Záznamy vložené do ASEP za UI (1. 7. – 31. 7. 2023)

New ICS records in ASEP (1. 7. – 31. 7. 2023)

0573944 - ÚI 2024 RIV NL J - Journal Article
Hladký, Jan - Hng, Eng Keat
Approximating fractionally isomorphic graphons.
European Journal of Combinatorics. Roč. 113, October 2023 (2023), č. článku 103751. ISSN 0195-6698. E-ISSN 1095-9971
R&D Projects: GA ČR(CZ) GX21-21762X
Institutional support: RVO:67985807
Keywords : fractional graph isomorphism * graphons
OECD category: Pure mathematics
Impact factor: 0.890, year: 2021
Method of publishing: Limited access
DOI: 10.1016/j.ejc.2023.103751
Grebík and Rocha (2022) extended the well studied notion of fractional isomorphism of graphs to graphons. We prove that fractionally isomorphic graphons can be approximated in the cut distance by fractionally isomorphic finite graphs. This answers the main question from ibid. As an easy but convenient corollary, we deduce that every regular graphon can be approximated by regular graphs.
Permanent Link: https://hdl.handle.net/11104/0344326

0573813 - ÚI 2024 CH eng J - Journal Article
Hlaváčková-Schindler, Kateřina
Causal Inference for Heterogeneous Data and Information Theory (Editorial).
Entropy. Roč. 25, č. 6 (2023), č. článku 910. E-ISSN 1099-4300
R&D Projects: GA ČR(CZ) GA19-16066S
Grant - others: AV ČR(CZ) AP1901
Program: Akademická prémie - Praemium Academiae
Institutional support: RVO:67985807
Impact factor: 2.738, year: 2021
Method of publishing: Open access
DOI: 10.3390/e25060910
The present Special Issue of Entropy, entitled "Causal Inference for Heterogeneous Data and Information Theory", covers various aspects of causal inference. The issue presents thirteen original contributions that span various topics, namely the role of instrumental variables in causal inference, the estimation of average treatment effects and the temporal causal models. Four papers are devoted to the design of novel causal models using interventions. The contributions use approaches of information theory, probability, algebraic structures, neural networks and with them related machine learning tools. The papers range from the theoretical ones, the paper applying the models, to the papers providing software tools for causal inference. All papers were peer-reviewed and accepted for publication due to their highest quality contribution. Here, we shortly preview the topics of the contributions.
Permanent Link: https://hdl.handle.net/11104/0344169

0573720 - ÚI 2024 DE eng J - Journal Article
Balasis, G. - Balikhin, M. A. - Chapman, S. - Consolini, G. - Daglis, I. A. - Donner, R.V. - Kurths, J. - Paluš, Milan - Runge, J. - Tsurutani, B. T. - Vassiliadis, D. - Wing, S. - Gjerloev, J. W. - Johnson, J. - Materassi, M. - Alberti, T. - Papadimitriou, V. C. - Manshour, Pouya - Boutsi, A. Z. - Stumpo, M.
Complex Systems Methods Characterizing Nonlinear Processes in the Near-Earth Electromagnetic Environment: Recent Advances and Open Challenges.
Space Science Reviews. Online 12 July 2023 (2023). ISSN 0038-6308. E-ISSN 1572-9672
Grant - others: AV ČR(CZ) AP1901
Program: Akademická prémie - Praemium Academiae
Institutional support: RVO:67985807
Keywords : Solar wind * magnetosphere * ionosphere coupling * Magnetic storms * Magnetospheric substorms * Space weather * Nonlinear dynamics * Complex systems
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
Impact factor: 8.943, year: 2021
Method of publishing: Open access
https://dx.doi.org/10.1007/s11214-023-00979-7
DOI: 10.1007/s11214-023-00979-7
Learning from successful applications of methods originating in statistical mechanics, complex systems science, or information theory in one scientific field (e.g., atmospheric physics or climatology) can provide important insights or conceptual ideas for other areas (e.g., space sciences) or even stimulate new research questions and approaches. For instance, quantification and attribution of dynamical complexity in output time series of nonlinear dynamical systems is a key challenge across scientific disciplines. Especially in the field of space physics, an early and accurate detection of characteristic dissimilarity between normal and abnormal states (e.g., pre-storm activity vs. magnetic storms) has the potential to vastly improve space weather diagnosis and, consequently, the mitigation of space weather hazards. This review provides a systematic overview on existing nonlinear dynamical systems-based methodologies along with key results of their previous applications in a space physics context, which particularly illustrates how complementary modern complex systems approaches have recently shaped our understanding of nonlinear magnetospheric variability. The rising number of corresponding studies demonstrates that the multiplicity of nonlinear time series analysis methods developed during the last decades offers great potentials for uncovering relevant yet complex processes interlinking different geospace subsystems, variables and spatiotemporal scales.
Permanent Link: https://hdl.handle.net/11104/0344102

0573622 - ÚI 2024 US eng J - Journal Article
Brožová, K. - Michalec, J. - Brabec, Marek - Bořilová, P. - Kohout, P. - Brož, J.
Dynamics of glucose concentration during the initiation of ketogenic diet treatment in children with refractory epilepsy: Results of continuous glucose monitoring.
Epilepsia Open. Online 22 June 2023 (2023). E-ISSN 2470-9239
Institutional support: RVO:67985807
Keywords : censored data * continuous glucose monitoring * epilepsy * glucose concentration * ketogenic diet
OECD category: Statistics and probability
Impact factor: 4.026, year: 2021
Method of publishing: Open access
https://dx.doi.org/10.1002/epi4.12778
DOI: 10.1002/epi4.12778

