Nguyen Minh Duc

EDUCATION

VNUHCM-University of Science — Ho Chi Minh City, VN
Bachelors of Science – Honor Program in Physics — *Sep. 2024 – June 2028*

EXPERIENCE

Quantum Lab @ VNU-HCM — Dec. 2024– Present
Research Assistant — *Quantum Computing, Machine Learning*
- Apply Quantum Machine Learning to solve problems.
- Speed up solving process by running in parallel using C++.

PROJECTS

Vietnamese OCR — Ongoing
- Synthesize high-quality image dataset for training using various augmentation.
- Make an open model integrate language model and OCR specialize in Vietnamese and English.

Wordle Solver Using Reinforcement Learning [Project] — Sep 2024
RL, Python
- Using transfer learning from 10 words and progressively expanded to 100 words and the full 2,315 words.
- Faced long training times as the action space increased, achieving 25% accuracy on 100 words (compared to 6% random guessing).
- Proposed solutions to improve learning efficiency, including structured action choices and incremental training.

Train GPT-2 with TPU [Project] — Aug. 2024
Pytorch, GPU, TPU
- Reproduced the GPT-2 124M based on GPT-2 and GPT-3 paper on Kaggle.
- Implemented gradient accumulation, distributed data parallel (GPU and TPU), half-precision, and flash attention.
- Sped up training by 33 times compared to GPU T4 x2 using TPU, BF16, and some other TPU optimization.
- Surpassed GPT-2 result with validation loss 3.2754 over 3.2924 and HellaSwag evaluation 0.2962 over 0.294463.

Confined Quantum Random Walk [Project], [Report] — July 2024
MaSSP - Math and Science Summer Program — *Math, Physics, Python*
- Explored quantum random walks (QRWs) using the Creutz ladder model, a quantum lattice structure with localization properties.
- Conducted numerical simulations that confirmed the analytical results, showing zero probability of the particle moving beyond the confined range.
- Visualized the QRW on the Creutz ladder, observing recurring patterns in particle location probability over time.

AWARDS

Top 2% of users on Kattis Problem Archive — Feb. 2024
- Solved numerous advanced algorithmic challenges across domain including data structures, dynamic programming and graph theory.

Sacombank Scholarship — Sep. 2023
- Award presented to students with outstanding achievements in academics, leadership, and community service.

Fourth place - Young Informatics Contest of Dong Nai Province - Informatics Olympiad — June 2023
Third place - Dong Nai Province Olympiad in Informatics - Informatics Olympiad — Feb. 2022

SKILLS & INTERESTS

Programming: C, C++, Python
Libraries: Pytorch, Numpy, Pandas, Scikit-learn
Languages: English, Vietnamese

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