Max Springer

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Research Interests

Algorithmic Game Theory, Auction and Mechanism Design,
Fair Allocation, Combinatorics, Machine Learning

Education

University of Maryland — College Park, MD
PhD in Applied Mathematics — August 2020 – Present
MS in Applied Mathematics — Awarded in May 2022
Advisor: Professor MohammadTaghi Hajiaghayi

Cornell University — Ithaca, NY
BA in Mathematics, concentration in Biology — August 2015 – May 2019
Minors in Biological Sciences & Cognitive Science

Accepted Publications

Almost Envy-Free Allocations of Indivisible Goods or Chores with Entitlements
M.T. Hajiaghayi, M. Springer and H. Yami*
38^{th} *AAAI Conference on Artificial Intelligence - February 2024*

Improved Oracle Based Algorithms for Adversarial Contextual Bandits
K. Banihashem, M.T. Hajiaghayi, S. Shin, and M. Springer*
37^{th} *Conference on Neural Information Processing Systems - December 2023*

Fair and Polylog Approximate Low-Cost Hierarchical Clustering
M. Knittel, M. Springer, J. Dickerson, M.T. Hajiaghayi
37^{th} *Conference on Neural Information Processing Systems - December 2023*

Estimating Insulin Sensitivity and Beta-Cell Function from the Oral Glucose Tolerance Test: Validation of a new Insulin Sensitivity and Secretion (ISS) Model
J. Ha, S. Chung, M. Springer, ..., A. Sherman
American Journal of Physiology - December 2023

Generalized Reductions: Making any Hierarchical Clustering Fair and Balanced with Low Cost
M. Knittel, M. Springer, J. Dickerson and M.T. Hajiaghayi
40^{th} *International Conference on Machine Learning (ICML) - July 2023*

Analysis of a Learning Based Algorithm for Budget Pacing
M.T. Hajiaghayi and M. Springer* (arXiv)
22nd AAMAS Conference - May 2023

Optimal Sparse Recovery Using Decision Stumps
K. Banihashem, M.T. Hajiaghayi and M. Springer*
37th AAAI Conference on Artificial Intelligence - February 2023

Online Algorithms for the Santa Claus Problem
M.T. Hajiaghayi, M.R. Khani, D. Panigrahi and M. Springer*
36th Conference on Neural Information Processing Systems - December 2022

A Machine Learning Approach for Predicting Impaired Consciousness in Absence Epilepsy
M. Springer, A. Khalaf, ... and H. Blumenfeld
Annals of Clinical and Translational Neurology (ACTN) - July 2022

The Pulse: Transient fMRI Signal Increases in Subcortical Arousal Systems During Transitions in Attention
R. Li, J.H. Ryu, P. Vincent, M. Springer, ... and H. Blumenfeld
NeuroImage - May 2021

Submitted Papers

Price of Class Fairness in Online Matching
S.C. Jahan, M.T. Hajiaghayi, M. Sharify, S. Shin and M. Springer*
ACM Conference on Economics and Computation (EC) 2024

Dynamic Metric Embedding into ℓ_p Space
K. Banihashem, M.T. Hajiaghayi, D. Kowalski, J, Olkowski and M. Springer*
41st International Conference on Machine Learning (ICML)

Almost Tight Guarantees for Online Nash Social Welfare Maximization
K. Banihashem, M.T. Hajiaghayi, E. Moreno, S. Shin and M. Springer*
41st International Conference on Machine Learning (ICML)

A Nash Equilibrium Approach to Missing Data Imputation
K. Banihashem, M.T. Hajiaghayi and M Springer
41st International Conference on Machine Learning (ICML)

Presentations

EEG and Machine Learning in Prediction of Impaired Responses to Visual Stimuli During Interictal Epileptiform Discharges
75th American Epilepsy Society Meeting - December 2021

* authors appear in alphabetical order

Analysis of a Learning Based Algorithm for Budget Pacing
Facebook Operations Research Workshop - October 2021

A Machine Learning Approach for Classification of Spike-Wave Discharges in Absence Epilepsy
74^{th} *American Epilepsy Society Meeting - December 2020*

Driving Safety in Patients with Generalized SWD but no Clinical Seizures: Evaluation with a Realistic Driving Simulator
73^{rd} *American Epilepsy Society Meeting - December 2019*

Honors and Awards

AI Hub Science Communication Ambassador — February 2023 - Present

AAAS Mass Media Fellowship Semi-Finalist — 2023

Nokia Bell Lab's Outstanding Innovation Award — Summer 2022

Recipient of Aziz / Osborn Gold Medal in Teaching Excellence — 2021 - 2022

Recipient of NSF Graduate Research Fellowship (NSF GRFP) — March 2022

Recipient of University of Maryland Dean's Fellowship — August 2020

Research Experience

Hajiaghayi Research Group — December 2020 – Present
University of Maryland (College Park), Department of Computer Science
Advisor: Professor MohammadTaghi Hajiaghayi
Research focuses on fair division problems and approximate algorithms.

AI Research Lab — May 2022 – August 2022
Nokia Bell Labs
Advisor: Dr. Matthew Andrews
Research focuses on computer vision for automation of industrial monitoring.

Laboratory of Biological Modeling — May 2021 – August 2021
National Institutes of Diabetes and Digestive Kidney Diseases (NIDDK)
Advisor: Dr. Arthur Sherman
Research focuses on analysis of dynamical systems model of Type 2 Diabetes.

Blumenfeld Lab — May 2019 – August 2020
Yale University School of Medicine, Department of Neurology
Advisor: Dr. Hal Blumenfeld
Formulated machine learning classification algorithm for epileptiform discharges from large-scale set of scalp EEG data.

Integrative Cancer Dynamics Unit May 2018 – May 2019
National Cancer Institute, National Institutes of Health
Advisor: Dr. Orit Lavi
Worked on dynamical systems model of cell cycle and tumorgenesis.

Computational Physiology Laboratory January 2017 – January 2018
Cornell University, Department of Neurobiology and Behavior
Advisor: Professor Christiane Linster
Investigated the physiological effects and behavioral role of serotonin within the rodent olfactory bulb.

Teaching experience

Lecturer and Head Teaching Assistant (UMD) Fall 2022
DATA/MSML 602: Principles of Data Science
Presented lectures on various topics concerning Python implementation of data science principles. Devised course assignments and exams.

Graduate Teaching Assistant (UMD) Fall 2021
MATH 140: Calculus I
Held twice weekly recitations for topics covered in lecture. Course topics: Limits continuity, derivatives and applications of the derivative, integration, etc…

Graduate Teaching Assistant (UMD) Spring 2021
MATH 141: Calculus II
Held twice weekly recitations for topics covered in lecture. Course topics: techniques of integration, differential functions, sequences & series, etc…

Graduate Teaching Assistant (UMD) Fall 2020
MATH 135: Mathematics for Life Sciences
Held twice weekly recitations for topics covered in lecture. Course topics: descriptive statistics, probability, discrete time modeling.

Services

External Reviewer
Conferences: ESA ’21, ITCS ’22, AAAI ’22, AISTATS ’22, ICML ’22, NeurIPS ’22, ICML ’23, NeurIPS ’23

Skills

Programming
Proficient in: MATLAB, Python, Java, R.

Languages: English (native), German (advanced), Italian (limited)