# Vishal Purohit

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## Education

**Purdue University** **Aug. 2021 – Present**
*Ph.D. in Electrical and Computer Engineering (GPA : 3.71/4.0)* *West Lafayette, Indiana*

**KLS Gogte Institute of Technology (Visvesvaraya Technological University)** **Aug. 2014 – June 2018**
*Bachelor of Engineering in Electronics and Communication* *Karnataka, India*

## Research / Work Experience

**Google** **Jan 2023 -Present**
*Research Assistant - Reproducibility in ML & LLMs* *West Lafayette, Indiana*

- Spearheaded the development of production-ready implementations of universal semantic segmentation models - MaskFormer and Mask2Former in TensorFlow and experience with working on TPUs. Research funded through TPU Cloud Research Program. Code accepted to Google public repo MaskFormer [code] and Mask2Former [code].
- Spearheaded independent research and development of novel algorithms for open-world object segmentation and detection and optimized them for low-power devices via pruning and knowledge distillation. [code]
- Independent research on identifying vulnerabilities in code generating LLMs. [code]
- Independent research on LLMs for software engineering applications. [code]

**Indian Institute of Technology, Varanasi** **Sep. 2020 – August 2021**
*Research Intern - Meta-Learning and Federated Learning* *Varanasi, India*

- Contributed towards implementing gradient-based meta-learning techniques for few-shot learning problems on medical images. Regularized deep networks for gradient-based meta-learning algorithms. [Code]
- Worked on deep learning algorithms to alleviate labeling burden on clients for federated learning setting using semi-supervised learning framework by designing novel combined loss function [Code]
- Worked on improving the convergence of nature-inspired optimization algorithm for genome feature selection task with help of ideas from quantum computing and chaos theory
- Worked on privacy-preserved deep learning using federated knowledge distillation using inverted data for medical images [Code]

**Tata Elxsi Limited** **Sep. 2018 – May 2020**
*Engineer* *Pune, India*

- Implemented algorithms R-CNN, Mask R-CNN, Cascade mask-RCNN, YOLO family, and EfficientDet. Optimally tuned hyper-parameters for high localization and classification accuracy for microbiology applications. Optimized inference time by 0.5 seconds and reduced memory consumption by 30% using techniques like quantization
- Improved algorithms for device calibration by 50%, by optimizing algorithms pertaining to Modulation Transfer Function (MTF) [ISO 12233] calculation, chromatic aberration detection, and spatial distortion for an optical system.
- Applied image processing techniques for pre-processing, post-processing, analysis of images and videos. Designed and implemented desktop application for automated training and testing of machine learning and deep learning models

## Publications

- **V. Purohit**, J. Luo, Y. Chi, Q. Guo, S. Chan, Q. Qiu " Exposure Correction for 1bQIS Images using Neural ODEs " **(Under Review)** [paper]
- **V. Purohit**, Q. Qiu " Learning Generalizable Subspace for Unsupervised Compressive Sensing " **(Ongoing)**
- **V. Purohit**, Q. Qiu " Efficient Neural Networks for Downstream Vision Tasks on One-Bit Quanta Images " **(Ongoing)**

## Projects

- "Ortho-ODE: Enhancing Robustness and of Neural ODEs against Adversarial Attacks" [Arxiv][Code]
- "Counterfactual Outcome Prediction using Structured State Space Model" [Arxiv][Code]
- "Explainability in code generating LLMs (from LLM course)" [Arxiv][Code]
- "Project from LLM course" [Arxiv][Code]
- "Project from ML Theory Course" [Code]
- " Computational photography for ML course"[Code]
- " Efficient Machine Unlearning", NeurIPS 2023 Machine Unlearning Challenge [Code]