Yash Sanjay Bhalgat

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EDUCATION

University of Michigan, Ann Arbor, MI — **Sep '17 - Dec '18**
Masters, Computer Science and Engineering, **GPA**: 3.64/4.0

Indian Institute of Technology, Bombay, — **Jul '13- May '17**
B.Tech. with *Honors* in Electrical Engineering and *Minor* in Computer Science, **GPA**: 9.35/10.0

WORK EXPERIENCE

[Full-time] Qualcomm AI research, Deep Learning Systems Engineer [06/10/2019 - Ongoing]
- Main role is building smaller, efficient and hardware-friendly deep networks for computer vision tasks on ASICs
- Developed approaches to achieve 4-bit/4-bit quantization on SOTA deep networks with almost no loss in performance
- Currently, the main driver of Qualcomm's participating team in the MicroNet Challenge at NeurIPS 2019

[Full-time] Voxel51, Inc., Computer Vision & Machine Learning Engineer [02/18/2019 - 05/31/2019]
- Built production-level pipelines for vehicle detection + tracking for querying on large-scale video databases
- Researched and developed action classification architectures based on C3D, I3D and TSN networks
- Developed several methods to bring the frames-per-second speed of our video processing pipelines closer to real-time

[Internship] IBM Almaden Research Center, *Mentor - Zhe Liu* [Summer '18]
- Proposed teacher-student learning paradigm for task-agnostic classification in presence of label noise in training data
- Built deep learning and ensemble frameworks to integrate weakly-labeled and high-quality training samples

[Internship] IFP Energies nouvelles, Paris, *Mentor - Laurent Duval* [Summer '17]
- Proposed a method for extraction of deformation invariant features of geophysical images, followed by feature selection
- Exploited the sparse structure of data to process gigabyte-sized images in real time (ICASSP 2018)

[Internship] IBM Research, Bangalore, *Mentor - Vikas Raykar* [Summer '16]
- Joint multi-modal representations for e-commerce catalog search by visual attributes without manual tagging
- Implemented autoencoder-based CorrNet in Theano achieving a query-search over 4 million images in 2-3 ms

[Internship] Infurnia, Mumbai [Summer '15]
- Software module development in Python and C++ for an augmented reality based furniture startup
- Created a range of linear programming solvers by modifying functions in the open-source software FreeCAD

[Internship] Mars Society of India, IIT Bombay [Aug '14 - Mar '15]
- Worked in the Navigation and Vision subsystem of a team aimed at building a prototype Mars Rover
- Implemented a video-guided navigation system in ROS (Robotic Operating System) using the A-star algorithm

SKILLS

Languages Python, C/C++, Julia, SQL, MATLAB, Java, Verilog, R, Bash, LaTeX
Packages PyTorch, TensorFlow, Keras, OpenAI gym, CUDA, Theano, OpenCV, git

PUBLICATIONS

- **Annotation-cost Minimization for Medical Image Segmentation using Suggestive Mixed Supervision Fully Convolutional Networks**, *Yash Bhalgat*, Meet Shah, et. al., *Medical Imaging meets NeurIPS 2018* (accepted) [Paper]
- **Teacher-Student Learning Paradigm for Tri-training: An Efficient Method for Unlabeled Data Exploitation**, *Yash Bhalgat*, Zhe Liu, Pritam Gundecha, et. al., *KONVENS 2019* (accepted) [Paper]
- **CatsEyes: Categorizing seismic structures with scattering wavelet networks**
  Yash Bhalgat, Laurent Duval, Jean Charlety, *ICASSP 2018* [Paper] [Poster]
- **A Scattering Wavelet Network based approach to Fingerprint Classification**
  P. Birajadar, *Yash Bhalgat*, Vikram Gadre, *Pattern Recognition Letters* (attempting rebuttal)
- **Stamp Processing with Examplar Features**
  Yash Bhalgat, Mandar Kulkarni, Shirish Karande, Sachin Lodha, *DAS 2016* [arxiv]

KEY PROJECTS

Content based Video Relevance Prediction - ACMMM Challenge [github] [May '18 - Jun '18]

- Implemented Triplet Net in PyTorch combining *video-level* and *frame-level* features with a BiLSTM + 3D CNN model
- Video-embeddings obtained from a dense layer were used to make relevance predictions on unseen videos

Scattering Wavelet Network based approach to Fingerprint Classification [Jul '16 - Apr '17]

Undergraduate Thesis, *Guide: Prof. Vikram Gadre*

- Used ScatNets and Local Non-linear Total Variation model to enhance texture components in fingerprints
- Extended version of this work on Iris classification/recognition submitted to the International Journal of Biometrics

Convolutional Neural Network from scratch, Advanced Computer Vision [github] [Fall '16]

- Built modules for every layer from scratch with back-propagation, batch normalization and dropout features.
- Obtained state-of-art results by training and testing on MNIST and CIFAR-10 datasets.

Digital Image Processing algorithms acceleration with CUDA [github] [Fall '16]

- Parallelized image filtering, edge detection, k-means segmentation and few other algorithms using CUDA
- Compared with serial implementation using OpenCV and MATLAB. *Guided by Prof. S. Gopalakrishnan*

Sarcasm detection in sentences, Machine Learning (CS 725) [github] [Fall '16]

- Built features based on n-grams, sentence polarity (incongruity), punctuation and emojis with feature selection
- Compared several classifiers and developed meaningful insights on feature relevance to sarcasm detection

Other Projects

- **Emotion from Speech (CNNs, HMMs)**, DSP Poster presentation [github]
- **Segmentation of MRI images using Expectation Maximization**, Estimation and Identification
- **Automated Stellarium Laser Pointing device**, Electronic Design Lab [youtube-demo]
- **Multicycle RISC15** - Verilog implementation of 16-bit multi-cycle RISC15 processor [github]

RELEVANT COURSES

Machine Learning, Advanced Computer Vision, Reinforcement Learning, Algorithms in Medical Image Processing, Information Retrieval, Parallel Computing, Probability and Random Processes, Estimation and Identification, Matrix Computations, Computational Data Science, Design and Analysis of Algorithms, Data Structures, Complex Analysis, Calculus

TEACHING EXPERIENCE

University of Michigan

Graduate Student Instructor, Computational Data Science, *Prof. Raj Nadakuditi* [Fall '18]

Graduate Student Instructor, Introduction to Logic Design, *Prof. Matthew Smith* [Winter '18]

IIT Bombay

Teaching Assistant, Wavelets, *Prof. Vikram Gadre* [Fall '16, Winter '17]

Teaching Assistant, Quantum Mechanics and Applications, *Prof. Siva Prasad* [Fall '14, Winter '15]

SCHOLASTIC ACHIEVEMENTS

- Awarded the Undergraduate Research Award (URA 02) for exceptional work during my Undergraduate Thesis.
- All India Rank **12** in IITJEE-Mains exam among 1.5 million students
- All India Rank **155** in IITJEE-Advanced exam among 0.15 million students
- All India Rank **60** in KVPY Scholarship by Govt. of India among 0.2 million candidates
- Featured in National Top 30 for the International Astronomy Olympiad, 2013
- Among top 300 in India to compete in the Physics, Chemistry and Mathematics olympiads.
- Awarded Cargill Global Scholarship 2014-15 and 2015-16 for excellence in leadership and academic skills
- Winner of IMATATHON - Image Processing Hackathon held by Electronics Club, IIT Bombay

REFERENCES

Available on request.