP(CZ) UH0383
Institucionální podpora: RVO:67985807
Obor OECD: Meteorology and atmospheric sciences
Trvalý link: http://hdl.handle.net/11104/0315416

Publikace ASEP:
Validation of the PALM model system 6.0 in real urban environment; case study of Prague-Dejvice, Czech Republic

Dataset :
Licence: BY-NC-ND - Uveďte původ + Neužívejte komerčně + Nezpracovávejte

0537101 - ÚI 2022 NL eng J - Článek v odborném periodiku
Tichý, A. - Brabec, Marek - Bradna, P. - Hosaka, K. - Chiba, A. - Tagami, J.
Influence of Central and Peripheral Dentin on Micro-tensile Bond Strength Estimated Using a Competing Risk Model.
Journal of the Mechanical Behavior of Biomedical Materials. Roč. 115, March 2021 (2021), č. článku 104295. ISSN 1751-6161
Klíčová slova: Adhesion * Dentin * Failure mode * Weibull analysis * Competing risks
Kód oboru RIV: BB - Aplikovaná statistika, operační výzkum
Obor OECD: Statistics and probability
Impakt faktor: 3.372, rok: 2019
DOI: 10.1016/j.jmbbm.2020.104295

The bonding performance of dental adhesives is most frequently evaluated using the micro-tensile bond strength (μTBS) test. Despite lacking evidence, peripheral specimens are often discarded to avoid regional variability. This study, therefore, examined whether μTBS to central and peripheral dentin differed. Dentin surfaces of extracted human molars were bonded with various self-etch adhesives, built up with a resin composite, cut into beams, and stressed in tension. Failure mode was classified as adhesive, cohesive in dentin, or other using scanning electron microscopy. Since cohesive failures in dentin were frequent and could confound μTBS results, the data from central/peripheral dentin were analyzed using a Weibull competing risk (CR) model distinguishing failure modes, and its outcomes were compared to a conventional failure mode non-distinguishing Weibull model. Based on the strength data of cohesively failed specimens, the CR model also estimated the strength of dentin. For comparison, the ultimate tensile strength (UTS) of dentin was measured in both regions. The conventional model suggested that peripheral μTBS was higher than central μTBS. Conversely, the CR model disclosed no significant difference in μTBS between the regions but indicated a higher strength of peripheral dentin. This finding was confirmed by UTS measurements, and further supported by the

significantly higher incidence of cohesive failures in central dentin. Therefore, peripheral specimens can be used in the μTBS test as well as central ones, but a CR model should be used for statistical analysis if cohesive failures in dentin are frequent, as the strength of peripheral dentin is higher.
Trvalý link: http://hdl.handle.net/11104/0314850

0537094 - ÚI 2021 RIV CZ cze J - Článek v odborném periodiku
Geletič, Jan - Lehnert, Michal - Resler, Jaroslav - Krč, Pavel
Teplota ve městě: Přehled používaných termínů a jejich rozdíly.
[Temperature in the city: an overview of terms and how they differ.]
Urbanismus a územní rozvoj. Roč. 23, č. 4 (2020), s. 17-21. ISSN 1212-0855
Institucionální podpora: RVO:67985807
http://hdl.handle.net/11104/0314843

V důsledku projevů klimatické změny přibývá ve střední Evropě extrémních projevů počasí. Provedené analýzy mj. prokazatelně dokládají rostoucí počet tropických dnů, dnů s tropickou nocí [Geletič a kol., 2018] a zvyšující se frekvence a intenzitu výskytu horkých vln [Kyselý, 2010 - Revi a kol., 2014 - Lhotka a Kyselý, 2015 - Lhotka a kol., 2018]. Teplotní extrémy mají negativní dopad na životní prostředí, kvalitu života a zdravotní stav populace a vedou k náhlým nárůstům úmrtnosti v dotčených oblastech [Arsenović a kol., 2019 - Urban a kol., 2019]. Mezi lokality nejvíce ohrožené vysokými teplotami patří především města, kde je koncentrace obyvatel nejvyšší a teplotní extrémy jsou navíc umocněny efektem tzv. tepelného ostrova města [Revi a kol., 2014]. S rostoucím uvědoměním si potřeby adaptace na probíhající klimatické změny se téma adaptace (měst) na klimatickou změnu dostává do povědomí širší (odborné) veřejnosti, médií i samotných obyvatel měst. Se zvyšujícím se zájmem o téma je bohužel spojeno také velké množství nepřesných vyjádření a mystifi kací. Výjimkou nejsou termíny, které souvisejí s teplotou v městském prostředí. I přes existenci volně dostupných odborných zdrojů, např. slovník České meteorologické společnosti, často dochází k záměně pojmů, což následně vede k desinterpretaci a mystifi kaci (nejen) veřejnosti. V důsledku dochází v městském prostředí např. k výběru nevhodných nebo nepřiměřeně nákladných adaptačních opatření. Cílem příspěvku je poukázat na rozdíly mezi často zaměňovanými pojmy, které s teplotou, tepelným komfortem a teplotním stresem (resp. stresem z tepla) v městském prostředí přímo souvisejí.

