0558931 - ÚI 2023 RIV eng J - Journal Article
Khan, K. S. - Munir, A. - Raza, A. - Latif, Yasir - Hensel, O.
Improving Milk Value Chains: A Case Study for Qualitative-Economic Feasibility of Decentralized Solar Milk Pasteurization and Chilling Processes.
Applied Engineering in Agriculture. Roč. 38, č. 2 (409), s. 419. ISSN 0883-8542. E-ISSN 1943-7838
Institutional support: RVO:67985807
Keywords : Milk adulteration * On-farm solar milk processing * Solar milk chiller * Solar milk pasteurizer
OECD category: Agricultural biotechnology and food biotechnology
Method of publishing: Limited access
https://dx.doi.org/10.13031/aea.14805
 DOI: 10.13031/aea.14805
Milk adulteration is common and inevitable which pledges milk quality after processing and lasts in whole supply chain, particularly in least developed countries (LDCs) like Pakistan. The dairy farmers must sell raw milk due to inadequate farm-gate milk processing facilities leading to economic and quality compromises for producers and consumers, respectively. The present study pursues the milk quality and techno-economic analysis of the processed milk (pasteurized and chilled) with indigenously developed Solar Milk Chiller (SMC) and Solar Milk Pasteurizer (SMP) compared to the existing milk value chain.. The processed milk contains fat (5.4%), solid-not-fat (9.1%), salts (0.7%), protein (3.9%), lactose (4.2%), total solids (14.5%), pH (6.85), density (1.031 kg/L), and freezing point (-0.532°C). The results of sensory evaluation using a 9-point hedonic scale showed overall likeness towards solar processed milk in terms of taste, color, aroma, and freshness. The processed milk costs USD 0.003 per liter with extended shelf life and superior in quality compared to locally available open (non-packaged) and packaged milk. With an estimated operational lifespan of 10 years, the payback periods for SMC and SMP have been found to be 1.3 to 4.5 and 1.1 to 2.7 years, respectively, depending upon the alternate source for equivalent energy generation.
Permanent Link: https://hdl.handle.net/11104/0332418

0559395 - NHÚ 2023 RIV GB eng J - Journal Article
Berec, L. - Smyčka, J. - Levínský, René - Hromádková, Eva - Šoltés, Michal - Šlerka, J. - Tuček, V. - Trnka, J. - Šmíd, Martin - Zajíček, Milan - Diviák, T. - Neruda, Roman - Vidnerová, Petra
Delays, masks, the elderly, and schools: first Covid-19 wave in the Czech Republic.
Bulletin of Mathematical Biology. Roč. 84, č. 8 (2022), č. článku 75. ISSN 0092-8240. E-ISSN 1522-9602
R&D Projects: GA MŠk(CZ) EF16_013/0001740
Institutional support: RVO:67985998 ; RVO:67985556 ; RVO:67985807
Keywords : Covid-19 pandemic * non-pharmaceutical interventions * approximate Bayesian computation
OECD category: Demography
Impact factor: 1.758, year: 2020
Method of publishing: Limited access
https://doi.org/10.1007/s11538-022-01031-5
DOI: 10.1007/s11538-022-01031-5

Running across the globe for nearly 2 years, the Covid-19 pandemic keeps demonstrating its strength. Despite a lot of understanding, uncertainty regarding the efficiency of interventions still persists. We developed an age-structured epidemic model parameterized with epidemiological and sociological data for the first Covid-19 wave in the Czech Republic and found that (1) starting the spring 2020 lockdown 4 days earlier might prevent half of the confirmed cases by the end of lockdown period, (2) personal protective measures such as face masks appear more effective than just a realized reduction in social contacts, (3) the strategy of sheltering just the elderly is not at all effective, and (4) leaving schools open is a risky strategy. Despite vaccination programs, evidence-based choice and timing of non-pharmaceutical interventions remains an effective weapon against the Covid-19 pandemic.
Permanent Link: https://hdl.handle.net/11104/0332736