OBJECTIVE: The ketogenic diet (KD) is a diet low in carbohydrates and rich in fats which has long been used to treat refractory epilepsy. The metabolic changes related to the KD may increase the risk of hypoglycemia, especially during the first days. The study focused on the impact of KD initiation on glycemia in non-diabetic patients with refractory epilepsy. METHODS: The subjects were 10 pediatric patients (6 boys, mean age 6.1 ± 2.4 years), treated for intractable epilepsy. Blinded continuous glucose monitoring system (CGM) Dexcom G4 was used. Patients started on their regular diet in the first 36 hours of monitoring, followed by an increase in lipids intake and a gradual reduction of carbohydrates (relations 1:1, 2:1, 3:1, 3.5:1). We analyzed changes in glycemia during fat: nonfat ratio changes using a generalized linear model. RESULTS: The mean monitored time per person was 6 days, 10 hours and 44 minutes. The mean ± SD glycemia for the regular diet was 4.84 ± 0.20 mmol/L, for the carbohydrates/fat ratio of 1:1 it was 4.03 ± 0.16, for the ratio of 2:1 it was 3.57 ± 0.10, for the ratio 3:1 it was 3.39 ± 0.13 and for the final ratio of 3.5:1 it was 2.79 ± 0.06 mmol/L ($P < 0.001$). The portions of time spent in glycemia ≤3.5 mmol/L (≤2.5 mmol/L respectively) were: on the normal diet 0.88% (0.31%) of the monitored period, during 1:1 KD ratio 1.92% (0.95%), during 2:1 ratio 3.18% (1.02%), and during 3:1 and 3.5:1 ratios 13.64% (2.36%) of the monitored time ($P < 0.05$). SIGNIFICANCE: Continuous glucose monitoring system shows the dynamic of glucose concentration in ketogenic diet treatment initiation. It may be a useful tool to control the effects of this diet on glucose metabolism, especially in hypoglycemia detection.
Permanent Link: https://hdl.handle.net/11104/0344024

0573795 - ÚI 2024 DE eng J - Journal Article
Piga, S. - Sanhueza-Matamala, Nicolás
Cycle Decompositions in 3-Uniform Hypergraphs.
Combinatorica. Online 15 May 2023 (2023). ISSN 0209-9683. E-ISSN 1439-6912
R&D Projects: GA ČR(CZ) GA19-08740S
Institutional support: RVO:67985807
Keywords : Hypergraphs * Euler tours * Cycles
Impact factor: 1.289, year: 2021
Method of publishing: Limited access
DOI: 10.1007/s00493-023-00001-2
We show that 3-graphs on n vertices whose minimum codegree is at least (2/3+o(1))n can be decomposed into tight cycles and admit Euler tours, subject to the trivial necessary divisibility conditions. We also provide a construction showing that our bounds are best possible up to a o(1) term. All together, our results answer in the negative some recent questions of Glock, Joos, Kühn, and Osthus.
Permanent Link: https://hdl.handle.net/11104/0344150

0573681 - ÚI 2024 GB eng J - Journal Article
Moraschini, T. - Wannenburg, Johann Joubert - Yamamoto, Kentarô
Elementary Equivalence iIn Positive Logic via Prime Products.
Journal of Symbolic Logic. Online 05 July 2023 (2023). ISSN 0022-4812. E-ISSN 1943-5886
R&D Projects: GA MŠk(CZ) EF18_053/0017594
Institutional support: RVO:67985807
Keywords : Keisler isomorphism theorem * positive model theory * prime product * positively existentially closed model * h-inductive theory
Impact factor: 0.634, year: 2021
Method of publishing: Limited access
https://dx.doi.org/10.1017/jsl.2023.50
DOI: 10.1017/jsl.2023.50

We introduce prime products as a generalization of ultraproducts for positive logic. Prime products are shown to satisfy a version of Łos's Theorem restricted to positive formulas, as well as the following variant of the Keisler Isomorphism Theorem: under the generalized continuum hypothesis, two models have the same positive theory if and only if they have isomorphic prime powers of ultrapowers.
Permanent Link: https://hdl.handle.net/11104/0344058

0573600 - ÚI 2024 US eng J - Journal Article
Dallmer-Zerbe, Isa - Jiruška, P. - Hlinka, Jaroslav
Personalized dynamic network models of the human brain as a future tool for planning and optimizing epilepsy therapy.
Epilepsia. Online 20 Jun 2023 (2023). ISSN 0013-9580. E-ISSN 1528-1167
R&D Projects: GA MZd(CZ) NU21-08-00533; GA ČR(CZ) GA18-07908S; GA ČR(CZ) GA21-17564S; GA ČR(CZ) GA21-32608S
Institutional support: RVO:67985807
Keywords : brain stimulation * computational modeling * dynamic systems * epilepsy treatment * surgery
OECD category: Neurosciences (including psychophysiology
Impact factor: 6.740, year: 2021
Method of publishing: Limited access
https://onlinelibrary.wiley.com/share/author/ZH6IGYVW73XRHJHWQG22?target=10.1111/epi.17690
DOI: 10.1111/epi.17690
Epilepsy is a common neurological disorder, with one third of patients not responding to currently available antiepileptic drugs. The proportion of pharmacoresistant epilepsies has remained unchanged for many decades. To cure epilepsy and control seizures requires a paradigm shift in the development of new approaches to epilepsy diagnosis and treatment. Contemporary medicine has benefited from the exponential growth of computational modeling, and the application of network dynamics theory to understanding and treating human brain disorders. In epilepsy, the introduction of these approaches has led to personalized epileptic network modeling that can explore the patient's seizure genesis and predict the functional impact of resection on its individual network's propensity to seize. The application of the dynamic systems approach to neurostimulation therapy of epilepsy allows designing stimulation strategies that consider the patient's seizure dynamics and long-term fluctuations in the stability of their epileptic networks. In this article, we review, in a nontechnical fashion suitable for a broad neuroscientific audience, recent progress in personalized dynamic brain network modeling that is shaping the future approach to the diagnosis and treatment of epilepsy.
Permanent Link: https://hdl.handle.net/11104/0344003