As a consequence of climate change, Central Europe is witnessing ever more manifestations of extreme weather. Analyses have evidenced that the number of tropical days is on the increase as well as the number of days with tropical nights. The frequency and intensity of heatwaves is also rising. Extremes of temperature have a negative impact on the environment, quality of life and health of the population, leading to a sharp increase in mortality rates. Among locations threatened by high temperatures, cities are most vulnerable because of high population density and extremes of temperature augmented by the heat island effect. Growing awareness of the need for climate change adaptation makes this a topical issue for professionals and the media, as well as the inhabitants themselves. Unfortunately, this increased interest has brought with it a lot of imprecise information and mystifi cation, including misuse of terms and expressions about temperature in urban settings. Although professional sources such as a glossary by the Czech Meteorological Society are freely available, many terms are used in a way that promotes confusion, which leads to misinterpretation by the public and some specialists. This can result in inappropriate choice of adaptation measures, leading to unnecessary expense. The aim of this article is to point out differences among terms relating to temperature, thermal comfort and thermal stress in urban settings.
Trvalý link: http://hdl.handle.net/11104/0314843

0537091 - ÚI 2022 GB eng J - Článek v odborném periodiku
Lyu, C. - Capps, S. L. - Kurashima, K. - Henze, D. K. - Pierce, G. - Hakami, A. - Zhao, S. - Resler, Jaroslav - Carmichael, G. R. - Sandu, A. - Russel, A. - Chai, T. - Milford, J.
Evaluating Oil and Gas Contributions to Ambient Nonmethane Hydrocarbon Mixing Ratios and Ozone-related Metrics in the Colorado Front Range.
Atmospheric Environment. Roč. 246, February 2021 (2021), č. článku 118113. ISSN 1352-2310
Institucionální podpora: RVO:67985807
Klíčová slova: Oil and natural gas * Nonmethane hydrocarbon * Ground-level ozone * Premature mortality * Source apportionment * Adjoint sensitivity analysis
Kód oboru RIV: DG - Vědy o atmosféře, meteorologie
Obor OECD: Meteorology and atmospheric sciences

Impakt faktor: 4.039, rok: 2019
http://hdl.handle.net/11104/0314838
DOI: 10.1016/j.atmosenv.2020.118113

Recently, oil and natural gas (O&NG) production activities in the Denver-Julesburg Basin have expanded rapidly. Associated nonmethane hydrocarbon (NMHC) emissions contribute to photochemical formation of ground-level ozone and include benzene as well as other hazardous air pollutants. Using positive matrix factorization (PMF) and chemical mass balance (CMB) methods, we estimate how much O&NG activities and other sources contribute to morning NMHC mixing ratios measured from 2013 to mid-2016 at a site in Platteville, CO, in the Denver-Julesburg Basin, and at a contrasting site in downtown Denver. A novel adjoint sensitivity analysis method is then used to estimate corresponding contributions to ozone and ozone-linked mortality in the Denver region. Average 6–9 am NMHC mixing ratios in Platteville were seven times higher than those in Denver in 2013 but four times higher in 2016. CMB estimates that O&NG activities contributed to the Platteville (Denver) site an average of 96% (56%) of NMHC on a carbon basis while PMF indicated 92% (33%). Average vehicle-related contributions of NMHC are estimated as 41% by CMB and 53% by PMF in Denver. Estimates of the fractional contribution to potential ozone and ozone-linked mortality from O&NG activities are smaller while those from vehicles are larger than the NMHC contributions. CMB (PMF) indicate that greater than 78% (40%) of annual average benzene in Denver is attributable to vehicle emissions while greater than 75% (67%) of benzene in Platteville is attributable to O&NG activities.
Trvalý link: http://hdl.handle.net/11104/0314838

0537049 - ÚI 2021 RIV GB eng C - Konferenční příspěvek (zahraniční konf.)
Sedlár, Igor
Finitely-valued propositional dynamic logics.
Advances in Modal Logic. London: College Publications, 2020 - (Olivetti, N.; Verbrugge, R.; Negri, S.; Sandu, G.), s. 561-579. ISBN 978-1-84890-341-8.
[AiML 2020: Conference on Advances in Modal Logic /14./. Helsinki / Online (FI), 24.08.2020-28.08.2020]
Grant CEP: GA ČR(CZ) GJ18-19162Y
Institucionální podpora: RVO:67985807
Klíčová slova: FL-algebras * Many-valued modal logic * Propositional Dynamic Logic * Residuated lattices * Substructural logics * Weighted structures
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics

