MARCELL NAGY

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EDUCATION

Budapest University of Technology and Economics, Budapest, Hungary
Doctoral School of Mathematics and Computer Science *2019 - 2023*
PhD in Applied Mathematics

- PhD Thesis: *Classification Problems in Network Science and Higher Education*
- Supervisors: Károly Simon, Roland Molontay

Budapest University of Technology and Economics, Budapest, Hungary *2016 - 2018*
MSc in Applied Mathematics, specializing in Stochastics

- Master's thesis:
  Data-Driven Analysis of Fractality and Other Characteristics of Complex Networks
  Supervisors: Károly Simon, Roland Molontay
- Qualification of diploma: with highest honors (DGPA = 4.87/5)

Budapest University of Technology and Economics, Budapest, Hungary *2013 - 2016*
BSc in Applied Mathematics

- Bachelor's thesis: *Fractal Networks and Assortativity*

WORK & RESEARCH EXPERIENCE

Research Fellow – Semmelweis University *2024 October*
Institute of Biostatistics and Network Science

Fulbright Visiting Student Researcher – Indiana University Bloomington *2022 Spring*
Research topic: network science

Junior researcher – Educational Development Informatics (formerly eKRÉTA) *2021 - Present*
Research topic: educational data science

Deputy team leader – Human & Social Data Science *2020 - Present*
Research topic: network science, educational data science, health data analytics,
and intelligent monitoring & anomaly detection

Young researcher – Higher Education Institutional Excellence Program (FIKP) *2018- Present*
Research topic: Artificial intelligence

Deputy coordinator – BME – Statistics Consulting Group *2017 - 2020*
We offer statistical consulting and provide data science research
and development service to our corporate and academic partners.

Research assistant – University of Debrecen (HU-MATHS-IN) *2018 - 2021*
Research topic: Data-driven analysis of complex networks

Research assistant – BME–Central Academic Office *2018 - 2020*

Research topic: Educational data science

Research assistant – MTA-BME Stochastics Research Group *2017 - 2019*
Research topic: Data-driven network science and fractal networks

Developer – Institute for Computer Science and Control *2017*
Supervisor: Balázs Csanád Csáji. Topic: Machine learning, system identification

TEACHING EXPERIENCE

Laboratory instructor

- Data Analytics (in English)– Budapest University of Technology and Economics (BME) *2020 -*
  RapidMiner & Tableau
- Business Analytics (MBA) – BME (in English)– BME *2020 -*
  RapidMiner, Gephi, & Tableau
- Statistics I. – BME *Spring 2020*
  Excel & R Studio (hypothesis testing, correlation and regression analysis)
- Applied Stochastics (in English) – BME *2019 - 2021*
  Python simulations (network models, random walks, queueing theory, percolation)

Teaching assistant

- Data Science (in English) – Aquincum Institute of Technology (AIT-Budapest) *2019 - Present*
  Assistance in recitation classes and evaluating projects
- Introduction to Data Science I. – BME *2017 - 2020*
  Data visualization tutorial classes using Tableau
  Grader, and student project supervisor

Assistant supervisor

- Individual research project of Bachelor and Master students at BME *2018 - Present*
  Topic: Educational data science
- Summer internship of Master students from ENSAE, Paris *Summer 2019 and 2020*
  Topic: Data science and network science
- Summer internship of Bachelor students from the UK *Summer 2018*
  Topic: Educational data science and network science
- BSc and MSc Theses. Topics: data science and network science *2018 - Present*

CONFERENCES & SCHOOLS

SEFI Annual Conference, Dublin, Ireland *September 2023*
Title of presentation: *Using Machine Learning Methods to Develop Person-Centered Models Predicting STEM Major Choice*

NetSci: International School and Conference on Network Science, Vienna, Austria *July 2023*
Title of presentation: *Towards a better understanding of the characteristics of fractal networks*

SITE 2022: 33rd Annual Conference of the Society for Information Technology and Teacher Education, San Diego, USA *April 2022*
Title of presentation: *Interpretable Dropout Prediction: Towards XAI-Based Personalized Intervention*

Networks 2021: A Joint Sunbelt and NetSci Conference *July 2021*
Title of presentation: *Twenty Years of Network Science: A Bibliographic and Co-Authorship Network Analysis*

The 9th International Conference on Complex Networks and their Applications *December 2020*
Title of presentation: *Data-Driven Analysis of Complex Networks and Their Model-Generated Counterparts*

NetSci-X 2020 International Conference and School on Network Science, Tokyo, Japan *January 2020*
Title of poster: *Comparing Box-Covering Algorithms for Fractal Dimension of Complex Networks*

The 47th European Society of Engineering Education (SEFI) Annual Conference, *September 2019*
Budapest, Hungary

The 2019 IEEE/ACM International Conference on Advances in Social Networks *August 2019*
Analysis and Mining, Vancouver, Canada
Title of presentation: *On the Structural Properties of Social Networks and their Measurement-calibrated Synthetic Counterparts*

