Zafeiria (Iro) Moumoulidou

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Research Interests

My research lies at the intersection of ethical, equitable, and responsible data management, with a focus on algorithmic *fairness* and *diversity* in data selection. I study the problem of retrieving representative subsets from large datasets by optimizing diversity objectives subject to fairness constraints. I am particularly interested in applications in Data Visualization & Human Perception, Recommendation Systems & Personalization, and Machine Learning.

Education

University of Massachusetts — Amherst, MA
Ph.D. in Computer Science, GPA: 3.98/4.00 — October 2025

Thesis: "Fair and Diverse Data Selection Schemes for Data Management and Visualization"

Advisor: Prof. Alexandra Meliou

Technical University of Crete — Chania, Greece
Diploma (5-year degree) in Electrical & Computer Engineering, GPA: 8.52/10.00 — August 2018

Thesis: "Dynamic Decision Trees in a Distributed Environment"

Advisors: Prof. Minos Garofalakis, Prof. Antonios Deligiannakis

Research & Academic Experience

University of Massachusetts — Amherst, MA
Research Assistant — September 2018-October 2025

- Research on data diversification and algorithmic fairness. [*work presented at ICDT 2021 & ICDT 2022*]
  - Proposed the Fair Max-Min diversification model, a novel approach for fair and diverse sampling.
  - Fair Max-Min extended Max-Min, a well-established diversification-only model, to support fairness (NP-hard).
  - Designed state-of-the-art algorithms with strong approximation guarantees in general and Euclidean metric spaces for Fair Max-Min.

Advisors: Prof. Andrew McGregor, Prof. Alexandra Meliou

- Research on sampling methods for facilitating visual analytics. [*arXiv pre-print*]
  - Proposed a novel perception-aware sampling method, guided by saliency maps, for scatterplot visualizations.
  - Proposed approximate visualizations and a perception-aware data compression scheme for efficiency purposes.
  - Designed user studies for evaluating the efficacy of the proposed methods.

Advisors: Prof. Cindy Xiong Bearfield, Prof. Alexandra Meliou

Megagon Labs — Mountain View, CA
Research Scientist Intern — June 2021-August 2021

- Research on semantic-type annotation in structured datasets.
  - Curated a novel dataset for semantic type annotation using tabular data extracted from Open Data sources.
  - Designed a crowdsourcing data labeling task using automatically generated labels by leveraging knowledge bases.
  - Evaluated the performance of state-of-the-art learning-based and language models on this dataset.

University of Massachusetts — Amherst, MA
Teaching Assistant — Fall 2021/2024, Spring 2022/2024

– *Research Methods in Empirical Computer Science & Principles of Data Science* with Prof. David Jensen.
– *Database Design and Implementation* with Prof. Yanlei Diao and Prof. Marco Serafini.
– *Practice and Applications of Data Management* with Prof. Alexandra Meliou [*co-taught lectures for 90 students*].

Publications

[1] **Z. Moumoulidou**, A. McGregor, and A. Meliou. Diverse Data Selection under Fairness Constraints. *In 24th International Conference on Database Theory (ICDT 2021)*

[2] R. Addanki, A. McGregor, A. Meliou, and **Z. Moumoulidou***. Improved Approximation and Scalability for Fair Max-Min Diversification. *In 25th International Conference on Database Theory (ICDT 2022)*

[3] **Z. Moumoulidou**, H. Elhamdadi, K. Yang, S. Mitra, C. Xiong Bearfield, and A. Meliou. Perception-aware Sampling for Scatterplot Visualizations. *(under submission)*

* Authors appear in alphabetical order.

Awards & Distinctions

- Dissertation Writing Fellowship, ($15,000) 2025
- Microsoft PhD Fellowship Nominee, (1 of 3 selected by UMass CICS) 2020
- Outstanding Academic Performance Scholarship, *Gerondelis Foundation*, ($5,000) 2019

Professional Service & Outreach

- **External Reviewer:** VLDB 2021 (demonstration track), EDBT 2022 (demonstration track), VLDB 2022-2023, SIGMOD 2022, EDBT 2023
- **Journal Reviewer:** The VLDB Journal 2022, International Journal of Data Science and Analytics
- **Volunteer:** PhD Applicant Support Program at CICS UMass, Undegraduate Research Night

Invited Talks

- University of Utah – Database Seminar September 2024
- Cornell University – Database Seminar April 2023
- Megagon Labs June 2021

Graduate Coursework

- Behavioral and Cognitive Neuroscience, *with Prof. David Moorman & Prof. Lisa Sanders* Spring 2024
- Business Process Optimization, *with Prof. Ahmed Ghoniem* (A) Fall 2022
- Advanced Topics in Natural Language Processing, *with Prof. Brendan O'Connor* (audit) Spring 2021
- Machine Learning, *with Prof. Benjamin Marlin* (A) Fall 2020
- Randomized Algorithms, *with Prof. Andrew McGregor* (A) Spring 2020
- Optimization in Computer Science, *with Prof. Madalina Fiterau* (A) Spring 2020
- Neural Networks: A Modern Introduction, *with Prof. Erik Learned-Miller* (A) Fall 2019
- Advanced Algorithms, *with Prof. Ramesh Sitaraman* (A-) Spring 2019

Technical Skills and Languages

- **Programming Languages:** Python, Java, Matlab/GNU Octave, SQL
- **Libraries & Tools:** Numpy, Pandas, Scikit-learn, PyTorch, Jupyter Notebook, Matplotlib, Latex
- **Languages:** *Greek* (native), *English* (CPE Univ. of Cambridge, ECPE Univ. of Michigan), *Spanish* (Diploma Superior C2, Instituto Cervantes), *German* (Goethe-Zertifikat B2)