0559056 - ÚI 2023 RIV CZ eng J - Journal Article
Kalina, Jan - Vidnerová, Petra
Least Weighted Squares Quantiles Reveal How Competitiveness Contributes to Tourism Performance.
Finance a úvěr-Czech Journal of Economics and Finance. Roč. 72, č. 2 (2022), s. 150-171. ISSN 0015-1920. E-ISSN 0015-1920
Grant - others: GA ČR(CZ) GA21-19311S
Institutional support: RVO:67985807
Keywords : quantile regression * travel and tourism * robust regression * least weighted squares
OECD category: Statistics and probability
Impact factor: 0.792, year: 2020
Method of publishing: Open access
https://doi.org/10.32065/CJEF.2022.02.03
DOI: 10.32065/CJEF.2022.02.03
Standard regression quantiles, which are commonly used in heteroscedastic regression models, are highly vulnerable with respect to the presence of leverage points in the data. The aim of this paper is to propose a novel robust version of regression quantiles, which are based on the idea to assign weights to individual observations. The novel method denoted as least weighted squares quantiles (LWSQ) is applied to a world tourism dataset, where the number of international arrivals is modeled for 140 countries of the world as a response of 14 pillars (indicators) of the Travel and Tourism Competitiveness Index (TTCI). Here, the economic motivation is to investigate whether tourism competitiveness promotes tourism performance. The data analysis reveals the advantages of LWSQ. Particularly, LWSQ is able to clearly outperform standard regression quantiles in several artificially contaminated versions of the tourism dataset. From the economic point of view, the study determines countries which are not effective in transforming their competitiveness to higher levels of tourist arrivals.
Permanent Link: https://hdl.handle.net/11104/0332474

0559100 - ÚI 2023 RIV DE eng J - Journal Article
Fott, J. - Nedbalová, L. - Brabec, Marek - Kozáková, Radka - Řeháková, Klára - Hejzlar, Josef - Šorf, M. - Vrba, Jaroslav
Light as a Controlling Factor of Winter Phytoplankton in a Monomictic Reservoir.
Limnologica. Roč. 95, July 2022 (2022), č. článku 125995. ISSN 0075-9511. E-ISSN 1873-5851
R&D Projects: GA ČR(CZ) GA15-04034S
Institutional support: RVO:67985807 ; RVO:67985912 ; RVO:60077344
Keywords : Chlorophyll a * CE-QUAL model * PEG model * Ice cover * Climate change * Daphnia
OECD category: Statistics and probability; Ecology (ARU-G)
Impact factor: 2.093, year: 2020
Method of publishing: Limited access

Factors affecting the seasonal succession of plankton communities in freshwater temperate lakes have been thoroughly studied for decades. However, there are still relatively few data describing the winter season patterns in detail, as the focus has been mostly on spring to autumn conditions. Ice cover is often the crucial factor limiting light availability for winter phytoplankton, but in warm monomictic lakes is usually lacking and the gradually increasing solar radiation should, theoretically, drive phytoplankton growth. In this study conducted in 2002–2010, we documented regular sharp increases in phytoplankton chlorophyll a, starting just after the winter solstice and lasting throughout the total circulation and/or unstable inverse stratification period in the monomictic Slapy reservoir (Czechia). Chlorophyll a concentrations analysed in one-week intervals reached their yearly minimum of 0.2–0.8 µg L−1 in the solstice period, and the spring peak occurred before the onset of stable thermal stratification. The regular pattern was slightly disrupted in some years, associated with short periods of ice cover. Winter phytoplankton were species poor and dominated by diatoms, cryptophytes, green algae, and cyanobacteria. Using semiparametric regression approach, we aimed to test if selected environmental parameters had a significant effect on the observed winter trend. The resulting model revealed that solar radiation and water temperature positively influenced log chlorophyll a concentrations, whereas water age had a significant negative effect. On the other hand, zooplankton density and ice cover effects were not significant. The shapes of the marginal effects of water temperature and solar radiation were nonlinear, and the interaction of these two major factors was significant. The model-based estimated chlorophyll a concentrations showed a shift from radiation dominance to temperature-positive effects along the temperature gradient. This might represent as yet neglected pattern of phytoplankton seasonal development in warm monomictic lakes worldwide.
Permanent Link: https://hdl.handle.net/11104/0332519

