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Nil Mamano

Education

PhD + Masters in Computer Science   University of California Irvine, GPA 3.83/4 — Sep 2015 – Dec 2019

B.E. in Computer Science   Polytechnic University of Catalonia, GPA 3.8/4 — Sep 2011 – 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

University of California Irvine

PhD Graduate Researcher   Sep 2015 – Dec 2019

Contributed to the field of Algorithms by co-authoring 8 peer-reviewed papers spanning graph algorithms, Greedy algorithms, data structures, and computational geometry. Selected results:

  – Proved that a class of Greedy algorithms can be distributed/parallelized, and used that to design faster algorithms even in the 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 an optimal algorithm for the knight tour problem. Built an interactive display in Javascript.

  – Designed efficient algorithms for a variant of Voronoi Diagrams that allows to cluster data into clusters of prescribed sizes.
    – Built an interactive application in C++ and OpenGL to visualize and benchmark the algorithms.
    – Published a paper on its application to anti-gerrymandering districting: it can partition a geographic region into compact and equal-population districts.

Undergrad Visiting Researcher   Feb 2015 – Jul 2015

Created SANA, a network alignment software in C++ for protein-protein interaction networks that aids in predicting the function of proteins. 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.

Teaching Assistant   Jan 2017 – Dec 2018

100+ discussions in large classrooms explaining algorithms, graph theory, and complexity theory, with excellent student evaluations. Championed the use of online automated grading to provide immediate feedback to the students and reduce the grading load. Led a study with 100+ students to evaluate their effectiveness.

Polytechnic University of Catalonia

Research Intern   Jan 2014 – Oct 2014

Contributed to RACSO, a free online judge (automated 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 Test-driven development.

Selected projects

  – Built an efficient in-memory key-value Cache that supports timeouts, using templates and C++17 features. It implements Redis' algorithm to remove expired entries and has an LRU eviction mechanism.

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