Rafal Urbaniak

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Key skills

R tasks and packages

- Bayesian statistics
  STAN, JAGS, BUGS, rethinking, rjags, runjags, BESTmcmc
- Bayesian networks
  bnlearn, gRain
- Discrete data models
  countreg, vcd, vcdExtra, car, MASS
- Time series, dynamic regression, algotrading
  xts, quantmod, tidyquant, TTR, fpp3
- Data wrangling and visualization
  tidyverse, ggplot2, ggpubr

other

- Python
- SQL
- Reproducible research
  R markdown, LaTeX, beamer, Shiny
- Datacamp: 24 courses completed
  130,102xp, 1,536 exercises aced

Selected data science projects

- **Legal Probabilism bayesian networks in R**
  R implementation of **bayesian network methods** for criminal evidence evaluation, based on our work with Marcello Di Bello on the Legal Probabilism entry in the Stanford Encyclopedia of Philosophy
- **Short-term impact of personal attacks on Reddit user activity**
  In cooperation with Samurai Labs, we tracked 148,317 users and identified personal attacks among 182,528 posts and comments using their high precision software. I analyzed the data from three perspectives: (i) **classical statistical methods**, (ii) **Bayesian estimation**, and (iii) **model-theoretic analysis with hurdle and zero-inflated models**. They agree: personal attacks decrease the victims' activity. Results published in *Computers in Human Behavior*
- **Bayesian estimation of multi-class bias in word2vec embeddings**
  We propose **Markov chain Monte Carlo** methods to supersede cosine-distance-based bias measures such as WEAT and argue that the resulting picture is not as clear as it initially might have seemed.
- **Probabilistic coherence measures over bayesian networks**
  Algorithms for calculating main existing coherence measures over bayesian networks, with a new method essentially relying on the causal structure, implemented in R, building on bnlearn, with application to multiple counterexamples to earlier proposals.
- **MC in backtesting of optimized trading strategies**
  Implementation in R of **Monte Carlo methods** for gauging uncertainty in algorithmic trading strategy evaluation. Illustrates how correcting for multiple testing in optimization can undermine claims to significance.

Education

2008 PhD in Logic & Philosophy of Mathematics, University of Calgary

Selected research grants & awards

2022 Bednarowski Trust Fellow, University of Edinburgh
Research project: *Explicating normic support*

2022 Kosciuszko Foundation Fellow, Northeastern University, Boston
Research project: *Epistemological challenges to imprecise probabilism*

2022-2025 Principal Investigator in a National Science Center OPUS project, University of Gdansk
Research project: *Rethinking legal probabilism*

2017-2021 Principal Investigator in a National Science Center SONATA BIS project, University of Gdansk
Research project: *Conceptual, formal and practical aspects of forensic and judicial applications of probabilistic tools*

2012 Trinity College Long Room Hub Visiting Fellow, Trinity College Dublin
Research project: *Mathematical existence, abstraction principles and real number theory*

2011-2012 Visiting Fellow, Benares Hindu University, Varanasi
Research project: *Knowability paradox and Nyaya logic*

2009 British Academy Visiting Fellow, Bristol University
Research project: *Modal reconstructions of mathematical theories*

Positions held

2012-2019 Postdoctoral Fellow of Research Foundation Flanders

2008- Associate Professor, University of Gdansk (with academic leaves)

2005-2008 TA, research assistant, instructor of record, University of Calgary

Academic activities

- **Multiple university courses taught** related to probability, statistical programming and inference
  e.g.: statistical methods in criminology; probability & philosophy of juridical evidence evaluation; uncertainty and R programming; interpretations of probability; decisions, games, and social choice theory; cognitive failures; meta-arithmetic; formal theories of truth; ontology of mathematics, logic I, logic II
- **3 books and ca. 30 research papers** in top academic journals
  e.g.: Stanford Encyclopedia of Philosophy; Computers in Human Behavior; Aggressive Behavior; Review of Symbolic Logic; Law, Probability & Risk; The International Journal of Evidence & Proof, Journal of Applied Logics, Artificial Intelligence and Law
- **30 invited lectures**
  e.g.: University of Oxford, Paris I Panthéon-Sorbonne, University of Edinburgh, Kyoto University, Keio University, Nagoya University, University of Turin
- **13 major research grants and awards**, 15 international conferences organized, referee for 18 journals
- **Research group coordinator** of LoPSE research group (4-7 researchers) since 2013