Záznamy vložené do ASEP za UI (1. 4. – 31. 5. 2022)
New ICS records in ASEP (1. 4. – 31. 5. 2022)

0557684 - PSÚ 2023 RIV US eng J - Journal Article
Hlinka, Jaroslav - Děchtěrenko, Filip - Rydlo, J. - Androvičová, R. - Vejmelka, Martin - Jajcay, Lucia - Tintěra, J. - Lukavský, Jiří - Horáček, J.
The Intra-session Reliability of Functional Connectivity during Naturalistic Viewing Conditions.
Psychophysiology. duben (2022), č. článku e14075. ISSN 0048-5772. E-ISSN 1469-8986
R&D Projects: GA ČR GA13-23940S
Institutional support: RVO:68081740 ; RVO:67985807
Keywords : fMRI * functional connectivity * naturalistic viewing * reliability * resting state
OECD category: Psychology (including human - machine relations); Neurosciences (including psychophysiology (UIVT-O)
Impact factor: 4.016, year: 2020
Method of publishing: Limited access
https://onlinelibrary.wiley.com/doi/epdf/10.1111/psyp.14075
DOI: 10.1111/psyp.14075
Functional connectivity analysis is a common approach to the characterization of brain function. While studies of functional connectivity have predominantly focused on resting- state fMRI, naturalistic paradigms, such as movie watching, are increasingly being used. This ecologically valid, yet relatively unconstrained acquisition state has been shown to improve subject compliance and, potentially, enhance individual differences. However, unlike the reliability of resting- state functional connectivity, the reliability of functional connectivity during naturalistic viewing has not yet been fully established. The current study investigates the intrasession reliability of functional connectivity during naturalistic viewing sessions to extend its understanding. Using fMRI data of 24 subjects measured at rest as well as during six naturalistic viewing conditions, we quantified the split-half reliability of each condition, as well as cross- condition reliabilities. We find that intrasession reliability is relatively high for all conditions. While cross-condition reliabilities are higher for pairings of two naturalistic viewing conditions, split-half reliability is highest for the resting state. Potential sources of variability across the conditions, as well as the strengths and limitations of using intra-session reliability as a measure in naturalistic viewing, are discussed.
Permanent Link: http://hdl.handle.net/11104/0331586

0557552 - ÚI 2023 CZ eng J - Journal Article
Resler, Jaroslav
Stability of Eigenvalues and Eigenvectors of Variational Inequalities.
Commentationes Mathematicae Universitatis Carolinae. Roč. 29, č. 3 (1988), s. 541-550. ISSN 0010-2628
Institutional support: RVO:67985807
Keywords : sup min principle * eigenvectors * Variational inequalities * eigenvalues
Method of publishing: Open access with time embargo
https://dml.cz/handle/10338.dmlcz/106668
We study the dependence of eigenvectors and eigenvalues of variational inequalities on continuous deformations of the cone. The lower semicontinuity of eigenvalues for general continuous deformations and continuity for continuous invertible deformations is proved.
Permanent Link: http://hdl.handle.net/11104/0331519

0557325 - ÚI 2023 RIV CH eng J - Journal Article
Jajcay, Lucia - Tomeček, David - Horáček, J. - Španiel, F. - Hlinka, Jaroslav
Brain Functional Connectivity Asymmetry: Left Hemisphere Is More Modular.
Symmetry-Basel. Roč. 14, č. 4 (2022), č. článku 833. E-ISSN 2073-8994
R&D Projects: GA ČR(CZ) GA21-17211S; GA ČR(CZ) GA21-32608S
Institutional support: RVO:67985807
Keywords : cerebral dominance * data analysis * functional laterality * fMRI * functional connectivity * graph theory * modularity
OECD category: Neurosciences (including psychophysiology
Impact factor: 2.713, year: 2020
Method of publishing: Open access
http://dx.doi.org/10.3390/sym14040833
DOI: 10.3390/sym14040833

Graph-theoretical approaches are increasingly used to study the brain and may enhance our understanding of its asymmetries. In this paper, we hypothesize that the structure of the left hemisphere is, on average, more modular. To this end, we analyzed resting-state functional magnetic resonance imaging data of 90 healthy subjects. We computed functional connectivity by Pearson's correlation coefficient, turned the matrix into an unweighted graph by keeping a certain percentage of the strongest connections, and quantified modularity separately for the subgraph formed by each hemisphere. Our results show that the left hemisphere is more modular. The result is consistent across a range of binarization thresholds, regardless of whether the two hemispheres are thresholded together or separately. This illustrates that graph-theoretical analysis can provide a robust characterization of lateralization of brain functional connectivity.
Permanent Link: http://hdl.handle.net/11104/0331363

0557324 - ÚI 2023 RIV eng J - Journal Article
Hlinka, Jaroslav - Děchtěrenko, Filip - Rydlo, J. - Androvičová, R. - Vejmelka, Martin - Jajcay, Lucia - Tintěra, J. - Lukavský, Jiří - Horáček, J.
The Intra-session Reliability of Functional Connectivity during Naturalistic Viewing Conditions.
Psychophysiology. Online 23 April 2022 (2022). ISSN 0048-5772. E-ISSN 1469-8986
R&D Projects: GA ČR GA13-23940S; GA ČR(CZ) GA21-32608S
Institutional support: RVO:67985807
Keywords : fMRI * functional connectivity * naturalistic viewing * reliability * resting state
OECD category: Neurosciences (including psychophysiology
Impact factor: 4.016, year: 2020
Method of publishing: Limited access
DOI: 10.1111/psyp.14075
Functional connectivity analysis is a common approach to the characterization of brain function. While studies of functional connectivity have predominantly focused on resting-state fMRI, naturalistic paradigms, such as movie watching, are increasingly being used. This ecologically valid, yet relatively unconstrained acquisition state has been shown to improve subject compliance and, potentially, enhance individual differences. However, unlike the reliability of resting-state functional connectivity, the reliability of functional connectivity during naturalistic viewing has not yet been fully established. The current study investigates the intra-session reliability of functional connectivity during naturalistic viewing sessions to extend its understanding. Using fMRI data of 24 subjects measured at rest as well as during six naturalistic viewing conditions, we quantified the split-half reliability of each condition, as well as cross-condition reliabilities. We find that intra-session reliability is relatively high for all conditions. While cross-condition reliabilities are higher for pairings of two naturalistic viewing conditions, split-half reliability is highest for the resting state. Potential sources of variability across the

conditions, as well as the strengths and limitations of using intra-session reliability as a measure in naturalistic viewing, are discussed.
Permanent Link: http://hdl.handle.net/11104/0331362

