Rayane Tayache

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Education

University of Strasbourg Strasbourg, FR
Bachelor of Science, Computer Science and Engineering | GPA: 12.04/20 | Top 15% *Expected June 2024*

- Related Coursework: Data Structure and Algorithms, Oriented Object Programming, Web Applications, Computer Architecture, Development techniques, Discrete Mathematics, Advanced Calculus, Linear Algebra and Economics.
- Activities: HackThe6ix, //Slash Hack, HackaTUM, GitHub Field Day London and Unistr'Hack.

Indian Institute of Technology, Bombay Mumbai, IN
Bachelor of Technology, Computer Science and Engineering | Semester Exchange *July 2023 - May 2024*

- Exchange semesters with the following subjects: Machine Learning, Operating Systems, Database and Managment Systems, Blockchain and Smart Contracts, Probability, Derivative Pricing, Numerical Analysis and Real Analysis.

Experience

ML Researcher Intern | National Center for Scientific Research - CNRS May 2023 – July 2023
Learning Signed Distance Function of a parametric human model, supervised by Pr. Hyewon Seo *Strasbourg, FR*

- Designed a Multilayer Perceptron model architecture to reconstruct a 3D Skinned Multi-Person Linear Model utilizing Signed Distance Functions optimizing by **230%** the runtime compared to the SMPL papers algorithm.
- Implemented the model using Pytorch, and enhanced the performance and portability of the model with ONNX. Visualized the accuracy with MatplotLib and performance on reconstructing the 3D Mesh using Blender.
- Enhanced representation and precision model's ability in reconstructing complex shapes by **31%** using Gaussian Fourier features mapping technique which renders state of the art 3D human model reconstruction with NN.
- Built a specialized algorithm for dataset generation, efficiently producing **15 Million** training and testing data tailored to meet the specific requirements of the model leveraging PyTorch's GPU computation efficiency.

Projects & Awards

P2P Blockchain Network Simulation | *C++, Graphviz* March 2024 – Present

- Developed a discrete-event simulator for a P2P cryptocurrency network, including transaction generation, network topology setup, latency simulation, and PoW consensus mechanism inspired by bitcoin.
- Implemented a loop-less transaction forwarding system and ensured resolution of forks to maintain the longest chain in the blockchain. Conducted experiments with varying parameters and utilized visualization tools to analyze blockchain dynamics, including the impact of different adversary mining powers on block mining ratios.
- Simulated a double selfish mining attack, implementing the steps and analyzing the success rate based on varying conditions. Achieved faster simulation times, outperforming 98% of other student simulators, attributed to its efficient optimized function and cpp language implementations.

SigmaZero [**Technical Report** | **Code**] | *C++, Boost, Python3, PyTorch, Numpy* November 2023 – Present
Reinforcement Learning Based Chess Engine. *Mumbai, IN*

- Led experimental initiatives to advance the capabilities of a chess-playing AI model, with a focus on optimizing performance and refining learning efficiency, drawing inspiration from past work such as AlphaZero
- Orchastrated the seamless integration of an advanced neural network architecture, featuring a deep convolutional block, policy head, and value head. Pioneered adaptive enhancements to Monte Carlo Tree Search steps, infusing the algorithm with a dynamic neural network for real-time move prediction during simulations.
- Implemented training strategies, enhancing the model's pattern recognition, legal move identification, and strategic positioning. Integrated an interactive platform (GUI), enabling users to play against the trained chess engine.

Technical Skills

Languages: Python (Advanced), C (Advanced), C++ (Intermediate), JavaScript, Haskell, Bash, SQL.
Framework/Tools: Pytorch, NumPy, Flask, React, PostgreSQL, MongoDB, NodeJS, TailwindCSS, Git, Docker, Agile
Human Languages: English (Fluent), French (Native), German (Intermediate)

Leadership & Interests

- Co-organizer of IIT Bombay Symposium RISC'24 & Co-organiser of the unConference *GitHub Field Day* Berlin '22
- I enjoy Running (10k and Semi), Skiing, playing Football, Travelling, Competitive Programming and Chess (∼1100 elo)