We study a many-valued generalization of Propositional Dynamic Logic where formulas in states and accessibility relations between states of a Kripke model are evaluated in a finite FL-algebra. One natural interpretation of this framework is related to reasoning about costs of performing structured actions. We prove that PDL over any finite FL-algebra is decidable. We also establish a general completeness result for a class of PDLs based on commutative integral FL-algebras with canonical constants.
Trvalý link: http://hdl.handle.net/11104/0314800

0537046 - ÚI 2021 RIV CH eng G - Konferenční sborník (zahraniční konf.)
Martins, M. A. - Sedlár, Igor
Dynamic Logic. New Trends and Applications.
Cham: Springer, 2020. 295 s. Lecture Notes in Computer Science, 12569. ISBN 978-3-030-65839-7. ISSN 0302-9743.
[DaLí International Workshop /3./. Prague / Online (CZ), 09.10.2020-10.10.2020]
Institucionální podpora: RVO:67985807
Klíčová slova: architecting * architecture verification and validation * artificial intelligence * computer programming * computer science * computer systems * dynamic logic * embedded systems * epistemic logic * formal languages * formal logic * linguistics * mathematics * modal logic * model checking * multiagent system * semantics * software architecture * software design * software engineering
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics

https://link.springer.com/book/10.1007/978-3-030-65840-3
DOI: 10.1007/978-3-030-65840-3

This book constitutes the proceedings of the Third International Workshop on Dynamic Logic, DaLí 2019, held in Prague, Czech Republic in October 2020. Due to COVID-19 the workshop has been held online. The 17 full papers presented together with 6 short papers were carefully reviewed and selected from 31 submissions. The theoretical relevance and practical potential of dynamic logic is a topic of interest in a number of scientific venues, from wide-scope software engineering conferences to modal logic specific events. The DaLí 2020 workshop is exclusively dedicated to Dynamic logic and aims at filling this gap and creating a heterogeneous community of colleagues, from Academia to Industry, from Mathematics to Computer Science.
Trvalý link: http://hdl.handle.net/11104/0314799

0537043 - ÚI 2021 RIV CH eng C - Konferenční příspěvek (zahraniční konf.)
van Ditmarsch, H. - Liu, M. - Kuijer, L. B. - Sedlár, Igor
Expressivity of Some Versions of APAL.
Dynamic Logic: New Trends and Applications. Cham: Springer, 2020 - (Martins, M.; Sedlár, I.), s. 120-136. Lecture Notes in Computer Science, 12569. ISBN 978-3-030-65839-7. ISSN 0302-9743.
[DaLí International Workshop /3./. Prague / Online (CZ), 09.10.2020-10.10.2020]
Institucionální podpora: RVO:67985807
Klíčová slova: Dynamic epistemic logic * Expressivity * Modal logic
Kód oboru RIV: BA - Obecná matematika
Obor OECD: Pure mathematics
DOI: 10.1007/978-3-030-65840-3_8

Arbitrary public announcement logic (APAL) is a logic of change of knowledge with modalities representing quantification over announcements. We present two rather different versions of APAL wherein this quantification is restricted to formulas only containing a subset of all propositional variables: FSAPAL and SCAPAL, and another version quantifying over all announcements implied by or implying a given formula: IPAL. We then determine the relative expressivity of these logics and APAL. The IPAL quantifier promises to provide a novel perspective on substructural implication as dynamic consequence.
Trvalý link: http://hdl.handle.net/11104/0314797

0536996 - ÚI 2022 RIV NL eng J - Článek v odborném periodiku
Lehnert, M. - Brabec, Marek - Jurek, M. - Tokar, A. - Geletič, Jan
The Role of Blue and Green Infrastructure in Thermal Sensation in Public Urban Areas: A Case Study of Summer Days in four Czech Cities.
Sustainable Cities and Society. Roč. 66, March 2021 (2021), č. článku 102683. ISSN 2210-6707
Grant CEP: GA TA ČR(CZ) TJ01000118
Institucionální podpora: RVO:67985807
Klíčová slova: Thermal comfort * Thermal sensation vote * Heat stress * Urban areas * Blue and green infrastructure
Kód oboru RIV: DG - Vědy o atmosféře, meteorologie
Obor OECD: Meteorology and atmospheric sciences
Impakt faktor: 5.268, rok: 2019
http://dx.doi.org/10.1016/j.scs.2020.102683
DOI: 10.1016/j.scs.2020.102683