Kučera, P. - Savický, Petr
Propagation Complete Encodings of Smooth DNNF Theories.
We investigate conjunctive normal form (CNF) encodings of a function represented with a decomposable negation normal form (DNNF). Several encodings of DNNFs and decision diagrams were considered by (Abio et al., 2016). The authors differentiate between encodings which implement consistency or domain consistency by unit propagation from encodings which are unit refutation complete or propagation complete. The difference is that in the former case we do not care about propagation strength of the encoding with respect to the auxiliary variables while in the latter case we treat all variables (the main and the auxiliary ones) in the same way. The currently known encodings of DNNF theories implement domain consistency. Building on these encodings we generalize the result of (Abio et al., 2016) on a propagation complete encoding of decision diagrams and present a propagation complete encoding of a DNNF and its generalization for variables with finite domains.
Permanent Link: https://hdl.handle.net/11104/0332581

0559279 - ÚI 2023 RIV CH eng J - Journal Article
Hůnová, I. - Brabec, Marek - Malý, Marek - Škáchová, H.
Reconstruction of Daily Courses of SO42−, NO3−, NH4+ Concentrations in Precipitation from Cumulative Samples.
Atmosphere. Roč. 13, č. 7 (2022), č. článku 1049. E-ISSN 2073-4433
R&D Projects: GA TA ČR(CZ) SS02030031
Institutional support: RVO:67985807
Keywords : precipitation chemistry * Central Europe * long-term trends * time series * data disaggregation * Bayesian modelling * INLA
OECD category: Statistics and probability
Impact factor: 2.686, year: 2020
Method of publishing: Open access
DOI: 10.3390/atmos13071049

It is important to study precipitation chemistry to comprehend both atmospheric and environmental processes. The aim of this study was the reconstruction of daily concentration patterns of major ions in precipitation from samples exposed for longer and differing time periods. We explored sulphates (SO42−), nitrates (NO3−) and ammonium (NH4+) ions measured in precipitation within a nation-wide atmospheric deposition monitoring network in the Czech Republic during 1980–2020. We visualised the long-term trends at selected individual years for four stations, Praha 4-Libuš (LIB), Svratouch (SVR), Rudolice v Horách (RUD) and Souš (SOU), differing in geographical location and reflecting different environments. We found anticipated time trends reflecting the emission patterns of the precursors, i.e., sharp decreases in SO42−, milder decreases in NO3− and steady states in NH4+ concentrations in precipitation. Statistically significant decreasing time trends in SO42− and NO3− concentrations in precipitation between 1990 and 2015 were revealed for the LIB and SVR sites. Spring maxima in April were found for all major ions at the LIB site and for NO3− for the SVR site, for both past and current samples, whereas no distinct seasonal behaviour was recorded for NH4+ at the RUD and SO42− at the SVR sites. By applying Bayesian modelling and the Integrated Nested Laplace Approximation approach, we were able to reconstruct the daily patterns of SO42−, NO3− and NH4+ concentrations in precipitation, which might be further utilised for a wide range of tasks, including comparison of magnitudes and shapes between stations, grouping the decomposed daily data into the ecologically motivated time periods, as well as for logical checks of sampling and measurement reliability.
Permanent Link: https://hdl.handle.net/11104/0332609

