Amartya Dutta

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RESEARCH INTERESTS

Deep Learning, Computer Vision, Natural Language Processing, Large Language Models, Vision Language Models

EDUCATION

Virginia Tech, Blacksburg, USA
Master of Science, Computer Science; GPA: 3.9/4   Aug 2022 - Present
Indian Institute of Information Technology (IIIT) Guwahati, India
Bachelor of Technology, Computer Science and Engineering; GPA: 8.6/10   July 2017 - May 2021

SKILLS SUMMARY

Languages: Python, LaTeX, C++, Shell
Frameworks/Tools: PyTorch, TensorFlow, Keras, Scikit, OpenCV, Numpy, Pandas, Git, Unity3D, vLLM,
LangChain, FAISS

WORK EXPERIENCE

Graduate Research Assistant, Virginia Tech   Aug 2022 – Dec 2024

- Developed a **novel zero-shot approach** for **Scene Graph Relationship Prediction** using **VLMs**, reframing Predicate Classification as an **MCQA task** and surpassing trained baselines by at least 7% for **balanced relationship prediction**. Designed an **open-ended relationship generation framework** to eliminate answer-choice biases and improve contextual understanding.
- Performed comparative analysis of **Weakly Supervised Semantic Segmentation** approaches, highlighting the superiority of saliency maps over CAMs and introducing stochastic aggregation to enhance saliency effectiveness.

Augmented Reality Developer Intern, Amply   Dec 2019 - Mar 2020

- Developed interactive Augmented Reality (AR) portals using AR-Core in Unity3D, enabling secure interactions with virtual objects to create immersive AR tours for client companies

Virtual Reality Developer Intern, IIT Guwahati   May 2019 - Jul 2019

- Designed and developed an interactive Virtual Reality (VR) tour using Unity3D, focusing on smooth navigation within the virtual environment to enhance user experience (UX) in VR.

PROJECTS

SEAL-0 (Search Engine Augmented Language) (Ongoing): Creating a dataset of complex questions that challenge state-of-the-art LLMs. This project evaluates how these models handle queries requiring up-to-date knowledge and complex reasoning by leveraging search engines for real-time information.
Evaluating Model Reasoning and Hallucinations in Medical LLMs: This project investigates factual error propagation in open-source medical LLMs (e.g., BioMistral, Asclepius) and documents their datasets for transparency. By highlighting performance variations, it aims to guide the development of safer, more reliable language models for healthcare. **GitHub**
Visualizing the Spotify Soundscape: This project visualizes the Spotify Top 50 Tracks of 2023 through an interactive, HTML-based dashboard. Using D3.js and Plotly.js, it enables dynamic, data-driven exploration of each track's popularity and attributes. **GitHub**
Predicting Popularity of Flickr Images (ICIP 2021): This project predicts how popular a Flickr image will be over 30 days, even before it's uploaded. By analyzing user and image social features alongside image visuals, it models engagement based on two factors: scale and shape. Using these factors, the method forecasts the daily engagement sequence. See publication [**P4**]. **GitHub**

PUBLICATIONS

[**P1**] Maruf, M., Daw, A., **Dutta, A.**, Bu, J., Karpatne, A. (2023). "Beyond Discriminative Regions: Saliency Maps as Alternatives to CAMs." arXiv. Under Review **Paper**
[**P2**] **Dutta, A.**, Nath, K. (2022). "Learning via LSTM for Railway Bridge strains." ICDSMLA 2020. **Paper**
[**P3**] **Dutta, A.**, Bhattacharjee, R.K., Barbhuiya, F.A. (2021). "Efficient Detection of Lesions During Endoscopy." ICPR 2021. **Paper**
[**P4**] **Dutta, A.**, Barbhuiya, F.A. (2021). "Predicting Popularity of Images Over 30 Days." arXiv.**Paper**

ACHIEVEMENTS, SERVICES & LEADERSHIP

3rd Position, IEEE ICIP Image Popularity Prediction Challenge (Oct 2020): View Results
Reviewer: AAAI 2024
Teaching Assistant, Virginia Tech: Machine Learning, Machine Learning with Big Data, Intermediate Python – Tutored 100+ students, resolved doubts, graded assessments, and enhanced understanding of complex concepts.