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WORK INTERESTS

Speech Recognition, Large Language Models (LLMs), Natural Language Processing (NLP), Computer Vision, Deep Learning, Machine Learning, Back-end with Python

WORK EXPERIENCE

ALTERSENSE.

ML Engineer & Team Lead

August 2024 to present

- Developed a surveillance application to **monitor individuals, track assigned tasks, and analyze engagement time** for performance insights.
- Designed & implemented a data pipeline for real-time streaming and fed streaming data into machine learning models for inference using **Apache Kafka**.

Next Solution Lab

AI Engineer

April 2022 to August 2024

- Led a team in **Contract LLM** (local LLM) project that successfully trained **domain adaptation, fine-tuning** on Contract Document based on **LLaMA-2-7b** model.
- Implemented **RAG** (Retrieval Augmented Generation) **on top of fine-tuned LLMs**.
- Developed **ASR** (Automatic Speech Recognition) with **3.91%** Word Error Rate.
- Led a team in an **OCR** project, achieving **3.5% accuracy** boost, and optimizing execution run **time by 33%** approximately.
- **Analyzed requirements and problems, developed, and optimized** deep learning models.
- Collaborated with **cross-functional** teams to create end-to-end pipelines.
- Ensured the **reliability & performance efficiency** of AI solutions.
- AI product containerization using **Docker** for deployment.
- Developed **Named Entity Recognition** system for **Japanese and English** language.
- Developed **document sequence classification**.
- Analyzing data and model output to **refine models** further.
- Designed and developed proof-of-concept using **NLP** techniques.
- **Explored new technologies** to enhance performance or replace existing ones.
- Improved post-processing pipeline to enhance OCR accuracy by **2.81%** approximately.

AI Engineer(Associate)

April 2021 to March 2022

- Developed data augmentation and text recognition pipeline.
- Developed data processing and test automation.
- Developed detection post-processing pipeline to enhance OCR accuracy **4.65%** approximately.

Semantics Lab

AI Researcher & Developer

February 2019 to March 2020

- Conducted research & developed deep learning and image processing algorithms for object detection and recognition.
- Assisted senior team members by implementing requested tasks.

TECHNICAL SKILLS

- **Languages** : Python(expert), C++(fluent), Java(prior experience), SQL(prior experience), Bash(familiar)
- **Agentic Systems** : MCP, RAG, LangChain, LangGraph, LLM Orchestration
- **ML/DL Framework** : Tensorflow, Keras, PyTorch, spaCy, Scikit Learn, NLTK
- **ML/DL Library** : Transformers, OpenCV, Numpy, Pandas, Seaborn, Matplotlib, SciPy, GloVe, Gensim
- **Workflow Automation** : Kafka
- **GPU-Aware Development** : CUDA Toolkit, NVIDIA Drivers, TensorRT, ONNX, Hardware Specific PyTorch/TensorFlow GPU builds

- **Development Tools** : Git, VS Code, Jupyter Notebook, Jupyter Lab
- **Web Development** : Django, Flask
- **DevOps** : Docker, Kubernetes, GitHub Actions
- **Scraping Tools** : Selenium, BeautifulSoup
- **Cloud Technology** : AWS lambda, EC2, Local Server Deployment
- **Miscellaneous** : Prompt Engineering, Fine-tuning, LLM Domain Adaptation, Hyperparameter Tuning

PROJECT EXPERIENCE

- **Contract Language Model (Contract LLM)**

Description : Contract LLM is an advanced system designed to directly query and analyze contract documents, significantly reducing the need for manual effort. Utilizing cutting-edge techniques in natural language processing (NLP), including **Transformer models** like **Llama2**, **Domain Adaptation**, **Fine-tuning**, and **RAG**, Contract LLM excels at understanding and processing complex legal language with exceptional accuracy and reliability.

Technologies Used : Transformers, PEFT, SFT, RAG

- **Automatic Speech Recognition (ASR) Bangla**

Link : <https://github.com/hassanaliemon/BanglaASR>

Description : Developed an advanced Bangla speech-to-text system capable of automatically converting audio recordings into Text without manual intervention. Leveraged cutting-edge deep learning techniques including **Transformer Encoder, Decoder** with the combination of **CNN**. Achieved a **Word Error Rate of 14.73** on Whisper Small model on decent amount of data.

Technologies Used : Transformer, Pytorch, Numpy.

- **Optical Character Recognition**

Description : Convert an image to an editable document removing human manual effort. The system can analyze different layouts of documents and extract data from those documents. I used **CNN, GRU, LSTM, CTC-Loss, Mask-RCNN, and Relevent Deep Learning** algorithms to solve **OCR** problems. I have also used several **morphological image processing** which helped to boost the model performance further. Final OCR model was **99.87 %** accurate on font data.

Technologies Used : Django, Tensorflow, Keras, OpenCV, Numpy.

- **Named Entity Recognition**

Description : Extract Entities along with their respective values to retrieve meaningful information from the document leveraging **NLP** techniques. I used **spaCy, Transformer** to solve **NER** problem alongside rule-based program to further furnish model's output. Final NER model has **97.29 %** accuracy on our selected test dataset.

Technologies Used : spaCy, Transformers, BERT, Numpy.

- **Safe Driving**

Description : Safe driving is a system that ensure driving safety. It is an AI-based system that can capture video of a driver and can predict whether the driver is sleeping or snooze or in a normal position. According to this prediction, it generates some alert for driver safety. I learnt **OpenPose** and **transfer learning** techniques. I was a newcomer then and my role is to help the team leader with anything they asks. Our team role is to find a facial landmark using OpenPose and classify this feature using **InceptionV3 pre-train** model.

Technologies Used : Python, Tensorflow, OpenCV, PyQt.

- **Attendance System Using Face Recognition**

Description : Implement a face recognition system in an IP camera. It can identify multiple faces from the image and assign a name to the corresponding face. This system also can handle an unknown face. In the backend, we also have a database where all the information is saved. I learn **dlib, MTCNN** for cropping the face from image and **facenet**, for identifying face.

Technologies Used : Python, Tensorflow, OpenCV, Facenet

- **Final Year Thesis**

Project Title : Action Recognition using RPCA and Attention

Developing a deep learning model that can understand human action in the given video. I used **RPCA** to remove the background, **YOLO** to detect objects within the frame, **CNN** to extract features, and state-of-the-art **Attention mechanism** to focus on the movement area to increase the accuracy. I learned Convolution, activation functions, various image features like spatial, temporal, spectral feature, loss function, model accuracy, model metrics.

Technologies Used : Python, Tensorflow, OpenCV, Attention mechanism, GRU, PCA, YOLO, Numpy, Matplotlib

CAREER OBJECTIVE

Dedicated and innovative Senior AI/Machine Learning Engineer with a Bachelor of Science in Computer Science & Engineering and around 5 years of experience in the software industry. Proven expertise in developing and implementing advanced machine learning models and algorithms to solve complex business problems. Adept at collaborating with cross-functional teams, conducting experiments, and staying updated with the latest advancements in AI and machine learning.

ACADEMIC DETAILS

| Qualification | Dept. / Group | Institute | Passing Year | Result |
|----------------------|--------------------------------|---------------------------------------|---------------------|---------------|
| B.Sc(Engg.) | Computer Science & Engineering | Begum Rokeya University, Rangpur | 2017 | 3.18 |
| H.S.C | Science | Dinajpur Government College, Dinajpur | 2012 | 4.50 |
| S.S.C | Science | Dinajpur High School, Dinajpur | 2010 | 5.00 |