0559478 - ÚI 2023 GB eng J - Journal Article
Bartoš, František - Maier, M. - Wagenmakers, J. E. - Doucouliagos, H. - Stanley, T. D.
Robust Bayesian Meta-Analysis: Model-Averaging Across Complementary Publication Bias Adjustment Methods.
Research Synthesis Methods. Online first, 23 July 2022 (2022). ISSN 1759-2879. E-ISSN 1759-2887
Grant - others: Ministerstvo školství, mládeže a tělovýchovy - GA MŠk(CZ) LM2018140
Institutional support: RVO:67985807
Keywords : Meta-Analysis * Publication Bias * Bayesian Model-Averaging * Selection Models * PET-PEESE
Impact factor: 5.273, year: 2020
Method of publishing: Open access
https://dx.doi.org/10.1002/jrsm.1594
DOI: 10.1002/jrsm.1594

Publication bias is a ubiquitous threat to the validity of meta-analysis and the accumulation of scientific evidence. In order to estimate and counteract the impact of publication bias, multiple methods have been developed; however, recent simulation studies have shown the methods'

performance to depend on the true data generating process, and no method consistently outperforms the others across a wide range of conditions. Unfortunately, when different methods lead to contradicting conclusions, researchers can choose those methods that lead to a desired outcome. To avoid the condition-dependent, all-or-none choice between competing methods and conflicting results, we extend robust Bayesian meta-analysis and model-average across two prominent approaches of adjusting for publication bias: (1) selection models of p-values and (2) models adjusting for small-study effects. The resulting model ensemble weights the estimates and the evidence for the absence/presence of the effect from the competing approaches with the support they receive from the data. Applications, simulations, and comparisons to preregistered, multi-lab replications demonstrate the benefits of Bayesian model-averaging of complementary publication bias adjustment methods.
Permanent Link: https://hdl.handle.net/11104/0332764

Goris, E. - Bílková, Marta - Joosten, J.J. - Mikec, L.
Theory and Application of Labelling Techniques for Interpretability Logics.
The notion of a critical successor [5] in relational semantics has been central to most classic modal completeness proofs in interpretability logics. In this paper we shall work with a more general notion, that of an assuring successor. This will enable more concisely formulated completeness proofs, both with respect to ordinary and generalised Veltman semantics. Due to their interesting theoretical properties, we will devote some space to the study of a particular kind of assuring labels, the so-called full labels and maximal labels. After a general treatment of assuringness, we shall apply it to obtain a completeness result for the modal logic ILP w.r.t. generalised semantics for a restricted class of frames.
Permanent Link: https://hdl.handle.net/11104/0332745

Haniková, Zuzana
Vopěnkova alternativní teorie množin v matematickém kánonu 20. století.
Permanent Link: https://hdl.handle.net/11104/0332480
Kalina, Jan
Model Choice for Regression Models with a Categorical Response.

The multinomial logit model and the cumulative logit model represent two important tools for regression modeling with a categorical response with numerous applications in various fields. First, this paper presents a systematic review of these two models including available tools for model choice (model selection). Then, numerical experiments are presented for two real datasets with an ordinal categorical response. These experiments reveal that a backward model choice procedure by means of hypothesis testing is more effective compared to a procedure based on Akaike information criterion. While the tendency of the backward selection to be superior to Akaike information criterion has recently been justified in linear regression, such a result seems not to have been presented for models with a categorical response. In addition, we report a mistake in VGAM package of R software, which has however no influence on the process of model choice.
Permanent Link: https://hdl.handle.net/11104/0332493

Ferenz, Nicholas - Tedder, A.
Neighbourhood Semantics for Modal Relevant Logics.
In this paper, we investigate neighbourhood semantics for modal extensions of relevant logics. In particular, we combine the neighbourhood interpretation of the relevant implication (and related connectives) with a neighbourhood interpretation of modal operators. We prove completeness for a range of systems and investigate the relations between neighbourhood models and relational models, setting out a range of augmentation conditions for the various relations and operations.
Permanent Link: https://hdl.handle.net/11104/0332494

Haniková, Zuzana
Structural completeness in many-valued logics with rational constants.
Permanent Link: https://hdl.handle.net/11104/0332481

Klaschka, Jan
Vzpomínky na Pepu Tvrdíka (nekrolog).
Permanent Link: https://hdl.handle.net/11104/0332486

0558938 - ÚI 2023 RIV CH eng C - Conference Paper (international conference)
Suchopárová, Gabriela - **Vidnerová, Petra** - **Neruda, Roman** - **Šmíd, Martin**
Using a Deep Neural Network in a Relative Risk Model to Estimate Vaccination Protection for COVID-19.