1st Conference on Transfer between Mathematics & Industry, *July 2019*
Santiago de Compostela, Spain
Title of poster: *Machine Learning Algorithms for Predicting Academic Performance and Identifying the Contributing Factors*

7th International Conference on Complex Networks and their Applications, *December 2018*
Cambridge, UK

2nd Danube Conference for Higher Education Management, Budapest *November 2018*
Title of presentation: *Predictive Power of Admission Point Score and its Variants on Academic Performance*

INES 2018, 22nd IEEE International Conference on Intelligent Engineering Systems, *June 2018*
Las Palmas, Gran Canaria, Spain
Title of presentation: *Predicting Dropout in Higher Education Based on Secondary School Performance*

PUBLICATIONS

1. Nagy, M., Main, J., Molontay, R., & Griffith, A. (2023). *Using Machine Learning Methods To Develop Person-Centered Models Predicting STEM Major Choice.* In Proceedings of the 51st SEFI Annual Conference.
2. Nagy, M. & Molontay, R. (2023). *Interpretable Dropout Prediction: Towards XAI-Based Personalized Intervention.* International Journal of Artificial Intelligence in Education, 1-27
3. Zakar-Polyák, E., Nagy, M., & Molontay, R. (2023). *Towards a better understanding of the characteristics of fractal networks.* Applied Network Science 8 (1), 17
4. Zakar-Polyák, E., Nagy, M., & Molontay, R. (2023). *Investigating the origins of fractality based on two novel fractal network models.* In Complex Networks XIII: Proceedings of the 13th Conference on Complex Networks, CompleNet 2022 (pp. 43-54).
5. Molontay, R., & Nagy, M. (2022). *How to improve the predictive validity of a composite admission score?* A case study from Hungary. Assessment & Evaluation in Higher Education, 1-19.

6. Kui, B., Pintér, J., Molontay, R., Nagy, M., ... & Hungarian Pancreatic Study Group. (2022). *EASY–APP: An artificial intelligence model and application for early and easy prediction of severity in acute pancreatitis.* Clinical and Translational Medicine, 12(6), e842.
7. Nagy, M., & Molontay, R. (2022). *Network classification-based structural analysis of real networks and their model-generated counterparts.* Network Science, 10(2), 146-169.
8. Kiss, S., Pintér, J., Molontay, R., Nagy, M., ... & Szentesi, A. (2022). *Early prediction of acute necrotizing pancreatitis by artificial intelligence: A prospective cohort-analysis of 2387 cases.* Scientific Reports, 12(1), 7827.
9. Fülöp O, & Nagy, M. (2021). *Teaching Mathematics Online with Increased Empathy in the COVID-19 Pandemic.* Opus et Educatio 8 (3).
10. Kovács, P.T., Molontay, R., & Nagy, M. (2021). *Comparative Analysis of Box-Covering Algorithms for Fractal Networks.* Applied Network Science, Springer.
11. Nagy, M., & Molontay, R. (2021). *Comprehensive analysis of the predictive validity of the university entrance score in Hungary.* Assessment & Evaluation in Higher Education, 1-19.
12. Molontay, R., & Nagy, M. (2021). *Twenty Years of Network Science: A Bibliographic and Co-authorship Network Analysis.* Big Data and Social Media Analytics, 1-24, Springer.
13. Baranyi, M., Nagy, M., & Molontay, R. (2020). *Interpretable Deep Learning for University Dropout Prediction.* In Proceedings of the 21st Annual Conference on Information Technology Education, ACM.
14. Kiss, B., Nagy, M., Molontay, R., & Csabay, B. (2019). *Predicting Dropout Using High School and First-semester Academic Achievement Measures.* In Proceedings of the 17th International Conference on Emerging eLearning Technologies and Applications, pp. 383-389, IEEE.
15. Nagy, M., Molontay, R., & Szabó, M. (2019). *A Web Application for Predicting Academic Performance and Identifying the Contributing Factors.* In Proceedings of the 47th SEFI Annual Conference, pp. 1794-1806.
16. Molontay, R., & Nagy, M. (2019). *Two Decades of Network Science: as seen through the co-authorship network of network scientists.* In Proceedings of The 2019 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, pp. 584-588.
17. Nagy, M., & Molontay, R. (2019). *On the structural properties of social networks and their measurement-calibrated synthetic counterparts.* In Proceedings of the 2019 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, pp. 584-588.
18. Nagy, M., & Molontay, R. (2018). *Predicting Dropout in Higher Education based on Secondary School Performance.* In Proceedings of the 22nd International Conference on Intelligent Engineering Systems, pp. 389-394, IEEE.

RELATED SKILLS

Programming languages	Python, R, Wolfram Language, MATLAB, SQL
Network science packages	networkx, graph-tool, igraph, PyGraphistry
Network science tools	Gephi, Cytoscape, VOSviewer
Data science packages	scikit-learn, pandas, seaborn, matplotlib, numpy, statsmodels, pytorch
Data science tools	Tableau, RapidMiner
Foreign languages	English (full professional working proficiency), German (intermediate proficiency)