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Nil Mamano

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Education

PhD + Masters in Computer Science University of California Irvine, GPA 3.83/4 Dec 2019

- Contributed to the field of Algorithm Design by co-authoring 8 papers on graph algorithms and computational geometry published on peer-reviewed journals/conferences.

B.E. in Computer Science Polytechnic University of Catalonia, Spain, GPA 9.5/10 Jul 2015

- 2nd highest GPA in a cohort of 400+ students.

Skills

Languages: C++, Python, Java, C, HTML5, CSS, Javascript, Typescript, node.js

Tools: Git, Github, Unix command line, Latex

Experience

PhD Graduate Researcher University of California Irvine Sep 2015 – Dec 2019

- Designed a dynamic nearest neighbor data structure for road networks.
  - Can be used to maintain a set of moving "drivers" and match clients to the closest driver as they appear.
  - Leveraged the structure of road networks to decompose them into subregions using graph separator techniques, improving the runtime per operation from $O(n)$ to $O(\sqrt{n})$.
  - Java implementation that scales to statewide networks with 100000+ edges.
- Proved that a class of problems in computational geometry can be solved faster than was previously known (in asymptotic terms), including routing and matching problems.
  - Proved new results about when Greedy algorithms work. Used this to design more efficient algorithms.
  - For instance, improved the runtime of the multi-fragment algorithm for Euclidean TSP from $O(n^2)$ to $O(n \log n)$.
- Started & led a research project where we invented a new algorithm for the knight's tour problem, and coded an interactive visualizer in Javascript.
- Designed efficient algorithms for a variant of Voronoi diagrams that allow clustering geometric data into clusters of prescribed sizes.
  - An application is anti-gerrymandering districting: designed and implemented in Java an algorithm for partitioning a geographic region into balanced and compact districts.
  - Implemented an interactive visualizer in Javascript and a standalone application in C++ and OpenGL.
- Implemented algorithms in Python for embedding hidden "watermarks" in large graphs by hiding information in the structure of the graphs, allowing companies to share data encoded as graphs such as social networks without fear of it being leaked by 3rd parties.
- Learned HTML and CSS to build a personal website showcasing my research.

Undergrad Visiting Researcher University of California Irvine Feb – Jul 2015

- Developed SANA, a network alignment algorithm in C++ for Protein-protein interaction networks that aids in transferring biological knowledge across species. Outperformed the state-of-the-art algorithms in a fraction of the time. The project has 30+ collaborators on Github and our paper got 30+ citations in 2 years.

Research Intern Polytechnic University of Catalonia, Spain Jan – Oct 2014

- Contributed to RACSO, a free online judge (automatic grading tool) for compiler and automata theory courses.
  - Coded an interpreter (in C++) for a C-like language used by the students to write their solutions.
  - Prepared 70+ online exercises, and exams taken by 100+ students.

Teaching Assistant University of California Irvine 2017 – 2018

- 100+ discussions in large classrooms explaining algorithms, graph theory, and complexity theory, with excellent student evaluations.
- Improved the students' experience and reduced the grading load by adopting an online automatic grader, and led a study with 150+ students to evaluate its effectiveness.
- Volunteered to give guest lectures at UCI and Pomona College.

Selected publications

Full list: scholar.google.com/citations?user=LIuligEAAAAJ

- "Euclidean TSP, Motorcycle Graphs, and Other New Applications of Nearest-Neighbor Chains" N. Mamano, A. Efrat, D. Eppstein, D. Frishberg, M.T. Goodrich, S. Kobourov, P. Matias, V. Polishchuk, ISAAC 2019
- "Stable-Matching Voronoi Diagrams: Combinatorial Complexity and Algorithms" G. Barequet, D. Eppstein, M. T. Goodrich, and N. Mamano, ICALP 2018
- "Reactive Proximity Data Structures for Graphs" D. Eppstein, M.T. Goodrich, and N. Mamano, LATIN 2018
- "SANA: Simulated Annealing far outperforms many other search algorithms for biological network alignment" N. Mamano and W. Hayes, Bioinformatics: Oxford Journals 2017