0557318 - ÚI 2023 RIV CH eng J - Journal Article
Jajcay, Nikola - Cakan, C. - Obermayer, K.
Cross-Frequency Slow Oscillation–Spindle Coupling in a Biophysically Realistic Thalamocortical Neural Mass Model.
Frontiers in Computational Neuroscience. Roč. 16, May 2022 (2022), č. článku 769860. E-ISSN 1662-5188
R&D Projects: GA MŠk(CZ) EF19_074/0016209; GA ČR(CZ) GA21-32608S
Institutional support: RVO:67985807
Keywords : neural mass model * thalamocortical loop * sleep spindles * slow oscillations * cross-frequency coupling
OECD category: Neurosciences (including psychophysiology
Impact factor: 2.380, year: 2020
Method of publishing: Open access
http://dx.doi.org/10.3389/fncom.2022.769860
DOI: 10.3389/fncom.2022.769860
Sleep manifests itself by the spontaneous emergence of characteristic oscillatory rhythms, which often time-lock and are implicated in memory formation. Here, we analyze a neural mass model of the thalamocortical loop in which the cortical node can generate slow oscillations (approximately 1 Hz) while its thalamic component can generate fast sleep spindles of σ-band activity (12–15 Hz). We study the dynamics for different coupling strengths between the thalamic and cortical nodes, for different conductance values of the thalamic node's potassium leak and hyperpolarization-activated cation-nonselective currents, and for different parameter regimes of the cortical node. The latter are listed as follows: (1) a low activity (DOWN) state with noise-induced, transient excursions into a high activity (UP) state, (2) an adaptation induced slow oscillation limit cycle with alternating UP and DOWN states, and (3) a high activity (UP) state with noise-induced, transient excursions into the low activity (DOWN) state. During UP states, thalamic spindling is abolished or reduced. During DOWN states, the thalamic node generates sleep spindles, which in turn can cause DOWN to UP transitions in the cortical node. Consequently, this leads to spindle-induced UP state transitions in parameter regime (1), thalamic spindles induced in some but not all DOWN states in regime (2), and thalamic spindles following UP to DOWN transitions in regime (3). The spindle-induced σ-band activity in the cortical node, however, is typically the strongest during the UP state, which follows a DOWN state “window of opportunity” for spindling. When the cortical node is parametrized in regime (3), the model well explains the interactions between slow oscillations and sleep spindles observed experimentally during Non-Rapid Eye Movement sleep. The model is computationally efficient and can be integrated into large-scale modeling frameworks to study spatial aspects like sleep wave propagation.
Permanent Link: http://hdl.handle.net/11104/0331355

0557159 - ÚI 2023 RIV DE eng C - Conference Paper (international conference)
Fernández Duque, David - Montacute, Y.
Dynamic Cantor Derivative Logic.
30th EACSL Annual Conference on Computer Science Logic. Dagstuhl: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2022 - (Manea, F.; Simpson, A.), 19:1-19:17. Leibniz International Proceedings in Informatics, 216. ISSN 1868-8969.
[CSL 2022: EACSL Annual Conference on Computer Science Logic /30./. Göttingen / Virtual (DE), 14.02.2022-19.02.2022]
Institutional support: RVO:67985807

Keywords : dynamic topological logic * Cantor derivative * temporal logic * modal logic
https://drops.dagstuhl.de/opus/volltexte/2022/15739/pdf/LIPIcs-CSL-2022-19.pdf
DOI: 10.4230/LIPIcs.CSL.2022.19
Topological semantics for modal logic based on the Cantor derivative operator gives rise to derivative logics, also referred to as d-logics. Unlike logics based on the topological closure operator, d-logics have not previously been studied in the framework of dynamical systems, which are pairs (X, f) consisting of a topological space X equipped with a continuous function f : X → X. We introduce the logics wK4C, K4C and GLC and show that they all have the finite Kripke model property and are sound and complete with respect to the d-semantics in this dynamical setting. In particular, we prove that wK4C is the d-logic of all dynamic topological systems, K4C is the d-logic of all TD dynamic topological systems, and GLC is the d-logic of all dynamic topological systems based on a scattered space. We also prove a general result for the case where f is a homeomorphism, which in particular yields soundness and completeness for the corresponding systems wK4H, K4H and GLH. The main contribution of this work is the foundation of a general proof method for finite model property and completeness of dynamic topological d-logics. Furthermore, our result for GLC constitutes the first step towards a proof of completeness for the trimodal topo-temporal language with respect to a finite axiomatisation – something known to be impossible over the class of all spaces.
Permanent Link: http://hdl.handle.net/11104/0331225

0557137 - ÚI 2023 HK eng A - Abstract
Hynek, M. - Zvárová, Jana - Smetanová, D. - Stejskal, D. - Kalina, Jan
Corrigendum to Real-time quality control of nuchal translucency measurements using the exponentially weighted moving average chart (vol 60, pg 84, 2021).
Taiwanese Journal of Obstetrics and Gynecology. Roč. 61, č. 1 (2022), s. 190-190. ISSN 1028-4559
Institutional support: RVO:67985807
Keywords : correction * oprava
DOI: 10.1016/j.tjog.2021.11.036
Permanent Link: http://hdl.handle.net/11104/0331187

