David Zeng

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COMPUTER SCIENCE PHD APPLICANT

RESEARCH INTERESTS

Algorithmic Game Theory, Complexity, Approximation Algorithms, Optimization, Machine Learning

EDUCATION

CARNEGIE MELLON UNIVERSITY | BS in Computer Science, Minor in Machine Learning

Expected May 2019 | Pittsburgh, PA
Dean's List (All Semesters) • GPA: 3.97 / 4.00

RESEARCH EXPERIENCE

DYNAMIC FAIR DIVISION WITH INDIVISIBLE ITEMS

Ariel Procaccia, Alex Psomas | Poster | Report
Jan 2018 - Present

- Worked on designing algorithms and proving lower bounds for fair division of indivisible items in an online setting.
- See link to poster for up to date results and report for details for some of the results.

PROJECTS

LEARNING IN MULTI-AGENT GAMES | Github | Paper

- Worked on reinforcement learning approach to learning approximate Nash Equilibrium in imperfect information multi-agent games.
- Implemented and evaluated different replay memory variants for training stability.

VISUAL CONVERSATIONAL AGENT | Poster | Paper

- Worked on models for the visual dialog dataset. The dataset consisted of images, questions, and dialog histories. We focused on discriminative models for selecting the best response to a question given the image and dialog history.
- Incorporated multimodal fusion techniques and similarity metrics into existing models and investigated resulting performance.

PARALLEL SHORTEST PATHS | Github | Report

- Implemented and optimized Δ-stepping, a parallel shortest paths algorithm, using **C++** and **OpenMP**.
- Achieved up to **7.76x** speedup (on 16 threads) over optimized sequential algorithm when testing on real world network graphs.

SIMD INTEGER COMPRESSION FOR GRAPH ALGORITHMS | Github | Report

- Used SIMD parallelism to speed up encoding and decoding of compressed graphs for use in common graph algorithms.
- Implemented Gamma coding and benchmarked compression size on both real world and generated graphs

TEACHING EXPERIENCE

GREAT IDEAS IN THEORETICAL COMPUTER SCIENCE | Teaching Assistant

Aug 2017 - Present | Pittsburgh, PA

MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE | Teaching Assistant

Aug 2016 - Dec 2016 | Pittsburgh, PA

INDUSTRY EXPERIENCE

TWO SIGMA INVESTMENTS | Software Engineering Intern - Trading Engineering
May 2018 – Aug 2018 | New York, NY

- Built liveness monitoring and anomaly detection system (alerts and dashboard) for live trade execution data in **Scala**. Processed millions of rows of data per day.
- Used historical data to investigate different anomaly detection methods and generate anomaly thresholds. Worked in **Spark** and **pandas**.

ADDEPAR | Software Engineering Intern - Data Engineering
May 2017 – Aug 2017 | Mountain View, CA

- Wrote data ingestion service to parse events from corporate actions feed and match events to securities. Wrote internal **Java** library for building regex to extract data from sentences.
- Updated security master to model data for multiple listings of a single security. Set up DB migration and data re-ingestion to support updates. Worked in **Java** and **MySQL**.

LEANPLUM | Software Engineering Intern
May 2016 – Aug 2016 | San Francisco, CA

- Rewrote user permissions system, adding more granularity and customization. Built new frontend permission management interface using **AngularJS** and **Python**

ACTIVITIES

CARNEGIE MELLON SOLAR RACING | Optimization Team Lead
Sep 2015 - May 2018 | CMSR

- Designed a new system of sensors to monitor power and propulsion system of a 18 ft long racing boat.
- Integrated with Android application that formats and displays data to driver.

AWARDS
CMU Quantathon First Place (2017, 2018)
TartanHacks Student Impact Prize (2017)
Putnam Top 500 (2015, 2016, 2017)
ACM ICPC Regionals 10th (2015), 13th (2016), 12th (2017)
USA Computing Olympiad Finalist (2014)

RELEVANT COURSEWORK
Machine Learning
(11777) Multimodal Machine Learning (Graduate)
(10703) Deep Reinforcement Learning (Graduate)
(10701) Introduction to Machine Learning (Graduate)
Theory
(15855) Computational Complexity Theory (Graduate)
(15850) Advanced Algorithms (Graduate)
(15483) Truth Justice and Algorithms
(15751) A Theorist's Toolkit (Graduate)
(15853) Algorithms in the Real World (Graduate)