Calos Lira

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Education

Universidad Nacional Autónoma de México — Expected graduation date august 2022
BS Data Science — *Mexico City, Mexico*

Technical Skills

Python: Numpy, SciPy, Pandas, Scikit Learn, Keras, PyTorch, Beautiful Soup
Databases: SQL (Postgres)
C++: CUDA, OpenFrameworks
Web Development: Heroku, Flask, Bootstrap
Work Flow: GitHub, Overleaf, Google Colab, VS Code

Experience

Intern — June-July 2016
Centro Conjunto de Investigación en Química Sustentable UAEM-UNAM — *State of Mexico, Mexico*

- Nanoparticle classification from electron microscope images.
- Nanoparticle sample creation for electron microscope.

Projects

Covid-19 Tracker | *Heroku, Flask, HighCharts, pyGitHub, Pandas*

- Web app that provides daily updates about COVID-19 for over 150 countries.
- Several charts available for each country.
- Custom API, data merged from different sources with automatic daily updates by server.

Boat detection using satellite images | *PyTorch, Scikit Learn, Pandas, Kaggle*

- Convolutional Neural Network image classification using LeNet-5 architecture.
- More than $40,000$ images from San Francisco Bay Area.
- Model with 97% precision on validation data.

Magnetic Pendulum simulation. Paralelization using CUDA | *CUDA, C++ Threads*
A magnetic pendulum is a chaotic system, one way to describe such a system involves solving a differential equation for every point in a $n \times n$ grid.

- Problem paralelization using two methods: Nvidia's API CUDA (GPU) and C++ threads (CPU).
- Reduced time complexity from $O(n^2)$ in CPU to $O(1)$ in GPU.

Schrödinger equation numerical solution. The double slit experiment | *C++, OpenFrameworks*
The double slit experiment challenges our intuition about how particles behave at a subatomic level. For this project I decided to use Schrödinger equation to simulate such experiment in a $n \times n$ grid.

- Implementation of RK4 Algorithm to solve 2D Schrödinger equation.
- Reduced time complexity from $O(n^6)$ using naive approach to $O(n^3)$.
- Program generated interference pattern similar to experimental one.

Academic Achivements

Contestant — June 2016
XXVI Mexico National Contest of Physics Experiments — *Mexico City, Mexico*

First Place — August 2016
XXVII State of Mexico Physics Olympiad — *State of Mexico, Mexico*

Languages

English C1 - TOEFL iBT 99/120
Spanish Native