0557038 - ÚI 2023 eng V - Research Report
Berec, L. - Diviák, T. - Kuběna, Aleš Antonín - Levínský, René - Neruda, Roman - Suchopárová, Gabriela - Šlerka, J. - Šmíd, Martin - Tuček, V. - Vidnerová, Petra - Zajíček, Milan - Zapletal, František
Model-M: An agent-based epidemic model of a middle-sized municipality.
2022. bioRxiv, 2021.05.13.21257139.
R&D Projects: GA TA ČR(CZ) TL04000282
Institutional support: RVO:67985807 ; RVO:67985556
http://dx.doi.org/10.1101/2021.05.13.21257139
DOI: 10.1101/2021.05.13.21257139
This report presents a technical description of our agent-based epidemic model of a particular middle-sized municipality. We have developed a realistic model with 56 thousand inhabitants and 2.7 millions of social contacts. These form a multi-layer social network that serves as a base of our epidemic simulation. The disease is modeled by our extended SEIR model with parameters fitted to real epidemics data for Czech Republic. The model is able to simulate a whole range of non-pharmaceutical interventions on individual level, such as protective measures and physical distancing, testing, contact tracing, isolation and quarantine. The effect of government-issued measures such as contact restrictions in different environments (schools, restaurants, vendors, etc.) can also be simulated.
Permanent Link: http://hdl.handle.net/11104/0331145

0556962 - ÚI 2023 RIV CZ cze J - Journal Article
Šípek, A. - Gregor, V. - Šípek jr., A. - Klaschka, Jan - Malý, Marek
Přežívání dětí narozených v České republice s Downovým, Edwardsovým a Patauovým syndromem. [Survival Of Children Born with Down Syndrome, Edwards Syndrome, And Patau Syndrome in the Czech Republic.]
Aktuální Gynekologie a Porodnictví. Roč. 14, Březen 2022 (2022), č. článku 1422007. ISSN 1803-9588
R&D Projects: GA MZd NV17-29622A
Institutional support: RVO:67985807
Keywords : Downův syndrom * Edwardsův syndrom * Patauův syndrom * přežívání * úmrtnost * Down syndrome * Edwards syndrome * Patau syndrome * survival rate * mortality rate
Method of publishing: Open access
https://www.actualgyn.com/pdf/cz_2022_266.pdf
CÍL A TYP STUDIE: Retrospektivní analýza přežívání dětí narozených v České republice (ČR) v období 1994–2015 s Downovým syndromem, Edwardsovým syndromem nebo Patauovým syndromem. MATERIÁL A METODIKA: V práci jsme využili údaje z Národního registru vrozených vad vedeného v rámci Registru reprodukčního zdraví v Ústavu zdravotnických informací a statistiky České republiky (ÚZIS ČR) za období 1994–2015. Analyzovali jsme případy narozených dětí se třemi diagnózami nejčastějších aneuploidních syndromů a přežívání těchto dětí v průběhu prvního roku života. Byly analyzovány případy dětí s Downovým syndromem – DS (Q90), s Edwardsovým syndromem – ES (Q91.0 – Q91.3) a Patauovým syndromem – PS (Q91.4 - Q91.7). Pro zpracování a analýzy byl využit soubor individuálních anonymizovaných údajů poskytnutých z ÚZIS. Časové trendy byly testovány exaktní Poissonovou regresí a ke srovnání skupin dětí ve stejném časovém období byl použit Fisherův exaktní test. VÝSLEDKY: V období 1994–2015 bylo v České republice diagnostikováno celkem 1162 případů DS, z toho bylo mrtvě narozeno 9 dětí. V případě ES bylo celkem zachyceno 138 případů, z toho u mrtvě narozených dětí bylo 9 případů. PS byl diagnostikován celkem u 65 případů, z toho u mrtvě narozených 2 případy. U DS jsme ve sledovaném období nalezli statisticky významný pokles časné novorozenecké úmrtnosti ($p = 0,027$) a statisticky významný pokles kojenecké úmrtnosti ($p < 0,001$). U ES a PS nebyly změny úmrtností statisticky významné. V naší studii jsme zjistili úmrtnost do jednoho roku života v 9,2 % pro DS, 84,5 % pro ES a 87,3 % pro PS. U 46,4 % případů DS byla přítomnost i vrozené srdeční vady, v 8,3 % byla současně přítomná vrozená srdeční vada a jiná strukturální vada. V případě ES bylo nalezeno 20,2 % případů s vrozenou srdeční vadou a u PS to bylo 4,8 % dětí. Vrozenou srdeční vadu současně s jinou strukturální VV mělo 40,3 % dětí s ES a 38,1 % dětí s PS. ZÁVĚR: V naší práci jsme nalezli statisticky významný pokles časné neonatální a kojenecké úmrtnosti u dětí narozených s Downovým syndromem. Změny úmrtností u dětí narozených s Edwardsovým a Patauovým syndromem nejsou statisticky významné. Zjištěné míry úmrtností odpovídají literárně udávaným údajům.
Permanent Link: http://hdl.handle.net/11104/0331079