Thermal comfort in public spaces, as an important factor in the quality of life, has been strongly affected by manifestations of climate change. City authorities are under pressure to adapt their approaches to the urban environment. This study investigates thermal sensation in public spaces in four Czech cities. Biometeorological measurements were taken and biometeorological indices (UTCI, PET, HUMIDEX) established, then contrasted with questionnaire surveys (thermal sensation vote – TSV). Regression models were subsequently constructed to explore the influences of elements of blue and green infrastructure beyond their microclimatic functions. The results suggest a highly complex relationship between biometeorological indices and TSV in urban environments, significantly influenced by specificity of place and time. Open grassy areas exhibit a lower probability of higher TSV related to heat stress. Despite measured microclimatic effects that might indicate the opposite, the

probability of TSV-related heat stress is higher under trees and near sprayed water-mist. The findings herein thus indicate that simple predicted mean vote models are of little or no use in urban planning, and that sensitive and sustainable planning of heat mitigation measures should reflect the behavioural patterns of citizens alongside the microclimatic effects in actual place.
Trvalý link: http://hdl.handle.net/11104/0314759

0536946 - ÚI 2021 RIV CH eng J - Článek v odborném periodiku
Hlaváčková-Schindler, Kateřina - Plant, C.
Heterogeneous Graphical Granger Causality by Minimum Message Length.
Entropy. Roč. 22, č. 12 (2020), s. 1-21, č. článku 1400. ISSN 1099-4300
Grant CEP: GA ČR(CZ) GA19-16066S
Institucionální podpora: RVO:67985807
Klíčová slova: Granger causality * graphical Granger model * overestimation * information theory * minimum message length
Impakt faktor: 2.494, rok: 2019
http://hdl.handle.net/11104/0314695
DOI: 10.3390/e22121400

The heterogeneous graphical Granger model (HGGM) for causal inference among processes with distributions from an exponential family is efficient in scenarios when the number of time observations is much greater than the number of time series, normally by several orders of magnitude. However, in the case of "short" time series, the inference in HGGM often suffers from overestimation. To remedy this, we use the minimum message length principle (MML) to determinate the causal connections in the HGGM. The minimum message length as a Bayesian information-theoretic method for statistical model selection applies Occam's razor in the following way: even when models are equal in their measure of fit-accuracy to the observed data, the one generating the most concise explanation of data is more likely to be correct. Based on the dispersion coefficient of the target time series and on the initial maximum likelihood estimates of the regression coefficients, we propose a minimum message length criterion to select the subset of causally connected time series with each target time series and derive its form for various exponential distributions. We propose two algorithms—the genetic-type algorithm (HMMLGA) and exHMML to find the subset. We demonstrated the superiority of both algorithms in synthetic experiments with respect to the comparison methods Lingam, HGGM and statistical framework Granger causality (SFGC). In the real data experiments, we used the methods to discriminate between pregnancy and labor phase using electrohysterogram data of Islandic mothers from Physionet databasis. We further analysed the Austrian climatological time measurements and their temporal interactions in rain and sunny days scenarios. In both experiments, the results of HMMLGA had the most realistic interpretation with respect to the comparison methods. We provide our code in Matlab. To our best knowledge, this is the first work using the MML principle for causal inference in HGGM.
Trvalý link: http://hdl.handle.net/11104/0314695

0536782 - MÚ 2022 RIV US eng J - Článek v odborném periodiku
Doležal, Martin - Grebík, Jan - Hladký, Jan - Rocha, Israel - Rozhoň, Václav
Relating the cut distance and the weak* topology for graphons.
Journal of Combinatorial Theory. B. Roč. 147, March (2021), s. 252-298. ISSN 0095-8956
Grant CEP: GA ČR(CZ) GA17-27844S; GA ČR GF17-33849L; GA ČR(CZ) GJ18-01472Y; GA ČR GJ16-07822Y
Institucionální podpora: RVO:67985840 ; RVO:67985807
Klíčová slova: graphon * compactness
Kód oboru RIV: BA - Obecná matematika; BA - Obecná matematika (UIVT-O)
Obor OECD: Pure mathematics; Pure mathematics (UIVT-O)
Impakt faktor: 1.306, rok: 2019
https://doi.org/10.1016/j.jctb.2020.04.003
DOI: 10.1016/j.jctb.2020.04.003

The theory of graphons is ultimately connected with the so-called cut norm. In this paper, we approach the cut norm topology via the weak* topology (when considering a predual of L1-functions). We prove that a sequence W1,W2,W3,… of graphons converges in the cut distance if and only if we have equality of the sets of weak* accumulation points and of weak* limit points of all sequences of

graphons W'1,W'2,W'3,… that are weakly isomorphic to W1,W2,W3,…. We further give a short descriptive set theoretic argument that each sequence of graphons contains a subsequence with the property above. This in particular provides an alternative proof of the theorem of Lovász and Szegedy about compactness of the space of graphons. We connect these results to 'multiway cut' characterization of cut distance convergence from [Ann. of Math. (2) 176 (2012), no. 1, 151-219]. These results are more naturally phrased in the Vietoris hyperspace K over graphons with the weak* topology.