Jacob Oaks

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EXPERIENCE

Associate Software Engineer (2022) / Intern (2020-2021)

Jan 2020 – Present

Carnegie Mellon University Software Engineering Institute

- **A Series of Unlikely Events (Inverse Reinforcement Learning)**
  - Created interactive web application (found here) using HTML, CSS, and React, demonstrating applicability of project's ML algorithm. This demo continues to be shown to internal and external parties and, ultimately leading to over $100,000 of funding thus far.
    - Visualized results of algorithm in intuitive spatial manner by using react-map-gl (a Mapbox wrapper for React) to display satellite imagery and DeckGL to overlay various data layers on the imagery, facilitating high levels of understanding and engagement.
    - Collaborated with design expert to create UI that feels responsive, natural, on-brand, increasing accessibility and interest.
    - Implemented half a dozen layers, keeping UX in mind by including concise functionality descriptions, using a colorblind-accessible pallet, and using multi-threading to provide smooth animations of multiple UI elements.
- **Knowing When You Don't Know (Uncertainty Quantification)**
  - Adapted an existing Python probabilistic object detection codebase towards our project's goals.
    - Built general data pipeline, enabling team to train models using field-specific data, increasing customer engagement during demonstrations.
    - Implemented metrics of direct concern to project, allowing team to select models with higher performance, a KPI for the project.
    - Crafted connective tissue between outputs of this codebase and a stakeholder-facing demo application, allowing more frequent and higher quality demonstrations to garner funding and collaboration.
  - Developed system in Python to generate and run ML pipelines, serving as the engine for extensive experimentation that led to a publication at ICLR (top ML conference) – a project KPI.
    - Created system to compile YAML-based DSL for ML into DAG workflows, automating the tediousness of experimentation and reducing completion time by a factor of three.
    - Automated artifact management with custom hash-based check-in/out system for artifacts, improving team collaboration by eliminating duplicate work and enabling intra-team artifact passing.
    - Built tooling using Pandas and Matplotlib to automate large-scale analysis and visualization of results, allowing for agile experimentation and halving time required to acquire key artifacts for our publication.
    - Optimized dataset-specific pre-processing procedures for over a dozen datasets of interest separately, allowing for the wide scope of experiments that led to acceptance of our publication.

EDUCATION

University of Pittsburgh

BS: Computer Science | **GPA**: 3.81 | Dec 2021

Courses: Computer Graphics, OS, Algorithms, Formal Methods, Web Programming, ML, Data Science, Systems Software, Assembly Language, Computer Organization, Data Structures, Software QA

SKILLS

Proficient: Python, Java
Familiar: C/C++, JavaScript, HTML, CSS, SQL, GLSL, Swift, Visual Basic
Python Libraries: PyTorch, NumPy, Pandas, Matplotlib, Flask
Other Libraries: OpenGL, Junit, React
Tools: Git, Docker, Jupyter, Bash

PERSONAL PROJECTS

Spacedust (Code | Demo)

Feb 2021 – May 2021

- Android game built with OpenGL ES, with custom joystick, shaders, physics, and UI element implementations.

Ambulare (Code | Demo)

Feb 2021 – May 2021

- Side-scrolling game engine built upon LWJGL featuring custom components such as physics, shaders, UI/UX design.
- Custom serialization format and data loading process provides direct support for custom user content.

GeoArt (Code)

Mar 2019

- iOS app for Steelhacks 2019 generates pieces of artwork derived from unique latitude/longitude location of the device.
- Won second place.