Shirshajit Sen Gupta

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LinkedIn — Portfolio — GitHub

EDUCATION

Bachelor of Computing, Computer Science | National University of Singapore, GPA: 4.11 May 2025

- 2nd Major in Mathematics, Minor in German
- Teaching Assistant: IT5005 Artificial Intelligence, DBA5101 Analytics in Managerial Economics

Courses:

Algorithms (Java), Computer Vision (Python), Big Data for Databases (Spark, Hadoop), Software Product Engineering for Digital Markets (Next.js, Django, AWS), Advanced Natural Language Processing (Graduate), Sound and Music Computing

SKILLS

Proficient: Python, PyTorch, Scikit-learn, HuggingFace, React, Django, Flutter, Firebase, PostgreSQL, Git, NLP, Reinforcement Learning, Graph Neural Networks, PyTorch-Geometric, Transformers

Familiar: TensorFlow, C++, TypeScript, OpenCV, MongoDB, Docker, Figma, Agile Methodologies, AWS, JavaScript

EXPERIENCE

Undergraduate Researcher (Final Year Project) | National University of Singapore Aug 2024 – Apr 2024

- Designed an extractive question answering system *using* a pipeline of **constituency parsing**, **knowledge graph enrichment**, and **heterogeneous graph transformers**
- Developed and trained a graph-based QA architecture combining **Graph Attention Transformers**, modified **DistMult**, and **BERT**, improving entity reasoning on **SQuAD 2.0**

Data Science Intern | Procter & Gamble May 2023 – Dec 2023

- Designed an optimization strategy for media budget allocation *using* **non-linear optimization**, reducing plan costs by **2%**
- Composed and fine-tuned a conversational chatbot for media execution *using* **OpenAI**, **LangChain**, and **Chainlit**, streamlining scenario workflows by **60%**
- Engineered prompt templates *using* **structured constraints**, enabling multi-condition media plan generation

***Junior Deep Learning Researcher* | Gaze** Feb 2020 – Jan 2021

- Developed a facial spoof detection system for GazePass using adversarial training and **Bi-Directional Feature Pyramid Networks**, improving presentation attack robustness **by 35%**
- Optimized embedded deployment performance *using* **teacher-student neural distillation** reducing inference load
- Spearheaded an **Optical Character Recognition (OCR)** pipeline for the Bangladesh National ID recognition system

PROJECTS

Real-Time Streaming Piano Transcription System Dec 2024

- Built a low-latency piano transcriber *using* a **4×-downsampled ZipFormer** encoder, achieving **<320ms end-to-end latency** and low-overhead streaming on consumer hardware
- Designed **real-time audio I/O inference** pipeline using **Librosa**, and **TorchAudio** for live pitch-to-note prediction

3D Segmentation Task Manager (OmniCAT) | *National Dental Centre Singapore* Dec 2024

- Built a comprehensive annotation workflow *using* **Django**, **React**, **TypeScript**, and **AWS**, enabling **10× throughput** in volumetric segmentation tasks
- Integrated **3D U-Net**-based dental structure inference *using* **PyTorch3D**, optimizing mesh labeling and processing latency

LLM Detector (FastDetectGPT++) Apr 2024

- Identified LLM-generated text from LLMs such **as GPT-2, Pythia-1.4, and MPT-1.3B** by extending **FastDetectGPT** with entropy-aware discriminators and statistical token variance features, achieving **+1% over SOTA** across mixed LLM inputs

Multiclass Threat Detector (ThreatVision) Apr 2023

- Built a multi-class object detector *using* a modified binary **Bi-FPN** backbone adding **ResNet-styled skip connections** and **Fourier spectral augmentation**, achieving the top unfiltered-dataset score in cohort

PUBLICATIONS

MHASAN: Multi-Head Angular Self Attention Network for Spoof Detection | **International Conference on Pattern Recognition (ICPR), 2022**

- Proposed a novel spoof detection model *using* **multi-head angular self-attention**, improving resistance to presentation attacks on facial recognition systems

***Bi-FPNFAS: Bi-Directional Feature Pyramid Network for Pixel-Wise Face Anti-Spoofing by Leveraging Fourier Spectra* | Sensors, 2021**

- Enhanced pixel-wise spoof detection *using* a **Bi-Directional Feature Pyramid Network (Bi-FPN)** and **Fourier spectral inputs**, improving cross-illumination generalization

***A-DeepPixBis: Attentional Angular Margin for Face Anti-Spoofing* | Digital Image Computing: Techniques and Applications (DICTA), 2020**

- Introduced an **attentional angular margin loss** function into face anti-spoofing pipelines, boosting accuracy on cross-domain datasets with limited training samples