0573792 - ÚI 2024 GB eng J - Journal Article
Geletič, Jan - Lehnert, M. - Resler, Jaroslav - Krč, Pavel - Bureš, Martin - Urban, Aleš - Krayenhoff, E. S.
Heat exposure variations and mitigation in a densely populated neighborhood during a hot day: Towards a people-oriented approach to urban climate management.
Building and Environment. Roč. 242, 15 August 2023 (2023), č. článku 110564. ISSN 0360-1323. E-ISSN 1873-684X
R&D Projects: GA TA ČR(CZ) TO01000219
Grant - others: AV ČR(CZ) MSM100302001; AV ČR(CZ) StrategieAV21/23
Program: Program na podporu mezinárodní spolupráce začínajících výzkumných pracovníků; StrategieAV
Institutional support: RVO:67985807 ; RVO:68378289

Keywords : Urban greenery * Universal thermal climate index (UTCI) * Thermal comfort * Biometeorology * PALM * Pedestrian
OECD category: Meteorology and atmospheric sciences; Meteorology and atmospheric sciences (UFA-U)
Impact factor: 7.093, year: 2021
Method of publishing: Open access
https://dx.doi.org/10.1016/j.buildenv.2023.110564
DOI: 10.1016/j.buildenv.2023.110564
Climate change and increasing urbanization call for the effective adaptation of cities to extreme heat. To improve the applicability of the research, sophisticated computational fluid dynamics models are being developed to capture the complexity of climate in a real urban environment, while a human-oriented paradigm is emerging concurrently. In this paper we present a synergy of these approaches by analyzing outdoor thermal exposure on five different pedestrian routes in Prague-Dejvice (Czech Republic), employing the PALM modeling system and realistic use-cases. Our simulations reveal important spatio-temporal variability in the Universal Thermal Climate Index (UTCI) in the urban neighborhood. Our findings particularly emphasize the negative effect of open spaces, such as gaps between buildings and shorter buildings, on the thermal exposure of pedestrians. These configurations allow more direct irradiation to reach ground level, while the other adverse climatic characteristics of midrise/highrise developments are largely preserved. The effect of urban greenery is quite variable during the day. Trees can reduce UTCI by up to 10 °C, but this strongly depends on the location (e.g., distance from neighboring buildings). Irrigated grass reduces UTCI by about 1.8 °C, but dried grass has little heat mitigation effect. In conclusion, our results suggest that expert-based knowledge together with sophisticated and fine-scale models can identify effective heat stress reduction measures without draconian changes to, or investments in, the urban environment.
Permanent Link: https://hdl.handle.net/11104/0344146

0573618 - ÚI 2024 US eng J - Journal Article
Slavík, O. - Pfauserová, N. - Brabec, Marek - Kolářová, J. - Červený, D. - Horký, P.
The effect of temperature on the dynamics of common bream Abramis brama migrations between the reservoir and its tributary.
Ecology of Freshwater Fish. Online 03 July 2023 (2023). ISSN 0906-6691. E-ISSN 1600-0633
Institutional support: RVO:67985807
Keywords : body temperature * cyprinids * migrations * radio telemetry * resource use
OECD category: Statistics and probability
Impact factor: 2.434, year: 2021
Method of publishing: Open access
https://dx.doi.org/10.1111/eff.12736
DOI: 10.1111/eff.12736
An active preference for higher temperatures within a physiological optimum is beneficial for animal movement. For example, ascending temperatures induce an increase in cyprinid fish metabolism and swimming ability. Spring upstream migrations driven by the search for resources may be related to these increases. Conversely, downstream migrations in autumn follow a decrease in temperature. When fish migrations are driven by a search for resources, for example, food availability and reproduction, or to avoid predators, then the temperature effect can be reduced to approximately the threshold temperatures that induce up- and/or downstream movement. To test this assumption, we tracked the seasonal migrations of the common bream Abramis brama between a reservoir and its tributary using radio tags with temperature sensors during a 5-year period. Upstream migrations of the species into the tributary were not motivated by seeking temperatures different from those in the reservoir, that is, fish body temperatures in both environments were comparable across seasons. However, for long-distance migrations, increasing temperature did support upstream migrations.

Temperature did not determine the direction or intensity of short-distance migration of the species between the reservoir and the tributary. No significant influence of temperature was recorded for the downstream migrations according to the results of the generalised additive mixed model (GAMM1), which related movement distance as the explanatory variable to the signed fish body temperature as the response. The second model (GAMM2) relating fish body temperature as the explanatory variable to the signed movement distance as the response obtained a threshold value of 19.1°C for the upstream migrations and 1.5°C for the downstream migrations of the common bream.
Permanent Link: https://hdl.handle.net/11104/0344022

