Yash Sanjay Bhalgat

EMAIL: *yashsb@robots.ox.ac.uk* ◇ LINKEDIN: *yashbhalgat* ◇ WEBPAGE: *yashbhalgat.github.io*

EDUCATION

University of Oxford — **Oct '21 - Ongoing**
DPhil (PhD), Computer Vision and Machine Learning @ Visual Geometry Group (VGG)

University of Michigan, Ann Arbor — **Sep '17 - Dec '18**
Masters, Computer Science and Engineering

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

WORK EXPERIENCE

Visual Geometry Group, Univ of Oxford, *Student Researcher* [Oct '21 - Ongoing]
Advisors: Prof. Andrea Vedaldi, Prof. Andrew Zisserman, Joao Henriques, Iro Laina

- Open-sourced Pytorch version of NVIDIA's Instant Training of Neural Graphics primitives. 500 stars on github. [Project]
- Worked on 3D scene decomposition into static-vs-dynamic objects from a monocular video using dynamic view synthesis.
- Currently working on a new formulation of neural implicit surface rendering using VAEs and SDF-like sphere tracing.
- Currently also working on improving the performance of image instance retrieval by incorporating 3D priors.

Qualcomm AI Research | *Senior Machine Learning Researcher* [Nov '20 - Jul '21]
Machine Learning Researcher [Jun '19 - Oct '20]

- Notable works are 3D hand-pose estimation [DIR-Net], low-bit quantization [LSQ+, QKD], structured [StructConv] and unstructured [LTP] pruning. Filed 12 inventions in FY2020 of which 5 ideas have been filed for patent protection.
- Led the ultra-low resource vision use-case development project from model design, quantization to final hardware mapping
- Led Qualcomm's team in the MicroNet Challenge at NeurIPS 2019, and achieved 3rd rank in ImageNet track [Code]
- Manager/mentor for intern John Yang (PhD @ SNU) working on the 3D hand-pose estimation problem

Voxel51, Inc., *Computer Vision & Machine Learning Engineer* [Feb '19 - May '19]

- Built production-level pipelines for real-time vehicle detection + tracking for querying on large-scale video databases
- Researched and developed efficient action classification models based on C3D, I3D and TSN backbone networks

PUBLICATIONS

Conference Publications * equal contribution

4. **Dynamic Iterative Refinement for Efficient 3D Hand Pose Estimation.**
   John Yang, *Yash Bhalgat*, Simyung Chang, Fatih Porikli, Nojun Kwak.
   *Winter Conference on Applications of Computer Vision (***WACV***), 2022*
3. **Structured Convolutions for Efficient Neural Network Design.** [Paper]
   Yash Bhalgat, Yizhe Zhang, Jamie Lin, Fatih Porikli.
   *Neural Information Processing Systems (***NeurIPS***), 2020*
2. **Teacher-Student Paradigm for Tri-training: An Efficient Method for Unlabeled Data Exploitation.** [Paper]
   Yash Bhalgat, Zhe Liu, Pritam Gundecha, Jalal Mahmud, Amita Misra.
   *Conference on Natural Language Processing (***KONVENS***), 2019*
1. **CatsEyes: Categorizing seismic structures with scattering wavelet networks.** [Paper] [Poster]
   Yash Bhalgat, Laurent Duval, Jean Charlety.
   *International Conference on Acoustics, Speech, and Signal Processing (***ICASSP***), 2018*

Unpublished Manuscripts

3. **A Prompt Array Keeps the Bias Away: Debiasing Vision-Language Models with Adversarial Learning** [Paper]
   Hugo Berg, Siobhan Hall, *Yash Bhalgat*, Wonsuk Yang, Hannah Rose Kirk, Aleksandar Shtedritski, Max Bain.
2. **Learned Threshold Pruning.** *arXiv:2003.00075* [Paper]
   Kambiz Azarian, *Yash Bhalgat*, Jinwon Lee, Tijmen Blankevoort.
1. **QKD: Quantization-aware Knowledge Distillation.** *arXiv:1911.12491* [Paper]
   *Yash Bhalgat**, Jangho Kim*, Jinwon Lee, Chirag Patel, Nojun Kwak.

