



Vedant Bhasin

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Carnegie Mellon University

Master of Science in Electrical & Computer Engineering

AI/ML Systems Concentration [CGPA: 3.92/4.00]

Coursework: LLM Systems, Distributed Systems, Multimodal Machine Learning, Advanced Natural Language Processing

December 2024

Pittsburgh, PA

Carnegie Mellon University

Bachelor of Science in Electrical & Computer Engineering

Software Systems Concentration [CGPA: 3.39/4.00]

Dean's List Fall '19, Fall '22

Coursework: Deep Reinforcement Learning & Control, Introduction to Deep Learning, Introduction to Machine Learning

May 2023

Pittsburgh, PA

SKILLS

Programming Languages: Python, C/C++, CUDA, Java, JavaScript, HTML/CSS, SQL

Libraries and Frameworks: PyTorch, Tensorflow, Scikit-Learn, Pandas, NumPy, Seaborn, Django

Cloud technologies: AWS, GCP, Azure, Docker, Kubernetes

PROJECTS

MiniTorch

January 2024

CUDA, C++, Python, Deep Learning Systems, Shared Memory Management, Kernel Fusion

- Implemented a lightweight deep-learning framework incorporating features such as reverse mode auto differentiation, tensor operations, and a custom CUDA backend.
- Optimized performance using techniques such as coalesced memory access, shared memory tiling, & kernel fusion.

Fine Grained Image Grounding for Visual Abductive Reasoning

December 2023

PyTorch, Computer Vision, Multimodal Machine Learning, Contrastive Learning

- Collaborated with a team of two other researchers to address the task of Visual Abductive Reasoning (VAR) in vision-language models. VAR refers to the task of making the most plausible inference about an image region with incomplete information.
- Pioneered a method that incorporates scene graph information of the image with no modification to the model architecture.
- Led the development of a fine-tuning pipeline using PyTorch, enabling the enhancement of BLIP2 models with an InfoNCE contrastive loss for improved performance, Improving P@1 scores by 15.6% and 3.9% over scene graph and image-only models.

Attention-based Automatic Speech Recognition

January 2023

PyTorch, Speech Recognition, Multi Head Self Attention, Autoregressive Generation

- Devised an end-to-end speech-to-text model based on Listen-Attend-Spell architecture to transcribe speech, using MFCC coefficients from the LibriSpeech dataset.
- Implemented scaled dot product attention from scratch. Incorporated data augmentation techniques such as time and frequency masking in addition to regularization techniques such as weight tying, locked dropout, and weight decay.
- Designed a custom teacher-forcing schedule to boost the performance of the auto-regressive decoder module.
- Achieved a promising Levenshtein distance of 9.54 on the test set.

Face Classification and Verification with CNNs

December 2022

PyTorch, Computer Vision, Model Architecture, Regularization, Contrastive Learning

- Performed ablation studies with MobileNetV2, ResNet-50, and ConvNeXt for facial recognition on the VGG Face 2 dataset.
- Experimented with different deep metric learning approaches such as ArcFace loss, triplet margin loss, and circle loss to maximize verification accuracy. Independently implemented ArcFace loss using the research paper as a reference.
- Implemented data augmentation techniques, including Random Augment, Random Perspective, and Random Erasing to mitigate overfitting. Applied regularization methods, including label smoothing, stochastic depth, and weight decay.
- The model correctly classified a satisfactory 92.83% of faces during testing.

EXPERIENCE

Carnegie Mellon University, Language Technologies Institute

January 2023 - May 2023

Teaching Assistant - Deep Learning

Pittsburgh, PA

- Teaching Assistant for Carnegie Mellon University's flagship deep learning course with Professor Bhiksha Raj.
- Lead TA for two of the four major projects in the course; responsible for preparing data sets, developing starter notebooks, and conducting experiments to discover high-performing architectures and optimization specifications.
- Leading recitations and lectures on Vision Transformers, Deep Reinforcement Learning, and project workflow fundamentals.

Axaitech

July 2022 - August 2022

AI & Data Science Intern

Cape Town, South Africa

- Developed a random forest classifier to distinguish between 11 different cancer types using gene expression data.
- Utilized feature selection techniques such as Mean Absolute Deviation, Recursive Feature Elimination, and Random Forest Feature Importance to reduce the number of features from 58,440 to 20 while maintaining a classification accuracy above 95%.
- Prototyped, evaluated, and optimized different models using Scikit-Learn and PyTorch; fine tuned hyper-parameters through random grid search. Attained a classification accuracy of 95.20%.