0556960 - ÚI 2023 RIV US eng J - Journal Article
Honěk, J. - Šrámek, M. - Honěk, T. - Šefc, L. - Januška, J. - Fiedler, J. - Horváth, M. - Novotný, Š. - Brabec, Marek - Veselka, J.
Screening and Risk Stratification Strategy Reduced Decompression Sickness Occurrence in Divers With Patent Foramen Ovale.
JACC-Cardiovascular Imaging. Roč. 15, č. 2 (2022), s. 181-189. ISSN 1936-878X. E-ISSN 1876-7591
Institutional support: RVO:67985807
Keywords : decompression sickness * paradoxical embolism * patent foramen ovale * risk stratification * screening
OECD category: Statistics and probability
Impact factor: 14.805, year: 2020
Method of publishing: Limited access

http://dx.doi.org/10.1016/j.jcmg.2021.06.019
DOI: 10.1016/j.jcmg.2021.06.019
OBJECTIVES: This paper sought to evaluate the occurrence of decompression sickness (DCS) after the application of a patent foramen ovale (PFO) screening and risk stratification strategy. BACKGROUND: PFO is associated with an increased risk of DCS. Recently, transcatheter closure was reported to reduce DCS occurrence in divers with a high-grade shunt. However, to date, there are no data regarding the effectiveness of any PFO screening and risk stratification strategy for divers. METHODS: A total of 829 consecutive divers (age 35.4 ± 10.0 years, 81.5% men) were screened for PFO by means of transcranial color-coded sonography in the DIVE-PFO (Decompression Illness Prevention in Divers with a Patent Foramen Ovale) registry. Divers with a high-grade PFO were offered either catheter-based PFO closure (the closure group) or advised conservative diving (high grades). Divers with a low-grade shunt were advised conservative diving (low grades), whereas those with no PFO continued unrestricted diving (controls). A telephone follow-up was performed. To study the effect of the screening and risk stratification strategy, DCS occurrence before enrollment and during the follow-up was compared. RESULTS: Follow-up was available for 748 (90%) divers. Seven hundred and 2 divers continued diving and were included in the analysis (mean follow-up 6.5 ± 3.5 years). The DCS incidence decreased significantly in all groups, except the controls. During follow-up, there were no DCS events in the closure group, DCS incidence was similar to the controls in the low-grade group (HR: 3.965, 95% CI: 0.558-28.18, P = 0.169) but remained higher in the high-grade group (HR: 26.170, 95% CI: 5.797-118.160, P < 0.0001). CONCLUSIONS: The screening and risk stratification strategy using transcranial color-coded sonography was associated with a decrease in DCS occurrence in divers with PFO. Catheter-based PFO closure was associated with a DCS occurrence similar to the controls, the conservative strategy had a similar effect in the low-grade group, but in the high-grade group the DCS incidence remained higher than in all other groups.
Permanent Link: http://hdl.handle.net/11104/0331077

0556959 - ÚI 2023 RIV NL eng J - Journal Article
Kážmér, L. - Brabec, Marek
The geographical epidemiology of smoking-related premature mortality: A registry-based small-area analysis of the Czech death statistics.
SPATIAL AND SPATIO-TEMPORAL EPIDEMIOLOGY. Roč. 41, June 2022 (2022), č. článku 100501. ISSN 1877-5845
Institutional support: RVO:67985807
Keywords : Smoking * Mortality * Spatial epidemiology * Small-area analysis * Socioeconomic determinants * Ecological approach
OECD category: Statistics and probability
Method of publishing: Limited access
http://dx.doi.org/10.1016/j.sste.2022.100501
DOI: 10.1016/j.sste.2022.100501
OBJECTIVES:Smoking-related mortality varies over different social, environmental, and policy contexts. However, spatial patterns, examined at a small area level, have been seldom considered. Therefore, the study provides a detailed analysis of socio-spatial inequalities in premature mortality related to smoking in the contemporary Czech adult population. DESIGN, SETTINGS, METHODS: We conducted a population-based, cross-sectional study to investigate the spatial pattern of the age-adjusted smoking-related mortality across Czechia. The spatial inequalities, as measured at the municipality level, were investigated using geostatistical modeling techniques. The ecological regression of the local mortality risk on socioeconomic composition of municipalities was also conducted. The target population was defined as permanent adult residents of Czechia aged 25–64 years in the period of 2011–2015. RESULTS: Among both sexes, a significant spatial gradient in the South-East (lower relative risk) – North-West (higher relative risk) axis was detected. The local mortality risk was significantly related to the level of relative deprivation of the municipalities (a

composite index comprised from unemployment rate and level of education): adjusted RR among males (for an increase by 1 SD): 1.21 [95% CI: 1.158–1.256], p < 0.001, adjusted RR among females (for an increase by 1 SD): 1.14 [95% CI: 1.090–1.186], p < 0.001. Mortality among males was approximately twice as high as opposed to females. Regarding the spatial inequalities of the phenomena, however, only rather minor sex-specific patterns were identified. Contrasted to males, mortality among females was unrelated to unemployment rates. CONCLUSIONS: Consistent spatial patterns of the premature mortality were identified. The mortality risk was significantly related to socioeconomic composition of the Czech municipalities. The higher the level of local deprivation, the higher the local mortality risk. The results of the study can be found beneficial for planning of both socially and spatially integrated public health policy.
Permanent Link: http://hdl.handle.net/11104/0331076