0573572 - ÚI 2024 RIV CH eng J - Journal Article
Landová, E. - Rádlová, S. - Pidnebesna, Anna - Tomeček, David - Janovcová, M. - Peléšková, Š. - Sedláčková, K. - Štolhoferová, I. - Polák, J. - Hlinka, Jaroslav - Frynta, D.
Toward a reliable detection of arachnophobia: subjective, behavioral, and neurophysiological measures of fear response.
Frontiers in Psychiatry. Roč. 14, June 2023 (2023), č. článku 1196785. ISSN 1664-0640. E-ISSN 1664-0640
Institutional support: RVO:67985807
Keywords : arachnophobia * fear * fMRI * snakes * spiders * behavioral approach test
OECD category: Neurosciences (including psychophysiology
Impact factor: 5.435, year: 2021
Method of publishing: Open access
https://dx.doi.org/10.3389/fpsyt.2023.1196785
DOI: 10.3389/fpsyt.2023.1196785
INTRODUCTION: The administration of questionnaires presents an easy way of obtaining important knowledge about phobic patients. However, it is not well known how these subjective measurements correspond to the patient's objective condition. Our study aimed to compare scores on questionnaires and image evaluation to the objective measurements of the behavioral approach test (BAT) and the neurophysiological effect of spiders extracted from fMRI measurements. The objective was to explore how reliably subjective statements about spiders and physiological and behavioral parameters discriminate between phobics and non-phobics, and what are the best predictors of overall brain activation. METHODS: Based on a clinical interview, 165 subjects were assigned to either a "phobic" or low-fear "control" group. Finally, 30 arachnophobic and 32 healthy control subjects (with low fear of spiders) participated in this study. They completed several questionnaires (SPQ, SNAQ, DS-R) and underwent a behavioral approach test (BAT) with a live tarantula. Then, they were measured in fMRI while watching blocks of pictures including spiders and snakes. Finally, the respondents rated all the visual stimuli according to perceived fear. We proposed the Spider Fear Index (SFI) as a value characterizing the level of spider fear, computed based on the fMRI measurements. We then treated this variable as the "neurophysiological effect of spiders" and examined its contribution to the respondents' fear ratings of the stimuli seen during the fMRI using the redundancy analysis (RDA). RESULTS: The results for fear ranks revealed that the SFI, SNAQ, DS-R, and SPQ scores had a significant effect, while BAT and SPQ scores loaded in the same direction of the first multivariate axis. The SFI was strongly correlated with both SPQ and BAT scores in the pooled sample of arachnophobic and healthy control subjects. DISCUSSION: Both SPQ and BAT scores have a high informative value about the subject's fear of spiders and together with subjective emotional evaluation of picture stimuli can be reliable predictors of spider phobia. These parameters provide easy and non-expensive but reliable measurement wherever more expensive devices such as magnetic resonance are not available. However, SFI still reflects individual variability within the phobic group, identifying individuals with higher brain activation, which may relate to more severe phobic reactions or other sources of fMRI signal variability.
Permanent Link: https://hdl.handle.net/11104/0343994
Research data: CRAN

0573945 - ÚI 2024 RIV CZ eng J - Journal Article
Daniel, M. - Brabec, Marek - Malý, Marek - Danielová, V. - Vrablík, T.
The influence of meteorological factors on the risk of tick-borne encephalitis infection.
Epidemiologie, Mikrobiologie, Imunologie. Roč. 72, č. 2 (2023), s. 67-77. ISSN 1210-7913
R&D Projects: GA ČR(CZ) GA22-24920S
Institutional support: RVO:67985807
Keywords : Tick-borne encephalitis * risk prediction * meteorological factors * generalized additive model * time-varying effects * distributed lag model
Impact factor: 0.500, year: 2021
https://www.prolekare.cz/en/journals/epidemiology-microbiology-immunology/2023-2-15/the-influence-of-meteorological-factors-on-the-risk-of-tick-borne-encephalitis-infection-134590
OBJECTIVES:: The aim of this work was to analyze the relationship between new cases of clinical tick-borne encephalitis (TBE) and various meteorological and seasonal predictors. MATERIAL AND METHODS: The modelling is based on national data from the Czech Republic for the period 2001–2016 in daily resolution, namely on average temperatures, average relative air humidity and the number of TBE cases classified according to the date of the first symptoms. Four variants of a negative binomial model from the generalized additive model class are used. The basic model relates the occurrence of TBE to the lagged ambient daily average temperature and daily average relative air humidity and their interaction with the lag reflecting the incubation period and other factors. The lag value was estimated via the optimization procedure based on Akaike information criterion. The model also includes the effect of the season and the effect of the day of the week. To increase the biological plausibility, the basic model has been expanded to account for possible time-varying effects of meteorological variables and to incorporate multiple lags. RESULTS: The most statistically significant effect is the within-year seasonality and then the interaction of the temperature and relative air humidity. The relationship of both meteorological factors and their interactions vary throughout the activities season of the hostquesting Ixodes ricinus. This also changes the conditions of occurrence of the new clinical cases of TBE. The time-varying effect of meteorological factors on the incidence of TBE shows non-trivial changes within a year. In the period before the middle of the calendar year (around the week 22) the effect decreases, then it is followed by an increase until the week 35. CONCLUSION: Flexible models were developed with quantitatively characterized effects of temperature, air humidity and their interaction, with the delay of the effect estimated through the optimization process. Performance of the model with multiple lags was checked using independent data to verify the possibility of using the results to improve the prediction of the risk of clinical cases of TBE uprise.
Permanent Link: https://hdl.handle.net/11104/0344329

0573601 - ÚI 2024 RIV CZ eng J - Journal Article
Daniel, M. - Brabec, Marek - Malý, Marek - Danielová, V. - Vráblík, T.
Vliv meteorologických faktorů na riziko infekce klíšťovou encefalitidou.
Epidemiologie, Mikrobiologie, Imunologie. Roč. 72, č. 2 (2023), s. 67-77. ISSN 1210-7913
R&D Projects: GA ČR(CZ) GA22-24920S
Institutional support: RVO:67985807
Keywords : klíšťová encefalitida * predikce rizika * meteorologické faktory * zobecněný aditivní model (GAM) * časově proměnlivé účinky * dynamický model
OECD category: Statistics and probability
Impact factor: 0.500, year: 2021
Method of publishing: Limited access
CÍL: Cílem této práce bylo analyzovat vztah mezi novými případy klinické formy klíšťové encefalitidy a různými meteorologickými a sezonními prediktory. MATERIÁL A METODIKA: Modelování vychází z národních dat České republiky za období 2001–2016 v denním rozlišení, a to z hodnot průměrné

