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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 Algorithms by co-authoring 8 peer-reviewed papers on graph algorithms and computational geometry.

B.E. in Computer Science   Polytechnic University of Catalonia, GPA 9.5/10   Jul 2015
- 2nd highest GPA in a cohort of 400+ students.

Skills

Languages: C++, Python, Java, C, HTML, CSS, Javascript, Typescript, Bash.   **Tools:** Git, Github, Linux, Oracle Grid Engine.

Experience

PhD Graduate Researcher   University of California Irvine   Sep 2015 – Dec 2019
- Proved that a class of Greedy algorithms can be distributed/parallelized, and used that to design faster algorithms even in a sequential setting. Example: improved the multi-fragment algorithm for Euclidean TSP from $O(n^2)$ to $O(n \log n)$ time.
- Designed a dynamic nearest neighbor data structure for road networks that allows to maintain a set of moving "drivers" and match clients to the closest driver as they appear.
  - Leveraged the structure of road maps to decompose them into subregions, improving the query runtime from $O(n)$ to $O(\sqrt{n})$.
  - Java implementation that scales to statewide networks with 100000+ edges.
- Started & led a project where we invented a new algorithm for the knight's tour problem. Built an interactive visualizer in Javascript.
- Designed efficient algorithms for a variant of Voronoi Diagrams that allows to cluster data into clusters of prescribed sizes.
  - Used it in an automatic districting algorithm (in Java) that partitions a geographic region into compact and equal-population districts to prevent gerrymandering.
  - Implemented an interactive visualizer in Javascript and a standalone application in C++ and OpenGL.
- Implemented an algorithm 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 the risk of it being leaked.

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 leading algorithms in a fraction of the time. Ran large-scale experiments in a computing cluster to fine-tune the algorithm. 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.
  - Built an interpreter (in C++) for a C-like language used by the students to write their solutions, following TDD.
  - 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.
- Championed the use of online automatic graders to improve the students' experience and reduce the grading load, and led a study with 100+ students to evaluate their effectiveness.

Selected publications

- "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