0556729 - ÚI 2023 NO eng J - Journal Article
Lukáš, M. - Kolář, M. - Reissigová, Jindra - Ďuricová, D. - Machková, N. - Hrubá, V. - Lukáš, M. - Vašátko, M. - Jirsa, J. - Pudilová, K. - Malíčková, K.
A switch from originator-adalimumab to the biosimilar SB5 in patients with Crohn's disease: an analysis of two propensity score-matched cohorts.
Scandinavian Journal of Gastroenterology. Online 02 Mar 2022 (2022). ISSN 0036-5521. E-ISSN 1502-7708
Institutional support: RVO:67985807
Keywords : Crohn's disease * adalimumab * biosimilar
Impact factor: 2.423, year: 2020
Method of publishing: Limited access
http://dx.doi.org/10.1080/00365521.2022.2041082
DOI: 10.1080/00365521.2022.2041082
BACKGROUND/AIMS: Originator-adalimumab, an established treatment for patients with Crohn's disease (CD), showed no difference in efficacy or adverse events versus adalimumab biosimilar SB5 (SB5-adalimumab) over 10 weeks (W) of treatment. To understand the long-term effectiveness of SB5-adalimumab in CD, patients switched from originator-adalimumab to SB5-adalimumab were compared with patients remaining on originator-adalimumab over 104 W. METHODS:
Data on patients aged ≥18 years, diagnosed with CD and treated at ISCARE, were collected prospectively from July 2018 to January 2021. Primary outcome: clinical disease activity at W52, measured by Harvey-Bradshaw index (HBI). Secondary outcomes: C-reactive protein (CRP), faecal calprotectin (FC) and adalimumab concentrations at W10, 26, 52 and 104, and treatment persistence. To ensure comparable cohorts, patients were propensity score (PS)-matched for age, gender and disease activity. RESULTS: After matching, 54 patients remained per cohort. At W52, mean (SD) HBI score was 3.2 (2.5) for originator-adalimumab and 4.0 [3.6] for SB5-adalimumab (difference [95% CI] −0.78 [−2.8, 1.3]; n = 18/cohort); no clinically meaningful differences in CRP, FC or drug concentrations were noted. Kaplan–Meier's estimates (95% CI) of remaining on treatment were originator-adalimumab: 0.870 (0.785–0.965) versus SB5-adalimumab: 0.648 (0.533–0.789) at W52 and significantly lower for SB5-adalimumab versus originator-adalimumab (p < .001) over 104 W. Local skin reaction events/pain was the main reason for treatment discontinuation in the SB5-adalimumab cohort (n = 20/54 [37%]). CONCLUSIONS: These long-term results of CD patients receiving originator-adalimumab or following nonmedical switch to SB5-adalimumab show similar therapeutic effects on clinical disease activity, biological parameters and pharmacokinetic profile in both cohorts from 52 to 104 W. A separation in persistence was observed beyond W26, mainly due to differences in local reactions at the injection site.
Permanent Link: http://hdl.handle.net/11104/0330887

0556339 - MÚ 2023 RIV US eng J - Journal Article
Doležal, Martin - Grebík, Jan - Hladký, Jan - Rocha, Israel - Rozhoň, V.
Cut distance identifying graphon parameters over weak* limits.
Journal of Combinatorial Theory. A. Roč. 189, July (2022), č. článku 105615. ISSN 0097-3165. E-ISSN 1096-0899
R&D Projects: GA ČR(CZ) GJ18-01472Y; GA ČR GF17-33849L; GA ČR GJ16-07822Y
Institutional support: RVO:67985840 ; RVO:67985807
Keywords : cut norm * graph limit * graph norms * weak* convergence
OECD category: Pure mathematics
Impact factor: 1.192, year: 2020
Method of publishing: Limited access
https://doi.org/10.1016/j.jcta.2022.105615
DOI: 10.1016/j.jcta.2022.105615

The theory of graphons comes with the so-called cut norm and the derived cut distance. The cut norm is finer than the weak* topology (when considering the predual of L1-functions). Doležal and Hladký ((2019) [13]) showed, that given a sequence of graphons, a cut distance accumulation graphon can be pinpointed in the set of weak* accumulation points as a minimizer of the entropy. Motivated by this, we study graphon parameters with the property that their minimizers or maximizers identify cut distance accumulation points over the set of weak* accumulation points. We call such parameters cut distance identifying. Of particular importance are cut distance identifying parameters coming from homomorphism densities, t(H,·). This concept is closely related to the emerging field of graph norms, and the notions of the step Sidorenko property and the step forcing property introduced by Král', Martins, Pach and Wrochna ((2019) [25]). We prove that a connected graph is weakly norming if and only if it is step Sidorenko, and that if a graph is norming then it is step forcing. Further, we study convexity properties of cut distance identifying graphon parameters, and find a way to identify cut distance limits using spectra of graphons. We also show that continuous cut distance identifying graphon parameters have the <[removed]>, and thus can be used in the proof of the Frieze–Kannan regularity lemma.
Permanent Link: http://hdl.handle.net/11104/0330616

0557328 - ÚI 2023 CZ cze J - Journal Article
Fabián, Zdeněk
Resuscitace momentové metody.
Informační bulletin České statistické společnosti. Roč. 24, 3-4 (2013), s. 27-36. ISSN 1210-8022
Institutional support: RVO:67985807
https://www.statspol.cz/wp-content/uploads/2014/07/IB_3_4_2013.pdf
Permanent Link: http://hdl.handle.net/11104/0331366

0557175 - ÚI 2023 CZ cze J - Journal Article
Fabián, Zdeněk
Nestandardní průzkum/výzkum veřejného mínění. Námět, scénář, jakožto i texty a část hudby spáchal Zdeněk Fabián.
Informační bulletin České statistické společnosti. Roč. 11, Zvláštní číslo (2000), s. 1-40. ISSN 1210-8022
https://www.statspol.cz/oldstat/bulletiny/ib-00-x.pdf
Permanent Link: http://hdl.handle.net/11104/0331243

0556970 - ÚI 2023 CZ cze J - Journal Article
Fabián, Zdeněk
Z Čech až na konec hotovosti.
Informační bulletin České statistické společnosti. Roč. 8, č. 4 (1997), s. 1-28. ISSN 1210-8022
https://www.statspol.cz/oldstat/bulletiny/ib-97-4.pdf
Permanent Link: http://hdl.handle.net/11104/0331088

0557174 - ÚI 2023 CZ cze J - Journal Article
Fabián, Zdeněk
Old good England.
Informační bulletin České statistické společnosti. Roč. 5, Velikonoční příloha (1994), s. 2-12. ISSN 1210-8022
https://www.statspol.cz/oldstat/bulletiny/ib-94-x.pdf
Permanent Link: http://hdl.handle.net/11104/0331242

