Koustav Ghosal

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Bio

I am a Research Scientist at Accenture Labs, Dublin and work with the Machine Reading team. My current research is focused on leveraging large language models and multimodal Generative AI to develop applications in healthcare. Previously, I was a postdoctoral researcher at the V-SENSE lab in Trinity College Dublin where I developed applications for 3D human pose estimation using graph neural networks and vision transformers. I hold a PhD and a research masters in Computer Vision.

I am passionate about problems in computer vision and natural language processing. Specifically, I am interested in multitask learning, generative adversarial learning, semi and unsupervised learning.

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

Experiences

Research Scientist | Accenture Labs, Dublin | January 2022 - Present

- Exploring LLMs, Computer Vision, knowledge graphs to develop applications in healthcare.
- Building prototypes and engaging regularly with clients and client facing partners.
- Publishing and patenting novel solutiuons to research problems.

Postdoctoral Researcher | V-SENSE, Dublin | March - December 2021

- Applied deep learning for developing applications in creative technologies, supervised by Prof. Aljosa Smolic.
- Developed weakly supervised applications for image aesthetics assessment using noisy web data.
- Explored vision transformers and graph neural networks for 3D human pose estimation in rugby videos.
- Worked on 3D mesh sequence compression using graph and 3D convolutional networks for applications in augmented and mixed reality.

PhD Researcher | 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.

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.

Machine Learning Consultant | 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.

Android App 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)

Natural Language Processing 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, Machine Learning, Deep Learning, Graph Neural Networks, Convolutional Neural Networks, Generative Adversarial Learning, Semi and Unsupervised Learning, Transformers

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

Libraries and Tools: PyTorch, PyTorch Geometric, Tensorflow, Caffe, SciPy, NLTK, GitHub, Docker

Publications

1. Koustav Ghosal, Aljosa Smolic. *Image Aesthetics Assessment Using Graph Attention Network*, International Conference on Pattern Recognition (ICPR 2022)
2. 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)
3. 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).
4. 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
5. 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
6. 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.
7. 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.

8. 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.

9. 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.

Teaching & Supervision

Teaching (Demonstrator):

1. **Microprocessor Systems**, Trinity College, Dublin. (January - April, 2020)
2. **Advanced Computer Vision**, Trinity College, Dublin. (September - December, 2018 & 2019)
3. **Computer Vision**, Trinity College, Dublin. (September - December, 2017 & 2019)
4. **Statistical Methods in AI**, IIIT Hyderabad. (Monsoon, 2014)
5. **Cognitive Neuroscience**, IIIT Hyderabad. (Spring 2014)

Thesis Supervision:

1. Data augmentation with Artistic Style, Xu Zheng (MSc)
2. Understanding the Geometry of Photographic Images Using Deep Learning, Sarvani Chakrabarty (MSc)
3. Style Transfer for 360 images, Xin Zhang (MSc)
4. Improving Low Light Photography with Generative Adversarial Networks, Ojasvi Yadav (UG)