teploty, průměrné relativní vlhkosti vzduchu a počtu případů klíšťové encefalitidy klasifikovaných podle data prvních příznaků. Používají se čtyři varianty negativně binomického modelu z třídy zobecněných aditivních modelů. Základní model dává výskyt klíšťové encefalitidy do souvislosti se zpožděnou průměrnou denní teplotou okolí a denní průměrnou relativní vlhkostí vzduchu a jejich interakcí se zpožděním odrážejícím inkubační dobu a další faktory. Hodnota zpoždění byla odhadnuta optimalizačním postupem založeným na Akaikeho informačním kritériu. Model také zahrnuje vliv sezony a vliv dne v týdnu. Pro zvýšení biologické věrohodnosti byl základní model rozšířen a byl použit distributed lag model, který zohledňuje možné časově proměnlivé účinky meteorologických proměnných a zahrnuje více zpoždění. VÝSLEDKY: Statisticky nejvýznamnějším efektem je sezonnost v rámci roku a pak interakce teploty a relativní vlhkosti vzduchu. Vztah obou meteorologických faktorů a jejich interakce se mění v průběhu sezony aktivity hladových klíšťat Ixodes ricinus. To také mění podmínky výskytu nových klinických případů klíšťové encefalitidy. Časově proměnlivý vliv meteorologických faktorů na výskyt klíšťové encefalitidy vykazuje netriviální změny v průběhu roku. V období před polovinou kalendářního roku (kolem 22. týdne) je efekt nižší, poté následuje zvýšení až do 35. týdne. ZÁVĚR: Byly vyvinuty flexibilní modely s kvantitativně charakterizovanými vlivy teploty, vlhkosti vzduchu a jejich interakce, se zpožděním efektu odhadnutým optimalizačním procesem. Výkonnost finálního modelu byla zkontrolována pomocí nezávislých dat, aby se ověřila možnost využití výsledků ke zlepšení predikce rizika nárůstu klinických případů klíšťové encefalitidy.
Permanent Link: https://hdl.handle.net/11104/0344006

0573950 - ÚI 2024 GB eng J - Journal Article
Garbe, F. - Hancock, R. - Hladký, Jan - Sharifzadeh, M.
Limits of Latin Squares.
Discrete Analysis. Roč. 8, July 2023 (2023), č. článku da.83253. ISSN 2397-3129
Institutional support: RVO:67985807
Keywords : Latin square * Latinon * limits of discrete structures * graphon
Method of publishing: Open access
https://dx.doi.org/10.19086/da.83253
DOI: 10.19086/da.83253
We develop a limit theory of Latin squares, paralleling the recent limit theories of dense graphs and permutations. We introduce a notion of density, an appropriate version of the cut distance, and a space of limit objects — so-called Latinons. Key results of our theory are the compactness of the limit space and the equivalence of the topologies induced by the cut distance and the left-convergence. Last, using Keevash's recent results on combinatorial designs, we prove that each Latinon can be approximated by a finite Latin square.
Permanent Link: https://hdl.handle.net/11104/0344331
Research data: ArXiv.org

0573637 - ÚI 2024 NL eng J - Journal Article
Grebík, Jan - Pikhurko, O.
Measurable versions of Vizing's theorem.
Advances in Mathematics. Roč. 374, 18 November 2020 (2020), č. článku 107378. ISSN 0001-8708. E-ISSN 1090-2082
R&D Projects: GA ČR GJ16-07822Y
Institutional support: RVO:67985807
Keywords : Graphing * Vizing's theorem * Graph colouring * Borel graph * Augmenting path
OECD category: Pure mathematics
Impact factor: 1.688, year: 2020
Method of publishing: Limited access

https://dx.doi.org/10.1016/j.aim.2020.107378
DOI: 10.1016/j.aim.2020.107378
We establish two versions of Vizing's theorem for Borel multi-graphs whose vertex degrees and edge multiplicities are uniformly bounded by respectively Δ and π. The "approximate" version states that, for any Borel probability measure on the edge set and any ϵ>0, we can properly colour all but ϵ-fraction of edges with Δ+π colours in a Borel way. The "measurable" version, which is our main result, states that if, additionally, the measure is invariant, then there is a measurable proper edge colouring of the whole edge set with at most Δ+π colours.
Permanent Link: https://hdl.handle.net/11104/0344035

0573791 - ÚI 2024 RIV CZ cze J - Journal Article
Lehnert, M. - Geletič, Jan - Jurek, M.
Tradiční a nové přístupy ke studiu tepelného prostředí člověka ve městě: kritické shrnutí současného stavu poznání.
[Traditional and novel approaches to studying the human thermal environment in urban areas: A critical review of the current state of the art.]
Geografie. Roč. 128, č. 3 (2023), s. 351-377. ISSN 1212-0014. E-ISSN 2571-421X
Institutional support: RVO:67985807
Keywords : urban climate * urban heat island * thermal exposure * thermal comfort * thermal sensation
OECD category: Meteorology and atmospheric sciences
Impact factor: 1.500, year: 2021
Method of publishing: Open access
DOI: 10.37040/geografie.2023.012
Specifické tepelné prostředí měst patří k významným faktorům životního prostředí městských populací. Ve městech dnes přitom žije více než polovina lidstva (OSN 2018). Městské teplo je častou příčinou environmentálního stresu, ovlivňuje životní spokojenost, zdraví a úmrtnost obyvatel (Kovats, Hajat 2008) a působí na řadu dalších faktorů, které ovlivňují jak přírodní (Schmidt, Poppendieck, Jensen 2014), tak i socioekonomické prostředí měst (Santamouris a kol. 2001). Oteplování a rostoucí extremita klimatu (IPCC 2021) současně vede k potřebě adaptace na tyto změny (Rosenzweig a kol. 2018) a problematika tepelného prostředí města si žádá i v oblasti střední Evropy více pozornosti než kdy dříve.
Traditional approaches to researching the urban thermal environment focus on identifying the specific manifestations of the local climate and microclimate within urban structures and various types of urban development, and on detecting urban heat islands using meteorological station data, mobile measurements, remote sensing, and (micro)climatic modelling. Nonetheless, current manifestations of climate change and its projections into the future bring the need for the effective climatic adaptation of urban environments. Current research focuses on approaches allowing for a more complex assessment of both the thermal and overall environment of people in towns and cities. This requires numerical modelling in high spatial resolution and large questionnaire surveys. Despite many unanswered theoretical and methodological questions, the approaches to and knowledge of the human urban thermal environment demonstrate growing application potential.
Permanent Link: https://hdl.handle.net/11104/0344145