0556726 - ÚI 2023 RIV CH eng C - Conference Paper (international conference)
Matonoha, Ctirad - Moskovka, A. - Valdman, Jan
Minimization of p-Laplacian via the Finite Element Method in MATLAB.
Large-Scale Scientific Computing. Cham: Springer, 2022 - (Lirkov, I.; Margenov, S.), s. 533-540. Lecture Notes in Computer Science, 13127. ISBN 978-3-030-97548-7. ISSN 0302-9743.
[LSSC 2021: International Conference on Large-Scale Scientific Computations /13./. Sozopol (BG), 07.06.2021-11.06.2021]
R&D Projects: GA MŠk 8J21AT001
Institutional support: RVO:67985807 ; RVO:67985556
Keywords : Finite elements * Energy functional * Trust-region methods * p-Laplace equation * MATLAB code vectorization
OECD category: Pure mathematics
http://dx.doi.org/10.1007/978-3-030-97549-4_61
DOI: 10.1007/978-3-030-97549-4_61
Minimization of energy functionals is based on a discretization by the finite element method and optimization by the trust-region method. A key tool to an efficient implementation is a local evaluation of the approximated gradients together with sparsity of the resulting Hessian matrix. Vectorization concepts are explained for the p-Laplace problem in one and two space-dimensions.
Permanent Link: http://hdl.handle.net/11104/0330880

0556720 - ÚI 2023 RIV CH eng C - Conference Paper (international conference)
Onderka, J. - Ratschan, Stefan
Fast Three-Valued Abstract Bit-Vector Arithmetic.
Verification, Model Checking, and Abstract Interpretation. Cham: Springer, 2022 - (Finkbeiner, B.; Wies, T.), s. 242-262. Lecture Notes on Computer Science, 13182. ISBN 978-3-030-94582-4. ISSN 0302-9743.
[VMCAI 2022: International Conference on Verification, Model Checking, and Abstract Interpretation /23./. Philadelphia (US), 16.01.2022-18.01.2022]
Institutional support: RVO:67985807
Keywords : Formal verification * Three-valued abstraction * Computer arithmetics * Addition and multiplication * Pseudo-Boolean modular inequality
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
http://dx.doi.org/10.1007/978-3-030-94583-1_12
DOI: 10.1007/978-3-030-94583-1_12

Abstraction is one of the most important approaches for reducing the number of states in formal verification. An important abstraction technique is the usage of three-valued logic, extensible to bit-vectors. The best abstract bit-vector results for movement and logical operations can be computed quickly. However, for widely-used arithmetic operations, efficient algorithms for computation of the best possible output have not been known up to now. In this paper, we present new efficient polynomial-time algorithms for abstract addition and multiplication with three-valued bit-vector inputs. These algorithms produce the best possible three-valued bit-vector output and remain fast even with 32-bit inputs. To obtain the algorithms, we devise a novel modular extreme-finding technique via reformulation of the problem using pseudo-Boolean modular inequalities. Using the introduced technique, we construct an algorithm for abstract addition that computes its result in linear time, as well as a worst-case quadratic-time algorithm for abstract multiplication. Finally, we experimentally evaluate the performance of the algorithms, confirming their practical efficiency.
Permanent Link: http://hdl.handle.net/11104/0330868

0556734 - ÚI 2023 RIV US eng C - Conference Paper (international conference)
Orjuela-Cañón, A. D. - Figueroa-Garcia, J.C. - Neruda, Roman
Automated Machine Learning Strategies to Damage Identification of Neurofibromatosis Mutations.
Proceedings of 20th IEEE International Conference on Machine Learning and Applications ICMLA 2021. Piscataway: IEEE, 2021 - (Wani, M.; Sethi, I.; Shi, W.; Qu, G.; Raicu, D.; Jin, R.), s. 1341-1344. ISBN 978-1-6654-4338-8.
[ICMLA 2021: IEEE International Conference on Machine Learning and Applications /20./. Pasadena / Virtual (US), 13.12.2021-16.12.2021]
Institutional support: RVO:67985807
Keywords : automatic machine learning * protein sequence * neurofibromatosis * amino-acids
http://dx.doi.org/10.1109/ICMLA52953.2021.00217
DOI: 10.1109/ICMLA52953.2021.00217
Machine learning tools have been employed for problem solutions in bioinformatics. However, the parameters tuning of these models cam imply additional difficulties around the specific technique used to classify. In this work data from protein sequences was applied to three auto machine learning strategies to determine the type of mutation for the Neurofibromatosis disease. Results show that the parameters in the machine learning models were found automatically. In addition, these tools were relevant to determine relations between the amino-acids in the protein sequence.
Permanent Link: http://hdl.handle.net/11104/0330895

0556710 - ÚI 2023 eng C - Conference Paper (international conference)
Sühring, M. - Resler, Jaroslav - Krč, Pavel
Evaluation of surface processes in the PALM model system 6.0 for a real urban environment: a case study in Dejvice, Prague.
DOI: 10.5194/dach2022-10
Permanent Link: http://hdl.handle.net/11104/0330858

0556781 - ÚI 2023 eng C - Conference Paper (international conference)
Jiřina, Marcel
A Criterion for Sorting Reals in a Linear Time.
[ICICT 2022: International Congress on Information and Communication Technology /7./. London / Virtual (GB), 21.02.2022-24.02.2022]
R&D Projects: GA MŠk LM2015068
Institutional support: RVO:67985807

Keywords : sorting reals * counting sort * time complexity * space complexity

We quantify the practical limits for sorting reals in a linear time. This possibility is assured under assumption on the distribution of the sorting key, mainly the independence and identity of the distribution. Here we give a more general criteria easily applicable in practice. We also show that the algorithm is applicable for data that do not fulfill criteria for linear time complexity but even that the computation is faster than the system quicksort.
Permanent Link: http://hdl.handle.net/11104/0330977