Engineering Applications of Neural Networks. Cham: Springer, 2022 - (Iliadis, L.; Jayne, C.; Tefas, A.; Pimenidis, E.), s. 310-320. Communications in Computer and Information Science, 1600. ISBN 978-3-031-08222-1. ISSN 1865-0929.
[EANN 2022: International Conference on Engineering Applications of Neural Networks /23./. Chersonissos / Virtual (GR), 17.06.2022-20.06.2022]
Institutional support: RVO:67985807 ; RVO:67985556
Keywords : Deep learning * Risk model * Immunity waning
OECD category: Computer sciences, information science, bioinformathics (hardware development to be 2.2, social aspect to be 5.8)
https://dx.doi.org/10.1007/978-3-031-08223-8_26
DOI: 10.1007/978-3-031-08223-8_26

The proportional hazard Cox model is traditionally used in survival analysis to estimate the effect of several variables on the hazard rate of an event. Recently, neural networks were proposed to improve the flexibility of the Cox model. In this work, we focus on an extension of the Cox model, namely on a non-proportional relative risk model, where the neural network approximates a non-linear time-dependent risk function. We address the issue of the lack of time-varying variables in this model, and to this end, we design a deep neural network model capable of time-varying regression. The target application of our model is the waning of post-vaccination and post-infection immunity in COVID-19. This task setting is challenging due to the presence of multiple time-varying variables and different epidemic intensities at infection times. The advantage of our model is that it enables a fine-grained analysis of risks depending on the time since vaccination and/or infection, all approximated using a single non-linear function. A case study on a data set containing all COVID-19 cases in the Czech Republic until the end of 2021 has been performed. The vaccine effectiveness for different age groups, vaccine types, and the number of doses received was estimated using our model as a function of time. The results are in accordance with previous findings while allowing greater flexibility in the analysis due to a continuous representation of the waning function.
Permanent Link: https://hdl.handle.net/11104/0332424

0559054 - ÚI 2023 eng C - Conference Paper (international conference)
Purgal, S. J. - Cerna, David M. - Kaliszyk, C.
Learning Higher-Order Logic Programs From Failures.
[IJCAI-ECAI 2022: International Joint Conference on Artificial Intelligence and the European Conference on Artificial Intelligence /31. and 25./. Vienna (AT), 23.07.2022-29.07.2022]
Institutional support: RVO:67985807

Learning complex programs through inductive logic programming (ILP) remains a formidable challenge. Existing higher-order enabled ILP systems show im- proved accuracy and learning performance, though remain hampered by the limitations of the underlying learning mechanism. Experimental results show that our extension of the versatile Learning From Failures paradigm by higher-order definitions significantly improves learning performance without the burdensome human guidance required by existing systems. Our theoretical framework captures a class of higher-order definitions preserving soundness of existing subsumption-based pruning methods.
Permanent Link: https://hdl.handle.net/11104/0332473

0559065 - ÚI 2023 CZ eng G - Proceedings (international conference)
Haniková, Zuzana - Švejdar, V. - Wannenburg, Johann Joubert
Czech Gathering of Logicians 2022. Book of Abstracts.
Prague: ICS CAS, UTIA CAS, 2022.
[Czech Gathering of Logicians 2022. Prague (CZ), 16.06.2022-17.06.2022]
Institutional support: RVO:67985807
https://uivty.cs.cas.cz/~clog2022/BookOfAbstracts.pdf
Permanent Link: https://hdl.handle.net/11104/0332483

