Koustav Ghosal

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Bio

I am a Research Scientist at Accenture Labs, an R&D team within Accenture PLC specializing in applied research. I focus on NLP and Computer Vision, leading projects on large language models and multimodal Generative AI.

With over 3 years of industry and 10 years of research experience, I have published extensively in top conferences like ICCV, ICPR, and ACPR. I hold a PhD from Trinity College Dublin and a research masters from IIIT-Hyderabad, India, both in NLP and Computer Vision.

In my current role, I leverage LLMs to develop scalable chatbots for pharmaceutical and business-media clients. I manage both structured and unstructured data, building prototypes with PyTorch and TensorFlow in Python. My responsibilities include collaborating with diverse teams, engaging with clients, and overseeing the deployment of ML models on Azure and AWS at scale for seamless integration with client systems.

Previously, I was a postdoctoral researcher working on graph neural networks and transformers in NLP and computer vision. My PhD in Computer Science focused on leveraging deep learning for vision-language problems.

Experience

Research Scientist | Accenture Labs, Dublin | January 2022 - Present
- Fine-tune LLMs and implement RAG for scalable pharmaceutical and media chatbots.
- Engage with clients to align deliverables and adapt plans in a DevOps environment.
- Lead software engineers for seamless system integration and optimized performance.
- Publish and patent novel solutions in NLP and Computer Vision.

Postdoctoral Researcher | V-SENSE, Dublin | March - December 2021
- Applied NLP and Computer Vision for Communication & Media technology applications.
- Developed weakly supervised image-captioning applications using noisy web data.
- Explored vision transformers and graph neural networks for 3D human pose estimation.
- Worked on 3D mesh sequence compression for augmented and mixed reality applications.

PhD | V-SENSE, Dublin | March 2017 - February 2021
- Using a large and in-the-wild database of photographs and user comments, I investigated the capacity of deep networks to analyze a photograph. I worked under the supervision of Prof. Aljosa Smolic.
- Developed an application for geometric attribute prediction using CNNs and visual saliency.
- Explored LSTMs, topic modelling and weakly supervised learning for developing an application in image captioning.
- Used graph neural networks to develop an application for aesthetic score regression.

Research Engineer | Deep Learn Labs, India | August, 2015 - March, 2016
- Implemented deep learning based solution for vehicle detection and classification using OpenCV, Caffe and C++ towards the proof of concept.
- Developed an intelligent annotation tool using Python and QT for quickly labelling a large collection traffic videos.

Software Developer | OMitra, India | August 2014 - January 2015
- Developed live in-journey features for the proof of concept such as chats, meal and cab bookings (Android utility app for train journeys)

Education

PhD in Computer Science   Trinity College Dublin, Ireland. 2021

Topic: *Applications in Image Aesthetics Using Deep Learning*

Supervisor: Prof. Aljosa Smolic

Masters (Research) in Computer Science   IIIT Hyderabad, India. 2016

Topic: *A Sketch-based Approach for Multimedia Retrieval*

Supervisor: Prof. Anoop Namboodiri

Bachelor of Technology, Computer Science & Engineering   WBUT, India. 2011

Internships

Machine Learning Intern | IRISA, France | June - September, 2016

- Worked on detecting and tracking tidal channels at Mont Saint-Michel Bay with the OBELIX team under the supervision of Prof. Sébastien Lefèvre.
- Developed an annotation tool and proposed segmentation algorithms using CNNs for multi-spectral data using Keras.

NLP Intern | IIT, Kharagpur | April - July, 2012

- Curated a large text corpus in Bengali language for studying readability of Bengali documents.
- Developed a tool using Python and QT for analyzing documents and predict standard readability scores such as Flesch, SMOG *etc*.

Skills

Subject Areas: Computer Vision, Image Processing, Natural Language Processing (NLP), Machine Learning, Deep Learning, Graph Neural Networks, Convolutional Neural Networks, Generative Adversarial Learning, Semi and Unsupervised Learning, Transformers, Knowledge Graphs, Large Language Models, Gen AI

Coding: C, C++, Java, Android, Python, Matlab

Libraries and Tools: PyTorch, PyTorch Geometric, Tensorflow, Caffe, SciPy, NLTK, GitHub, Docker, Hugging Face, Azure ML, AWS Sagemaker

Publications

1. Bao Y, Shah AP, Narang N, Rivers J, Maksey R, Guan L, Barrere LN, Evenson S, Basole R, Miao C, Mehta A. *Harnessing Business and Media Insights with Large Language Models.* arXiv preprint arXiv:2406.06559. 2024 Jun 2.

2. Koustav Ghosal, Aljosa Smolic. *Image Aesthetics Assessment Using Graph Attention Network*, International Conference on Pattern Recognition (ICPR 2022)

3. Sebastian Lutz, Richard Blythman, Koustav Ghosal, Matthew Moynihan, Ciaran Simms, Aljosa Smolic. *Jointformer: Single-Frame Lifting Transformer with Error Prediction and Refinement for 3D Human Pose Estimation*, International Conference on Pattern Recognition (ICPR 2022)

4. Ojasvi Yadav, Koustav Ghosal, Sebastian Lutz, and Aljosa Smolic. *Frequency-domain loss function for deep exposure correction of dark images.* Signal, Image and Video Processing (2021).

5. Koustav Ghosal, Aakanksha Rana, and Aljosa Smolic. *Aesthetic Image Captioning From Weakly-Labelled Photographs.*, Workshop In Cross-Modal Learning in Real World, International Conference on Computer Vision (ICCV) 2019, Seoul

6. Xu Zheng, Tejo Chalasani, Koustav Ghosal, Sebastian Lutz, Aljosa Smolic. *STaDA: Style Transfer as Data Augmentation.*, 14th International Conference on Computer Vision Theory and Applications, VISAPP 2019, Prague

7. Koustav Ghosal, Mukta Prasad, Aljosa Smolic, *A Geometry-Sensitive Approach for Photographic Style Classification*, Irish Machine Vision and Image Processing Conference, August 2018 (IMVIP), Belfast.

8. Koustav Ghosal, Ameya Prabhu, Riddhiman Dasgupta, Anoop M. Namboodiri, *Learning Clustered Subspaces for sketch-based Image Retrieval*, Asian Conference on Pattern Recognition (ACPR), November 2015, Kuala Lumpur, Malaysia.

9. Koustav Ghosal, Anoop M. Namboodiri, *A Sketch-Based Approach to Video Retrieval using Qualitative Features*, Proceedings of the Ninth Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP), 14-17 Dec 2014, Bangalore, India.

10. Sanchit Aggarawal, Koustav Ghosal, Pulkit Singhal, Priyanka Srivastava, *Effect of Learning on Audio Spatial Working Memory*, Spatial Cognition 2014, Bremen, Germany, 15-19 September 2014.