Basel Mostafa

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EDUCATION

California Institute of Technology — Pasadena, CA
Bachelor of Science in Computer Science; GPA: 4.2 — Sep. 2019 – Mar. 2023

EXPERIENCE

Meta — Menlo Park, CA
SWE Intern - BI Commerce Products Integrity Team (CPI Team) — Jun. 2022 – Sep. 2022

- Worked on content moderation infrastructure for commerce content (e.g. product postings, ads), including:
  - Enhancing logs to store more comprehensive info about why product reviews were triggered.
  - Building a pipeline to trigger product reviews based on user interaction with dynamic ads. Estimated the new reviews to be 3x more effective at reducing policy violations shown to users.
  - Identifying and addressing deficiencies in the review-triggering framework, including:
    1. Optimizing compute and storage utilization - reduced load on the system bottleneck by up to 3x.
    2. Improving the system architecture to allow fast tuning - increased iteration speed from daily to hourly.
    3. Fixing a concurrency bug to allow reliable detection of review trigger conditions - over 200% more reviews were scheduled on-time, keeping reviews in sync with user activity.
- Wrote code in Python, SQL, and Hack (a dialect of PHP).

Amazon Web Services — Seattle, WA
SDE Intern - Web Application Firewall Team (WAF Team) — Jun. 2021 – Sep. 2021

- Implemented threat-detection procedures for HTTP request headers and cookies as Nginx add-ons written in C. The header inspection procedure is used in the Log4JRCE rule for detecting Log4j vulnerability exploits.
- Wrote Java and C++ to incorporate the new features into the WAF infrastructure (e.g. checksums, canaries, ...).

The Cosmic Dawn Center — Copenhagen, Denmark
Undergraduate Research Fellow — Jun. 2020 – Sep. 2020

- Investigated the implications of adding a temperature-like parameter called T_{IMF} to models of galaxy formation.
- Built an automated data pipeline for fitting T_{IMF} to a catalog of galaxies, revising the estimates of various galaxy properties based on the new T_{IMF} fits, and analyzing and visualizing the effects on the star-forming main sequence
- Featured publications: Implications of a Temperature-dependent Initial Mass Function. I. II. III.

PROJECTS

- **Assassery:** Collaborated with a colleague to build a website for automatically administering a game of assassins at my university residence (Backend: Django REST framework, Frontend: React-Redux).

- **Pintos Virtual Memory:** Implemented the virtual memory abstraction used by the Pintos instructional OS.

- **TeenyBASIC Compiler:** Compiles a simplified version of BASIC in $O(n)$ time on the parse tree size, optimized to pre-evaluate constant expressions, replace multiplication with bit shifts where possible, and maximize register use.

- **DAMMIT:** Collaborated in a team of three using git to create a top-down monster survival game using JavaFX. Used OOP principles of inheritance and polymorphism to build a consistent and intuitive software architecture.

- **Python Rubik's Cube Solver:** 2x2x2 Rubik's Cube solver implements a brute force algorithm which considers up to 2 billion times fewer states compared to naive BFS. 3x3x3 Rubik's Cube solver implements a corners first algorithm.

- **Covid-19 Vaccine Efficacy Model:** Collaborated in a team of four to analyze vaccine efficacy for multiple variants using ML. Constructed a LSTM-VAR ensemble model for predicting the future prevalence of each variant from vaccination rates and auxiliary factors. Achieved an out-of-sample MAE of 0.08 for the alpha variant.

PROGRAMMING SKILLS

- **Courses:** Distributed Computing, Relational Databases, Operating Systems, Compilers, ML and Data Mining

- **Languages:** [Proficient] Python, C/C++, Java, OCaml, R, SQL   [Basic] HTML/CSS, JavaScript

- **Tools and Technologies:** Linux, Git, VS Code, AWS, Protocol Buffers, Nginx, CI/CD

- **Frameworks:** Django REST Framework, React.js, Redux, NumPy, Pandas, Matplotlib, Scikit-learn, PyTorch, Keras