Hongjia Huang

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EDUCATION

New York University Shanghai Shanghai, China 09/2022 – present

Double Majoring in Computer Science and Mathematics

- Overall GPA: **3.938** / 4.0 (CS Major GPA: **4.0**/4.0; Math Major GPA: **4.0**/4.0)
- Research Interest: **Computer Vision, AI for science, and Multimodal Machine Learning**
- Core Course: NLP (Graduate-Level), Machine Learning, Parallel Computing, Algorithms and Data Structure; Linear and None Linear Optimization, ODE (Honor), Analysis (Honor), Probability&Statistics
- Programming: Proficient in Python; familiar with C++/C; PyTorch, OpenMP, MPI, CUDA and Latex

Awards and Honors

Deans' Undergraduate Research Found (22-23), Dean's Honor List (22-23, 23-24), Recognition Award (23-24)

RESEARCH

Bi-directional Diffusion Model with Information Conservation 12/2023 – present

Independent Research; Supervised by Prof. Shengjie Wang(NYUSH) and Prof.Tianyi Zhou(UMD)

- Aimed to achieve the conservation of information in the process of generating text and images for world model environment via diffusion model.
- Implemented Data Distributed Parallel to make the model run on multiple GPUs
- Applied text diffusion models such as Diffuseq in the Text-to-Image generation process
- Acquired a better image encoder by pretraining it with a diffusion model to reconstruct images

Machine Learning for Small Molecular Forcefield 06/2024 – present

Independent Research; Supervised by Prof. Shengjie Wang(NYUSH) and Prof.Tianyi Zhou(UMD)

- Implemented code for molecular dynamic simulation with mixed precision, submodular function-based selection on representative molecules to run high-precision calculations.
- Tried to leverage between the forcefield learned by the Gemnet model and the commonly used molecular forcefield with cost-aware training
- Tried to acquire a generalized forcefield for small molecules

Popularity Prediction of YouTube Videos 06/2023 – 09/2023

Summer Research; Supervised by Prof. Xianbin Gu, NYUSH

- Applied action recognition model SlowFast to acquire action labels for our model
- Used Bert Encoder to convert sequences of action labels into high-dimensional feature vectors
- Trained an MLP layer that takes visual features and the first seven days' views of the videos as input to predict the total views of the video after 30 days

SELECTED PROJECT

Cost-aware finetuning on LM to perform Chemical Reaction Prediction 11/2024

Final Project for Natural Language Processing with Representation Learning

- Finetuning pretrained Bart-based models in chemical reaction prediction efficiently
- Constructed USPTO50K_ γ, a dataset that contains LLM-generated predictions and experiment data, saving resources in the data collection stage.
- Applied various finetuning methods on the LM, especially implementing a simple LoRA finetuning code, saving resources in the finetuning stage.

Audio Recognition 05/2024

Final Project of Machine Learning

- Achieved the **highest** score in the competition leaderboard
- Used Spleeter to separate vocal and instrumental components of music
- Converted music into mel spectrogram and tried out various computer vision models to perform classification

Image Recognition 11/2023

Self-Oriented Project for Stanford CS231n

- Implemented the ResNet in PyTorch, and achieved 90% accuracy in the CIFAR10 dataset
- Applied HPC Clusters to perform computationally demanding jobs
- Used a self-implemented Mixup function to perform data augmentation
- Updated the learning rate in the process of training using Cosine annealing