Carlo Velarde

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Education

University of Iowa Aug. 2022 – Present
B.S. Computer Science *GPA 3.73*

- **Coursework:** Data Structures, Algorithms, Software Development, Programming Languages, Web Application Development, Networks, Computer Organization
- **Activities:** ACM, The Navigators

Experience

Research Intern NSF REU May 2024 – August 2024
New Mexico Tech *Socorro, NM*

- Researched the effectiveness and limitations of popular LLMs such as GPT and Gemini at obfuscating code.
- Tested the ability of LLM's to produce similar embeddings for functionally equivalent obfuscations using the models corresponding API and PyTorch.
- Utilized similarity algorithms to compare the proximity of normal and obfuscated code in the latent space and visualized the results to identify patterns and outliers.
- Created a dataset of over 2000 code samples which featured the normal and obfuscated code, text similarity scores, embedding similarity scores, and other significant relations.

IT Assistant August 2021 – August 2022
Mesilla Valley Christian School *Las Cruces, NM*

- Worked directly under the lead information technician on campus.
- Worked with desktops, routers, switches, printers, projectors, and other technologies.
- Led a team of 3 to properly set up over 150 computers and devices in classrooms each summer.
- Worked closely with over 20 staff and faculty to diagnose and solve technical issues.
- Took and maintained inventory of over 200 computers around campus on Excel spreadsheets.

Projects

Park Finder | *JavaScript, FastAPI, MongoDB, Beanie ODM, Bootstrap*

- Developed a fullstack web application that aggregates content for all parks under the National Park Service.
- Created 15 RESTful API endpoints using FastAPI in Python.
- Utilized the NPS API to populate the MongoDB database with over 450 parks.
- Implemented CRUD operations which allow users to interact with content and manage uploads.
- Integrated JWT-based authentication to manage user sessions, access control, and privileges.

Obfuscate Pro | *Python, PyTorch, Google Genai, Pandas*

- Developed an AI-powered tool for code obfuscation, embedding generation, similarity analysis, and table building using Google's Gemini as the backend model.
- Generates naming, dead code, or control flow obfuscations based on code given by the user.
- Simplified CSV file creation by abstracting Pandas and focusing table creation on embeddings, similarity statistics, and other data relations.
- Utilized an object oriented approach for abstraction and reusability, allowing users to set up quickly.

Wireless Sensor Network (WARP) | *Java, JUnit 5, JavaDoc, UML*

- Worked on an existing Java codebase that tracked the flows of a wireless sensor network.
- Employed Object-Oriented principles, especially in class design and inheritance, to encourage code reuse.
- Wrote 40+ JUnit test for new and existing functions to ensure code correctness.
- Implemented 2 classes to help visualize flow latency through charts and a graphical user interface.
- Generated JavaDocs to document method and class definitions.
- Created UML class and sequence diagrams to visualize the system architecture.

Technical Skills

Languages: Python, Java, C++, JavaScript
Frameworks: React, FastAPI, PyTorch, JUnit, Pytest, Bootstrap
Technologies and Methodologies: MongoDB, Git, Unix, VirtualBox, Agile, Waterfall, SDLC, HTML, CSS