0559063 - ÚI 2023 eng U - Conference, Workshop Arrangement
Cintula, Petr - Wannenburg, Johann Joubert - Vacková, Kateřina - Grimau, Berta - Haniková, Zuzana
Czech Gathering of Logicians 2022.
[Prague, 16.06.2022-17.06.2022, (K-EUR 21/2)]
Institutional support: RVO:67985807 ; RVO:67985556
https://uivty.cs.cas.cz/~clog2022/BookOfAbstracts.pdf
Czech Gathering of Logicians is an annual regional event that brings together researchers in all areas of logic.
Permanent Link: https://hdl.handle.net/11104/0332482

0559294 - ÚI 2023 eng A - Abstract
Řezníček, Hynek - Geletič, Jan - Bureš, Martin - Krč, Pavel - Resler, Jaroslav
Comparison of LES model (PALM v 6.0) results to the wind-tunnel measurements for neutrally stratified Urban Boundary Layer.
[PANM 21 - Programy a algoritmy numerické matematiky 21 (2022). Jablonec nad Nisou, 19.06.2022]
Method of presentation: Přednáška
Event organizer: Matematický ústav AV ČR, v. v. i
URL events: https://panm21.math.cas.cz/
Grant - others: AV ČR(CZ) StrategieAV21/23
Program: StrategieAV
Institutional support: RVO:67985807
Permanent Link: https://hdl.handle.net/11104/0332628

0559297 - ÚI 2023 cze A - Abstract
Řezníček, Hynek - Geletič, Jan - Bureš, Martin - Resler, Jaroslav - Krč, Pavel
Obyvatelé měst a pocitová teplota: rozdíly z pohled modelu a občana.
[Město jako laboratoř změny: fórum Strategie AV ČR /2./. Praha, 2.6..22. - 2.6..22.]
Grant - others: AV ČR(CZ) StrategieAV21/23
Program: StrategieAV
Institutional support: RVO:67985807
Permanent Link: https://hdl.handle.net/11104/0332630

0559058 - ÚI 2023 eng A - Abstract
Haniková, Zuzana
A case for constants.
[LINZ 2022: inz Seminar on Fuzzy Set Theory /39./. Linz, 07.06.2022]
Method of presentation: Zvaná přednáška
URL events: http://www.flll.jku.at/linz2022/
Institutional support: RVO:67985807
Permanent Link: https://hdl.handle.net/11104/0332478

0559366 - ÚI 2023 US eng V - Research Report
Maršálek, P. - Šanda, Pavel - Bureš, Z.
On the precision of neural computation with interaural time differences in the medial superior olive.
Cornell University: Cornell University, 2022. arXiv.org e-Print archive, arXiv:2007.00524v1.
Keywords : binaural hearing * coincidence detection * ergodic hypothesis * ideal observer * interaural time difference * just noticeable difference * lateral and medial superior olive * neuronal arithmetic * psychophysics * sound localization * spike timing jitter
https://arxiv.org/abs/2007.00524
DOI: 10.48550/arXiv.2007.00524

Incoming sound is in cochlea and auditory nerve encoded into spike trains. At the third neuron of the auditory pathway, spike trains of the left and right sides are processed in brainstem nuclei to yield sound localization information. Two different localization encoding mechanisms are employed in two centers for low and high sound frequencies in the brainstem. The centers are superior olivary nuclei, medial and lateral. This paper contains analytical estimates of parameters needed in description of auditory coding in sound localization neural circuit. Our model spike trains are based on electro-physiological recordings. We arrive to best estimates for neuronal signaling with the use of just noticeable difference of the ideal observer. We describe spike timing jitter and its role in the spike train processing. All parameters are accompanied with detailed estimates of their values and variability. Intervals bounding all the parameter from lower and higher values are discussed.
Permanent Link: https://hdl.handle.net/11104/0332702