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

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)
22^{nd} *AAMAS Conference - May 2023*

Optimal Sparse Recovery Using Decision Stumps
K. Banihashem, M.T. Hajiaghayi and M. Springer*
37^{th} *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*
36^{th} *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

* authors appear in alphabetical order

Submitted Papers

Price of Class Fairness in Online Matching
S.C. Jahan, M.T. Hajiaghayi, M. Sharify, S. Shin and M. Springer*
ACM Symposium on Discrete Algorithms (SODA) 2024

Dynamic Metric Embedding into ℓ_p Space
K. Banihashem, M.T. Hajiaghayi, D. Kowalski, J, Olkowski and M. Springer*
ACM Symposium on Discrete Algorithms (SODA) 2024

Almost Envy-Free Allocations of Indivisible Goods or Chores with Entitlements
M.T. Hajiaghayi, M. Springer and H. Yami*
37^{th} *Conference on Neural Information Processing Systems*

Almost Tight Guarantees for Online Nash Social Welfare Maximization
K. Banihashem, M.T. Hajiaghayi, E. Moreno, S. Shin and M. Springer*
37^{th} *Conference on Neural Information Processing Systems*

A Nash Equilibrium Approach to Missing Data Imputation
K. Banihashem, M.T. Hajiaghayi and M Springer
37^{th} *Conference on Neural Information Processing Systems*

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*

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*

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

Presentations

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

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

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)