Workshop Publications

2. **LSQ+: Improving low-bit quantization through learnable offsets and better initialization.** [Paper]
   Yash Bhalgat, Jinwon Lee, Markus Nagel, Tijmen Blankevoort, Nojun Kwak.
   CVPR Workshop on Efficient Deep Learning in Computer Vision, 2020

1. **Annotation-cost Minimization for Medical Image Segmentation using Suggestive Mixed Supervision Fully Convolutional Networks**. [Paper]
   *Yash Bhalgat**, Meet Shah*, Suyash Awate. *Medical Imaging meets NeurIPS Workshop, 2018*

INTERNSHIPS & SELECTED PROJECTS

[Project] NeurIPS '19 MicroNet challenge - 3rd place, ImageNet track [Code] [Jul '19 - Oct '19]
- Developed fast evolutionary search algorithm for mixed precision quantization optimized for both param and MAC count
- Developed an end-to-end pipeline with quantization-aware training, knowledge distillation and unstructured pruning
- Achieved 8x compression on EfficientNet-B0 and MixNet-S on ImageNet with less than 1% drop in accuracy

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

[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) [Paper]

[Thesis] Scattering Wavelet Network based Robust Fingerprint Classification [Jul '16 - Apr '17]
- *Guide: Prof. Vikram Gadre*. Explored ScatNets based approaches for robust feature extraction combined with Local Non-linear Total Variation based texture enhancement. Awarded Undergraduate Research Award (URA02) for this work.

[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 milliseconds

[Internship] Infurnia, Mumbai [Summer '15]
- Created a range of linear programming solvers in Python and C++ for an augmented reality based furniture startup

SKILLS

Languages	Python (proficient), C++ (moderate), Julia, MATLAB, Verilog, Bash, LaTeX
Frameworks	PyTorch (proficient), TensorFlow and Keras (basic), OpenAI gym, CUDA, Theano, OpenCV, git

TEACHING EXPERIENCE

University of Oxford, *Tutor*	Computer Graphics, *with Dr. Jassim Happa, Stuart Golodetz*	[Hillary '22]
	Artificial Intelligence, *with Prof. Bernardo Cuenca Grau*	[Hillary '22]
University of Michigan, *Graduate Student Instructor*	Computational Data Science, *with Prof. Raj Nadakuditi*	[Fall '18]
	Introduction to Logic Design, *with Prof. Matthew Smith*	[Winter '18]
IIT Bombay, *Teaching Assistant*	Wavelets, *with Prof. Vikram Gadre*	[Fall '16, Winter '17]
	Quantum Mechanics and Applications, *with Prof. Siva Prasad*	[Fall '14, Winter '15]

PROFESSIONAL SERVICE

At Qualcomm AI Research: Judge panel, Qualcomm Innovation Fellowship winner selection for ML proposals
Reviewer: ECCV '22; EMNLP '22, '21; Transactions on Multimedia; Transactions on Neural Networks & Learning Systems
Website Chair for BMVC 2022.

SCHOLASTIC ACHIEVEMENTS

- Awarded the Undergraduate Research Award (URA 02) for exceptional work during Bachelors Thesis at IIT Bombay
- Awarded Cargill Global Scholarship 2014-15 and 2015-16 for excellence in leadership and academic skills
- All India Rank **12** in IITJEE-Mains exam among 1,000,000 candidates
- All India Rank **155** in IITJEE-Advanced exam among 150,000 candidates
- All India Rank **60** in KVPY Scholarship by Govt. of India among 0.2 million candidates
- Selected in National Top 30 (for OCSC camp) for International Astronomy Olympiad '13
- Selected among top 300 participants of India to compete in **all three national olympiads**: INPhO (Indian National Physics Olympiad), INChO (Chemistry), INAO (Astronomy)
- Visharad Degree (i.e. Bachelors in Music) in Indian Classical Music for playing Tabla