0573667 - ÚI 2024 SK eng C - Conference Paper (international conference)
Paluš, Milan - Kathpalia, Aditi - Brunovský, M.
EEG Connectivity in Treatment of Major Depressive Disorder: Tackling the Conductivity Effects.
2023 14th International Conference on Measurement. Proceedings. Bratislava: Institute of Measurement Science, SAS / IEEE, 2023 - (Dvurečenskij, A.; Maňka, J.; Švehlíková, J.; Witkovský, V.), s. 76-79. ISBN 979-8-3503-1218-8.
[MEASUREMENT 2023: International Conference on Measurement /14./. Smolenice (SK), 29.05.2023-31.05.2023]
R&D Projects: GA ČR(CZ) GF21-14727K
Institutional support: RVO:67985807
Keywords : Brain Connectivity * EEG * Imaginary Coherence * Major Depressive Disorder * Antidepressant Treatment
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://dx.doi.org/10.23919/MEASUREMENT59122.2023.10164615
DOI: 10.23919/MEASUREMENT59122.2023.10164615
Brain connectivity, extracted from EEG is considered for quantitative characterization of changes in brain function due to a mental disease and its treatment. Weighted imaginary coherence is chosen as a connectivity measure reflecting true brain interactions without distortions due to scalp conductivity and a common reference electrode. This measure is used in analyses of EEG data from patients suffering from major depressive disorder and its potential in prediction of efficacy of antidepressant treatment is demonstrated.
Permanent Link: https://hdl.handle.net/11104/0344051

0573769 - ÚI 2024 RIV GB eng C - Conference Paper (international conference)
Bílková, Marta - Sedlár, Igor
Epistemic Logics of Structured Intensional Groups.
Proceedings Nineteenth conference on Theoretical Aspects of Rationality and Knowledge (TARK 2023). Oxford: Open Publishing Association, 2023 - (Verbrugge, R.), s. 113-130. Electronic Proceedings in Theoretical Computer Science, 379. ISSN 2075-2180.
[TARK 2023: Theoretical Aspects of Rationality and Knowledge /19./. Oxford (GB), 28.06.2023-30.06.2023]
R&D Projects: GA ČR(CZ) GF22-23022L
Institutional support: RVO:67985807
https://cgi.cse.unsw.edu.au/~eptcs/paper.cgi?TARK2023.11.pdf
DOI: 10.4204/EPTCS.379.11
Epistemic logics of intensional groups lift the assumption that membership in a group of agents is common knowledge. Instead of being represented directly as a set of agents, intensional groups are represented by a property that may change its extension from world to world. Several authors have considered versions of the intensional group framework where group-specifying properties are articulated using structured terms of a language, such as the language of Boolean algebras or of description logic. In this paper we formulate a general semantic framework for epistemic logics of structured intensional groups, develop the basic theory leading to completeness-via-canonicity results, and show that several frameworks presented in the literature correspond to special cases of the general framework.
Permanent Link: https://hdl.handle.net/11104/0344132
Research data: ArXiv.org

0573762 - ÚI 2024 RIV CZ eng C - Conference Paper (international conference)
Ghanbari, B. - Hartman, David - Jelínek, V. - Pokorná, Aneta - Šámal, R. - Valtr, P.
On the structure and values of betweenness centrality in dense betweenness-uniform graphs.
EUROCOMB'23. Proceedings of the 12th European Conference on Combinatorics, Graph Theory and Applications. Brno: MUNI Press, 2023 - (Král', D.; Nešetřil, J.), s. 478-484. E-ISSN 2788-3116.
[EUROCOMB 2023: European Conference on Combinatorics, Graph Theory and Applications /12./. Prague (CZ), 28.08.2023-01.09.2023]
R&D Projects: GA ČR(CZ) GA23-07074S
Institutional support: RVO:67985807
https://journals.muni.cz/eurocomb/article/view/35600/31477
DOI: 10.5817/CZ.MUNI.EUROCOMB23-066
Betweenness centrality is a network centrality measure based on the amount ofshortest paths passing through a given vertex. A graph is betweenness-uniform (BUG)if all vertices have an equal value of betweenness centrality. In this contribution, wefocus on betweenness-uniform graphs with betweenness centrality below one. Wedisprove a conjecture about the existence of a BUG with betweenness valueαforany rational numberαfrom the interval (3/4,∞) by showing that only very few be-tweenness centrality values below 6/7 are attained for at least one BUG. Furthermore,among graphs with diameter at least three, there are no betweenness-uniform graphswith a betweenness centrality smaller than one. In graphs of smaller diameter, thesame can be shown under a uniformity condition on the components of the comple-ment.
Permanent Link: https://hdl.handle.net/11104/0344131

