Alex Fernandez

Computer Scientist

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About me

Research & Development Engineer at Ansys, where I'm developing PyAnsys open source initiative. I loved the machine learning and computer vision subjects during my bachelor's degree, so I decided to specialize on it with a master's degree. Passionate about all sciences.

Skills overview

Software engineering

- I mostly program in **Python** and **C++** (3 years work experience), and some **Golang**. I'm experienced in **object oriented programming**, so I'm comfortable in any language that uses this paradigm. I've implemented plenty of **REST** services, using **OpenAPI** for the specification, **Flask** framework in Python, and **Boost** in C++.
- I've continuously been using **Git** since the start of my career, with Github and Gitlab, to organize and maintain my code, and to properly collaborate with others. I've implemented **Github Workflows** for the continous integration and continuous delivery of my projects, as well as some open source **Github Actions**. Also, I've worked plenty with **Docker** to containerize my applications for easier deployment.
- To sustain code quality in the projects I participate in, I use extensive code testing, through **PyTest** and **Google test** frameworks. Also I participate in **code reviews** to ensure code quality, both as reviewer and reviewee.

Machine Learning and computer vision

- I'm working on several language processing projects, where I use **OpenAI Azure**, **Ollama** and **HuggingFace**, for RAG based applications for coding helpers.
- I've worked with **OpenCV** and different **deep learning** approaches for **real time object detection and classification**.

Work history

R&D Software Engineer @ Ansys, Remote (November 2022 - Currently)

Main developer of plotting features across PyAnsys open source organization

- Engineered a unified plotting interface library for PyAnsys ecosystem to achieve the seamless integration of different plotting backends.

- Created the open source project pytest-pyvista, a plugin for pytest, to perform regression tests with the output plots. This plugin is a crucial component that ensures the continued reliability and maintenance of PyVista applications.
- Development of plotting features inside the PyAnsys libraries.
- Provide ongoing support and assistance to PyAnsys developers seeking to incorporate PyVista and advanced plotting capabilities into their respective libraries.

Research and development of large language models technologies

- Development of an internal service in Golang to concurrently manage access from several client to several text generation providers, a robust and high-availability system capable of seamlessly handling hundreds of simultaneous calls, enhancing overall system reliability and performance.
- Development of C++ clients for the aforementioned LLM service.
- Developed an innovative experimental tool for PyAnsys-specific code generation utilizing OpenAI API, Hugging Face, and other NLP-focused libraries. Containerized the tool using Docker, facilitating easy deployment and scalability. This groundbreaking experimentation served as a catalyst for larger-scale projects, laying the groundwork for future innovations in code generation within the PyAnsys ecosystem.
- Deployment of large language models services. Setup of remote machines environments for LLMs by using Docker and Nvidia setup.
- Continuous research on the state of the art of large language models and its associated technologies and integrations.

Development and maintenance of open source PyAnsys libraries

- Development and maintainment of PyAnsys Geometry. Implemented enhancements based on valuable client feedback, bolstering its plotter capabilities and improving user experience.
- Development and maintenance of PyPrimeMesh. Strengthened PyPrimeMesh's reliability and maintainability by introducing comprehensive unit testing and integrating CI/CD pipelines on GitHub.
- Development of github actions to improve maintainability and reliability of the PyAnsys ecosystem.
- Offered expert technical reviews for proposed new PyAnsys libraries intended for open-source release, ensuring adherence to best practices and compatibility with existing ecosystem standards.

Computer Vision Engineer @ CTAG, Remote (August 2021 - October 2022)

Developed scalable software project for concurrent image processing in C++

- Engineered a scalable software project enabling concurrent execution of image processing modules, enhancing processing speed and efficiency, as well as the memory safety of the system.

Implemented generic CAN bus communications for image processing modules in C++

- Designed and implemented generic CAN bus communications for image processing modules, improving interoperability and commu- nication reliability across systems.

Development of object detection models for embedded devices

- Conducted a research on the state of the art of deep learning models for edge devices, as well as a research on the state of the art for automotive datasets.
- Achieved the integration of custom trained object detection models tailored for embedded devices, in different devices, such as Nvidia Jetson TX2, Intel Movidius and Google coral, achieved by converting the developed model from PyTorch to ONNX and from ONNX to different frameworks, such as OpenVINO, TensorRT Tensorflow. Real time usage was achieved in most of the devices.
- Conducted thorough benchmarking of a deep learning model on different embedded devices, optimizing device selection and best use for different resource-constrained environments.

Promoted good programming practices within the team

- Introduced and championed good programming practices, including unit testing and linter usage, fostering a culture of code quality and collaboration within the team.

Machine Learning Engineer Internship @ ITG, A Coruna (October 2018 - January 2019)

- Development of regression models for water consumption prediction in a public building.
- Research, data collection and development of a regression problem about power generation prediction in wind parks.

Education

International Master's degree in Computer Vision @ Universities of Porto, Santiago, Vigo and A Coruna

- Master's Extraordinary Award for academic excellence.
- Master's Thesis - Object Detection in Embedded Systems: A Study on Deep Learning Approaches (92% qualification).

Bachelor's degree in Computer Science @ University of A Coruna

- Bachelor's thesis - Analysis, design and implementation of machine learning models: prediction using sensoric data from trawling vessels (90% Qualification).