Shashank Shekhar

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Education

University of Guelph **Sep 2019 - present**
MASc, Engineering Systems & Computing (AI specialization), 90.14/100

Indian Institute Of Technology, Dhanbad **July 2013 - April 2017**
B.Tech, Electronics And Communication Engineering, 8.17/10

Research Experience

Machine Learning Group, University of Guelph & Vector Institute **Jan 2020 – present**
Graduate Research Assistant *Ontario, Canada*

Pursuing masters thesis research on visual representation learning. Present research focus: dynamic inference models, mutual information maximization, confidence estimation and calibration, cognitive science approaches for explainability.

Visual Computing Lab, Indian Institute of Science **Jan 2018 – April 2019**
Project Assistant *Bangalore, India*

Research on applied computer vision problems including object detection, person re-identification & visual question answering; both in academic (refer publications) and industrial (refer professional experience) projects.

Indian Institute Of Technology **May 2015 – July 2015**
Summer Research Fellow *Hyderabad, India*

Developed modules for Internet-Of-Things HetNet simulator in MATLAB: Downlink and SCFDMA uplink proportional-fair scheduling for LTE, Page-segmentation and RAW based channel-access scheduling for 802.11ah

Publications

*** denotes equal contribution**

- E Taylor*, **S Shekhar***, and GW Taylor, *"Response Time Analysis for Explainability of Visual Processing in CNNs"*, Computer Vision and Patter Recognition (CVPR) 2020 workshop: Minds vs. Machines: How far are we from the common sense of a toddler? **(Oral: among 3 papers selected)**
- AK Singh, A Mishra, **S Shekhar**, and A Chakraborty, *"From Strings to Things: Knowledge-Enabled VQA Model That Can Read And Reason"*, International Conference on Computer Vision (ICCV) 2019 **(Oral: 4.3% acceptance rate)**
- A Mishra, **S Shekhar**, AK Singh, and A Chakraborty, *"OCR-VQA : Visual Question Answering By Reading Text In Images"*, International Conference on Document Analysis & Recognition (ICDAR) 2019
- Navaneet KL, RK Sarvadevabhatla, **S Shekhar**, RV Babu and A Chakraborty, *"Operator-In-The-Loop Deep Sequential Multi-camera Feature Fusion for Person Re-identification"*, IEEE Transactions on Information Forensics & Security (vol 15)
- **S Shekhar*** and J Singh*, *"Road Damage Detection And Classification In Smartphone Captured Images Using Mask R-CNN"*, IEEE International Conference On Big Data 2018 Challenge Workshop

Technical Skills

Languages: Python • C++ • C • Matlab • Julia

Machine Learning Frameworks: PyTorch • TensorFlow • Scikit-Learn • NLTK

Computer Vision Frameworks: OpenCV • Torchvision

Bayesian Inference Frameworks: Tensorflow Probability • PyMC

Development Tools: Scientific Python Stack • Jupyter • Sublime Text • Vim

DevOps Tools: Docker • AWS • Git • JIRA

Relevant Coursework

- **Graduate**: Machine Learning, Computational Thinking For AI, Scientific Computing, Optimization, Computational Statistical Inference, Machine Learning for Natural Language Processing

- **Online**: Deep Learning, Mathematics for Machine Learning, Reinforcement Learning, Mind and Machine

Awards

- Vector Research Grant 2020-21
- Conference on Neural Information Processing Systems (NeurIPS) 2019 Travel Grant
- International Conference on Computer Vision (ICCV) 2019 Travel Grant and Student Volunteer
- JN Tata Endowment and Travel Grant 2019
- Vector Institute Scholarship in Artificial Intelligence 2019
- Machine Learning Summer School (MLSS) London 2019 full scholarship
- Indian Academy of Sciences Summer Research Fellowship 2015

Professional Experience

deeplearning.ai **April 2019 – June 2019**
Content Engineer (Remote) *Palo Alto, CA*
Developed Tensorflow assignments & Docker based auto-graders for Coursera's Deep Learning specialization

Shell R&D **Oct 2018 – April 2019**
Research Associate (in collaboration with IISc Bangalore) *Bangalore, India*
Implemented image denoising, contrast enhancement, segmentation and super-resolution algorithms for large scale 3D μ-CT digital rock images in MATLAB and C++

Hyperworks Imaging **March 2018 – Sep 2018**
Computer Vision Engineer (in collaboration with IISc Bangalore) *Bangalore, India*
Implemented person detection, labeling & re-identification methods on real-world videos from a multi camera network using Python (Pytorch, OpenCV, PyQT5)

Samsung Research Institute **July 2017 – Jan 2018**
Software Development Engineer *Delhi, India*
Developed middleware for video streaming applications for Samsung Smart TV's Linux based OS using C++ (gstreamer)

BlackCoffer **Jan 2017 – Feb 2017**
Data Science Intern (Remote) *Delhi, India*
Performed text mining and analysis as time series, automatic transfer of json records to Google Big Query format and Named Entity Extraction from financial documents. Used Python and Google Cloud

Projects

- **Meta-Learning with Implicit Gradients**
  - Implemented the NeurIPS 2019 paper using the Torchmeta library as well as numerical approximation for second-order optimization using Higher library
  - Replicated the results obtained by authors for few-shot learning on Ominglot dataset
- **Cross-Modal GAN for Person Re-Identification**
  - Implemented the IJCAI 2018 paper "Cross-Modality Person Re-Identification with Generative Adversarial Training" in PyTorch
- **Deep Policy Gradients To Train Musculo-Skeletal Controller To Walk**
  - Used policy gradient approaches (Proximal Policy Optimization (PPO) and Deep Deterministic Policy Gradients (DDPG)) on the OpenSim simulator to train a bipedal controller to walk.
  - Received $500 cloud credits from Google for being Top 100 in NIPS 2018 challenge
- **Playing FPS Game from Raw Pixels by Combining Improvements From Deep Q-Learning**
  - Implemented different improvements in Deep Q-Learning from the RAINBOW algorithm and trained it to play an FPS game via the VizDoom framework using only the image pixels
- **Bi-Linear Convolutional Neural Nets For Fine-Grained Visual Classification**
  - Implemented Bi-Linear CNNs for Fine-grained Visual Recognition (ICCV 2015) and ensembled with other CNN based classifiers to perform both single-label and multi-label image classification
  - Finished in top 50/630 in the iMaterialist Challenge for the CVPR 2018 FGVC5 Workshop
- **Classifying Hate Speech in Wikipedia Dialogues using Recurrent Neural Nets**
  - Implemented Long Short Term Memory (LSTM), Gated Recurrent Units (GRU), Attention Networks as well as used word embeddings from Glove and FastText to perform text classification. Achieved 98.58% ROC-AUC score