0573674 - ÚI 2024 SK eng C - Conference Paper (international conference)
Hlaváčková-Schindler, Kateřina - Pacher, C. - Plant, C. - Lazarenko, M. - Paluš, Milan - Hlinka, Jaroslav - Kathpalia, Aditi - Brunovský, M.
Pattern Discovery in an EEG Database of Depression Patients: Preliminary Results.
2023 14th International Conference on Measurement. Proceedings. Bratislava: Institute of Measurement Science, SAS / IEEE, 2023 - (Dvurečenskij, A.; Maňka, J.; Švehlíková, J.; Witkovský, V.), s. 80-83. ISBN 979-8-3503-1218-8.
[MEASUREMENT 2023: International Conference on Measurement /14./. Smolenice (SK), 29.05.2023-31.05.2023]
R&D Projects: GA ČR(CZ) GF21-14727K
Institutional support: RVO:67985807
Keywords : Major Depressive Disorder * Interactive Clustering * Granger Causality * Classification Methods
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://dx.doi.org/10.23919/MEASUREMENT59122.2023.10164584
DOI: 10.23919/MEASUREMENT59122.2023.10164584
The ability to predict response to medication treatment of depressed patients, either early in the course of therapy or before treatment even begins can avoid trials of ineffective therapy and save patients from prolonged intervals of suffering. Symptom alleviation requires 4-6 weeks after starting current antidepressive medication. Based on the data basis of the patients and their EEG before and on the 7th day of treatment we apply data mining, causal discovery and machine learning approaches to discover interactive patterns between patient's brain regions to separate the treatment responders from non-responders. In this paper we report the preliminary results of our international project "Learning Synchronization Patterns in Multivariate Neural Signals for Prediction of Response to Antidepressants" ongoing at the University of Vienna, the Czech Academy of Sciences and the National Institute of Mental Health in the Czech Republic.
Permanent Link: https://hdl.handle.net/11104/0344055

0573672 - ÚI 2024 SK eng C - Conference Paper (international conference)
Ghosh, Anupam - Bhattacharjee, Madhurima - Kathpalia, Aditi - Brunovský, M. - Paluš, Milan
Phase Dynamics and Directed EEG Connectivity in Treatment of Major Depressive Disorder.
2023 14th International Conference on Measurement. Proceedings. Bratislava: Institute of Measurement Science, SAS / IEEE, 2023 - (Dvurečenskij, A.; Maňka, J.; Švehlíková, J.; Witkovský, V.), s. 88-91. ISBN 979-8-3503-1218-8.
[MEASUREMENT 2023: International Conference on Measurement /14./. Smolenice (SK), 29.05.2023-31.05.2023]
R&D Projects: GA ČR(CZ) GF21-14727K
Institutional support: RVO:67985807
Keywords : Coupled Oscillatory Systems * Coupling Direction * EEG * Major Depressive Disorder
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://dx.doi.org/10.23919/MEASUREMENT59122.2023.10164557
DOI: 10.23919/MEASUREMENT59122.2023.10164557
In this paper, we infer the direction of information transfer between interacting subsystems using a cross-dependence index derived from the phase dynamics of coupled subsystems. First, we apply this method to unidirectionally coupled Rössler oscillators. This index always has a higher value along the direction of coupling than that opposite to the coupling. Finally, we employ this method in analysis of EEG signals. The aim of this analysis is to identify the direction of information transfer in the brain in patients suffering from depression and quantify its changes during the treatment process.
Permanent Link: https://hdl.handle.net/11104/0344054

0573671 - ÚI 2024 SK eng C - Conference Paper (international conference)
Bhattacharjee, Madhurima - Kathpalia, Aditi - Brunovský, M. - Paluš, Milan
Phase-based Causality Analysis of EEG in Treatment of Major Depressive Disorder.
2023 14th International Conference on Measurement. Proceedings. Bratislava: Institute of Measurement Science, SAS / IEEE, 2023 - (Dvurečenskij, A.; Maňka, J.; Švehlíková, J.; Witkovský, V.), s. 84-87. ISBN 979-8-3503-1218-8.
[MEASUREMENT 2023: International Conference on Measurement /14./. Smolenice (SK), 29.05.2023-31.05.2023]
R&D Projects: GA ČR(CZ) GF21-14727K
Institutional support: RVO:67985807
Keywords : Brain Connectivity * Phase-Based Causality * Eeg * Major Depressive Disorder * Mutual Information
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://dx.doi.org/10.23919/MEASUREMENT59122.2023.10164427
DOI: 10.23919/MEASUREMENT59122.2023.10164427
This study analyzes causal connections between cross-hemispheric brain regions in individuals diagnosed with major depressive disorder (MDD) through Electroencephalography (EEG) data. A phase-based causality analysis technique is first validated on coupled Rössler systems and then employed on EEG recordings from MDD patients. Our results provide significant insights regarding causal influences in cross-hemispheric brain connectivity of MDD patients who exhibit an early response to medication after commencing treatment.
Permanent Link: https://hdl.handle.net/11104/0344053

0573722 - ÚI 2024 eng C - Conference Paper (international conference)
Sedlár, Igor - Vigiani, P.
Relevant Reasoning and Implicit Beliefs.
WoLLIC 2023 Accepted Talks. 2023.
[WoLLIC 2023: Workshop on Logic, Language, Information and Computation /29./. Halifax (CA), 11.07.2023-14.07.2023]
Institutional support: RVO:67985807
Keywords : Epistemic logic * explicit belief * implicit belief * knowledge representation * modal logic * relevant logic
https://www.mathstat.dal.ca/wollic2023/papers/sedlar-vigiani.pdf
Combining relevant and classical modal logic is an approach to overcoming the logical omniscience problem and related issues that goes back at least to Levesque's well known work in the 1980s. The present authors have recently introduced a variant of Levesque's framework where explicit beliefs concerning conditional propositions can be formalized. However, our framework did not offer a formalization of implicit belief in addition to explicit belief. In this paper we provide such a formalization. Our main technical result is a modular completeness theorem.
Permanent Link: https://hdl.handle.net/11104/0344103