0556968 - ÚI 2023 CZ cze N - Newspaper Article
Fabián, Zdeněk
Proč jezdit na konference.
Vesmír. Roč. 78, č. 6 (1999), s. 349-349. ISSN 0042-4544
https://vesmir.cz/cz/casopis/archiv-casopisu/1999/cislo-6/proc-jezdit-konference.html
Permanent Link: http://hdl.handle.net/11104/0331086

0556969 - ÚI 2023 CZ cze N - Newspaper Article
Fabián, Zdeněk
Poznámka k lidové definici statistiky.
Vesmír. Roč. 77, č. 5 (1998), s. 289-289. ISSN 0042-4544
https://vesmir.cz/cz/casopis/archiv-casopisu/1998/cislo-5/poznamka-k-lidove-definici-statistiky.html
Permanent Link: http://hdl.handle.net/11104/0331087

0556931 - ÚI 2023 NL eng A - Abstract
Stančák, A. - Dostálek, C. - Fabián, Zdeněk
On the dependence of spontaneous eyeblinks upon the phase of respiration.
International Journal of Psychophysiology. Elsevier. Roč. 7, č. 2-4 (1989), s. 398-399. ISSN 0167-8760. E-ISSN 1872-7697
DOI: 10.1016/0167-8760(89)90331-0
Permanent Link: http://hdl.handle.net/11104/0331052

0556933 - ÚI 2023 FR fre A - Abstract
Lepičovská, V. - Fabián, Zdeněk - Dostálek, C.
Short rhythms of the ecg, respiration and the plethysmogram in the course of respiratory exercises.
Journal de physiologie. Roč. 78, č. 5 (1982), A40-A40. ISSN 0021-7948
Permanent Link: http://hdl.handle.net/11104/0331053

0556950 - ÚI 2023 eng A - Abstract
Kathpalia, Aditi - Manshour, Pouya - Paluš, Milan
Ordinal Patterns for 'Compression-Complexity' based Causality Detection.
[ORPATT22: International Workshop on Ordinal methods: Concepts, applications, new developments and challenges. 28.02.2022-04.03.2022, Dresden / Online]
Institutional support: RVO:67985807
https://www.pks.mpg.de/orpatt22
Permanent Link: http://hdl.handle.net/11104/0331067

0556956 - ÚI 2023 CH eng A - Abstract
Kathpalia, Aditi - Nagaraj, N.
Information-theoretic Underpinnings of the Effort-to-Compress Complexity Measure.
IECI 2021 List of accepted submissions. Basel: MDPI, 2021.
[IECI 2021: International Electronic Conference on Information /1./. 01.12.2021-15.12.2021, Basel / Online]
Institutional support: RVO:67985807
Keywords : Effort-to-compress * data compression * self-information * dimension * multifractal analysis
https://sciforum.net/paper/view/11957
DOI: 10.3390/IECI2021-11957
Effort-to-Compress (ETC) is a measure of complexity based on a lossless data-compression algorithm that has been used extensively in characterization and analysis of time-series. ETC has been shown to give good performance for short and noisy time series data and has found applications in the study of cardiovascular dynamics, cognitive research and regulating the feedback of musical instruments. It has also been used to develop causal inference methods for time series data. In this work, a theoretical analysis helps us to demonstrate the links of ETC measure to the total self-information contained in the joint occurrence of most dominant (shortest) patterns occurring at different scales (of time) in a time-series. This formulation helps us to visualize ETC as a dimension like quantity that computes the effective dimension at which patterns in a time-series (translated to a symbolic sequence) appear. We also show that the algorithm that computes ETC can be used as a means for an analysis akin to 'multifractal analysis' using which the power contained in patterns appearing at different scales of the sequence/ series can be estimated. Multifractal analysis has been used widely in analysis of biomedical signals, financial and geophysical data. Our work provides a theoretical understanding of the ETC complexity measure that links it to information theory and opens up more avenues for its meaningful usage and application.
Permanent Link: http://hdl.handle.net/11104/0331073

0556953 - ÚI 2023 IN eng A - Abstract
Kathpalia, Aditi - Nagaraj, N.
Causal Criteria for Synchronization.
CNSD2021 Abstract Book. Thanjavur: SASTRA Deemed University, 2021. s. 66-66.
[CNSD 2021: Conference on Non-linear Systems and Dynamics /13./. 17.12.2021-22.12.2021, Thanjavur]
Institutional support: RVO:67985807
https://www.sastra.edu/cnsd2021/abstract_book.php
Permanent Link: http://hdl.handle.net/11104/0331071

0556951 - ÚI 2023 IN eng A - Abstract
Kathpalia, Aditi - Nagaraj, N.
Measuring the Level of Consciousness in the Brain using Network Connectivity Approaches.
AACS8 Abstract Book. Vidyapeetham: Amrita Mind Brain Center, 2022. s. 62-63.
[ACCS8: Annual Conference of Cognitive Science /8./. 20.01.2022-22.01.2022, Vidyapeetham / Online]
Institutional support: RVO:67985807
https://amrita.edu/wp-content/uploads/2022/01/accs8-proceedings-book.pdf
Permanent Link: http://hdl.handle.net/11104/0331068

0556745 - ÚI 2023 RS eng A - Abstract

Haniková, Zuzana

Vopěnka's Alternative Set Theory within Twentieth Century Mathematics.

The Third Conference of East European Network for Philosophy of Science EENPS 2021: Book of Abstracts. Belgrade: University of Belgrade, Faculty of Philosophy, 2021. s. 163-163.