0573756 - ÚI 2024 RIV CZ eng C - Conference Paper (international conference)
Hartman, David - Hons, T. - Nešetřil, J.
Rooting algebraic vertices of convergent sequences.
EUROCOMB'23. Proceedings of the 12th European Conference on Combinatorics, Graph Theory and Applications. Brno: MUNI Press, 2023 - (Král', D.; Nešetřil, J.), s. 539-544. E-ISSN 2788-3116.
[EUROCOMB 2023: European Conference on Combinatorics, Graph Theory and Applications /12./. Prague (CZ), 28.08.2023-01.09.2023]
Institutional support: RVO:67985807
https://journals.phil.muni.cz/eurocomb/article/view/35609/31523
DOI: 10.5817/CZ.MUNI.EUROCOMB23-075
Structural convergence is a framework for convergence of graphs by Nešetřil andOssona de Mendez that unifies the dense (left) graph convergence and Benjamini-Schramm convergence. They posed a problem asking whether for a given sequenceof graphs (Gn) converging to a limit L and a vertexrofLit is possible to find asequence of vertices (rn) such thatLrooted atris the limit of the graphsGnrootedatrn. A counterexample was found by Christofides and Král', but they showed thatthe statement holds for almost all vertices r of L. We offer another perspective to theoriginal problem by considering the size of definable sets to which the rootrbelongs.We prove that if r is an algebraic vertex (i.e. belongs to a finite definable set), thesequence of roots (rn) always exists.
Permanent Link: https://hdl.handle.net/11104/0344128

0573584 - ÚI 2024 CZ cze N - Newspaper Article
Trčka, M. - Wiedermann, Jiří - Černý, David
Panika kolem AI odvádí pozornost od reálných problémů.
Academix. Roč. 2, č. 6 (2023), s. 40-45. ISSN 2788-094X
Institutional support: RVO:67985807
https://www.academixrevue.cz/panika-kolem-ai-odvadi-pozornost-od-realnych-problemu
Permanent Link: https://hdl.handle.net/11104/0344000

0573793 - ÚI 2024 US eng V - Research Report
Lang, R. - Sanhueza-Matamala, Nicolás
On sufficient conditions for spanning structures in dense graphs.
Cornell University: Cornell University, 2023. 68 s. arXiv.org e-Print archive, arXiv:2110.14547.
R&D Projects: GA ČR(CZ) GA19-08740S
Institutional support: RVO:67985807
https://arxiv.org/abs/2110.14547
DOI: 10.48550/arXiv.2110.14547
We study structural conditions in dense graphs that guarantee the existence of vertex-spanning substructures such as Hamilton cycles. It is easy to see that every Hamiltonian graph is connected, has a perfect fractional matching and, excluding the bipartite case, contains an odd cycle. A simple consequence of the Robust Expander Theorem of Kühn, Osthus and Treglown tells us that any large enough graph that robustly satisfies these properties must already be Hamiltonian. Our main result generalises this phenomenon to powers of cycles and graphs of sublinear bandwidth subject to natural generalisations of connectivity, matchings and odd cycles.
This answers a question of Ebsen, Maesaka, Reiher, Schacht and Schülke and solves the embedding problem that underlies multiple lines of research on sufficient conditions for spanning structures in dense graphs. As applications, we recover and establish Bandwidth Theorems in a variety of settings including Ore-type degree conditions, Pósa-type degree conditions, deficiency-type conditions, locally dense and inseparable graphs, multipartite graphs as well as robust expanders.
Permanent Link: https://hdl.handle.net/11104/0344148

0573507 - ÚI 2024 eng V - Research Report
Harikrishnan, N. B. - Kathpalia, Aditi - Nagaraj, N.
Causality Preserving Chaotic Transformation and Classification using Neurochaos Learning.
OpenReview.net, 2022. Thirty-Sixth Conference on Neural Information Processing Systems. Accepted Papers.
Institutional support: RVO:67985807
https://openreview.net/forum?id=XdMusblCkB
Discovering cause and effect variables from observational data is an important but challenging problem in science and engineering. In this work, a recently proposed brain inspired learning algorithm namely-Neurochaos Learning (NL) is used for the classification of cause and effect time series generated using coupled autoregressive processes, coupled 1D chaotic skew tent maps, coupled 1D chaotic logistic maps and a real-world prey-predator system. In the case of coupled skew tent maps, the proposed method consistently outperforms a five layer Deep Neural Network (DNN) and Long Short Term Memory (LSTM) architecture for unidirectional coupling coefficient values ranging from 0.1 to 0.7. Further, we investigate the preservation of causality in the feature extracted space of NL using Granger Causality for coupled autoregressive processes and Compression-Complexity Causality for coupled chaotic systems and real-world prey-predator dataset. Unlike DNN, LSTM and 1D Convolutional Neural Network, it is found that NL preserves the inherent causal structures present in the input timeseries data. These findings are promising for the theory and applications of causal machine learning and open up the possibility to explore the potential of NL for more sophisticated causal learning tasks.
Permanent Link: https://hdl.handle.net/11104/0343941

0573794 - ÚI 2024 US eng V - Research Report

Pavez-Signé, M. - Sanhueza-Matamala, Nicolás - Stein, M.

Towards a hypergraph version of the Pósa-Seymour conjecture.

Cornell University: Cornell University, 2023. 29 s. arXiv.org e-Print archive, arXiv:2110.09373.

R&D Projects: GA ČR(CZ) GA19-08740S

Institutional support: RVO:67985807

https://arxiv.org/abs/2110.09373

DOI: 10.48550/arXiv.2110.09373

We prove that for fixed r≥k≥2, every k-uniform hypergraph on n vertices having minimum codegree at least (1−(\binom{r−1}{k−1}+\binom{r−2}{k−2})−1)n+o(n) contains the (r−k+1)th power of a tight Hamilton cycle. This result may be seen as a step towards a hypergraph version of the Pósa-Seymour conjecture. Moreover, we prove that the same bound on the codegree suffices for finding a copy of every spanning hypergraph of tree-width less than r which admits a tree decomposition where every vertex is in a bounded number of bags.

Permanent Link: https://hdl.handle.net/11104/0344149