[EENPS 2021: The Conference of East European Network for Philosophy of Science /3./. 09.06.2021-11.06.2021, Belgrade]

Institutional support: RVO:67985807

https://eenps.weebly.com/uploads/1/3/2/7/132787932/eenps_2021_book_of_abstracts_2_.pdf

Petr Vopěnka presented his Alternative Set Theory (AST) in the monograph, Mathematics in the Alternative Set Theory, published by Teubner Verlag in 1979. Prior to this publication, the AST had been developed for a decade in a research seminar headed by himself and attended by a group of graduate students and collaborators, including Antonín Sochor, Josef Mlček, or Karel Čuda, and these explorations yielded dozens of papers available via the Czech Digital Mathematical Library (dml.cz). As a sidenote, during this decade Vopěnka was prevented from publishing his own work, maintaining international scientific contacts, or developing his career, for political reasons. Vopěnka subsequently published another monograph on the AST in 1989, and offered several papers and lectures that detailed the philosophical and historical motivations for the AST. The latter include the works of Leibniz and Bolzano; as a matter of fact, Vopěnka's interests in various areas of the history of mathematics were quite broad, producing works ranging from geometry to analysis and set theory. However, the AST also has tight links to developments in mathematics in the 20th century, roughly from the 1930's onwards: namely, Skolem's work in nonstandard models of arithmetic, Vopěnka's nonstandard models of set theory, Robinson's nonstandard analysis, Vopěnka and Hájek's work in the theory of semisets, or Parikh's feasible arithmetic. These are only some major mathematical influences; the AST also reflects Vopěnka's growing interest in phenomenology. Moreover, one can find parallel developments that were presumably independent of the AST but share some of its motivations, background, and its timing, such as the axiomatic nonstandard set theories proposed by Nelson and by Hrbáček. This talk will present and discuss the twentieth century mathematical narrative for the AST and demonstrate how the AST can be understood as a natural continuation of the above inspirations and experience.

Permanent Link: http://hdl.handle.net/11104/0330906

0556947 - ÚI 2023 US eng V - Research Report

Harikrishnan, N. B. - Kathpalia, Aditi - Nagaraj, N.

Cause-Effect Preservation and Classification using Neurochaos Learning.

Cornell University, 2022. 13 s. arXiv.org e-Print archive, arXiv:2201.12181.

R&D Projects: GA ČR(CZ) GA19-16066S

Grant - others: AV ČR(CZ) AP1901

Program: Akademická prémie - Praemium Academiae

Institutional support: RVO:67985807

https://arxiv.org/abs/2201.12181v1

DOI: 10.48550/arXiv.2201.12181

Discovering cause-effect from observational data is an important but challenging problem in science and engineering. In this work, a recently proposed brain inspired learning algorithm namely-\emph{Neurochaos Learning} (NL) is used for the classification of cause-effect from simulated data. The data instances used are generated from coupled AR processes, coupled 1D chaotic skew tent maps, coupled 1D chaotic logistic maps and a real-world prey-predator system. The proposed method consistently outperforms a five layer Deep Neural Network architecture for 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 (GC) for coupled AR processes and and Compression-Complexity

Causality (CCC) for coupled chaotic systems and real-world prey-predator dataset. This ability of NL to preserve causality under a chaotic transformation and successfully classify cause and effect time series (including a transfer learning scenario) is highly desirable in causal machine learning applications.
Permanent Link: http://hdl.handle.net/11104/0331065

0556881 - ÚI 2023 CZ eng V - Research Report
Keikha, Vahideh
Large Perimeter Objects Surrounded by a 1.5D Terrain.
Prague: ICS CAS, 2022. 13 s. Technical Report, V-1286.
Institutional support: RVO:67985807
Given is a 1.5D terrain T , i.e., an x-monotone polygonal chain in R2. Our objective is to approximate the largest area or perimeter convex polygon with at most k vertices inside T . For a constant k > 0, we design an FPTAS that efficiently approximates such polygons within a factor (1 − ϱ). For the special case of the´ largest-perimeter contained triangle in T , we design an O(n log n) time exact algorithm that matches the same result for the area measure.
Permanent Link: http://hdl.handle.net/11104/0330996

0556948 - ÚI 2023 US eng V - Research Report
Kathpalia, Aditi - Charantimath, K. P. - Nagaraj, N.
Learning Generalized Causal Structure in Time-series.
Cornell University, 2021. 10 s. arXiv.org e-Print archive, arXiv:2112.03085.
R&D Projects: GA ČR(CZ) GA19-16066S
Grant - others: AV ČR(CZ) AP1901
Program: Akademická prémie - Praemium Academiae
Institutional support: RVO:67985807
https://arxiv.org/abs/2112.03085
DOI: 10.48550/arXiv.2112.03085
The science of causality explains/determines 'cause-effect' relationship between the entities of a system by providing mathematical tools for the purpose. In spite of all the success and widespread applications of machine-learning (ML) algorithms, these algorithms are based on statistical learning alone. Currently, they are nowhere close to 'human-like' intelligence as they fail to answer and learn based on the important "Why?" questions. Hence, researchers are attempting to integrate ML with the science of causality. Among the many causal learning issues encountered by ML, one is that these algorithms are dumb to the temporal order or structure in data. In this work we develop a machine learning pipeline based on a recently proposed 'neurochaos' feature learning technique (ChaosFEX feature extractor), that helps us to learn generalized causal-structure in given time-series data.
Permanent Link: http://hdl.handle.net/11104/0331066

0556750 - ÚI 2023 eng U - Conference, Workshop Arrangement
Durnová, H. - Dušek, J. - Haniková, Zuzana - Paseka, J. - Raclavský, J. - Švandová, B.
Kurt Gödel Day 2021 with Czech Gathering of Logicians 2021.
[Brno, 25.06.2021-26.06.2021(WRD]
Institutional support: RVO:67985807
https://www.physics.muni.cz/~godel/kgd2021/index.php
Permanent Link: http://hdl.handle.net/11104/0330911