

# Jinen Setpal

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## EDUCATION

### Purdue University

*Doctor of Philosophy, Electrical & Computer Engineering*

**Relevant Coursework:** Optimization for Deep Learning, Machine Learning Theory, Deep Learning, Computational Optimal Transport & Deep Generative Models, Real Analysis & Measure Theory

Aug. 2024 – Present

*West Lafayette, IN, USA*

## FUNDED RESEARCH

### *Contrastive Optimization*

<https://dagshub.com/jinensetpal/contrastive-optimization.git>

- Derived a provably faithful interpretability technique for image classification models, demonstrating an equivalency with maximum likelihood estimation while **recovering spatial information**.
- Derived an ablation to cross-entropy loss to constrain optimization to the derived interpretable basis, which improved classification accuracy<sup>1</sup> while **motivating distribution invariant generalization**.

Nov. 2022 – Present

*Purdue University, USA*

### *Semi-Supervised Class Activation Mappings for Target Localization & Super-Resolution*

*Final Presentation, TE AI Cup 2022. Setpal, et al.*

- Won the **Best Innovation Award** for a custom neural architecture developed to classify minute differences.
- Implemented a latent feature aggregator network to minimize re-training for updating classification targets.

Sep. 2021 – Apr. 2022

*TE Corporate, UK*

## PUBLICATIONS

### *BoilerBot: A Reliable Task-Oriented Chatbot Enhanced with Large Language Models*

*2nd Proceedings of Alexa Prize TaskBot (Alexa Prize 2023). Hu, Setpal, et al.*

- Fine-tuned quantized LLM adapters using QLoRA for task title augmentation & patching ASR failure modes.
- Extended Amazon's COBOT framework, integrating custom logic modules for constraint-based state management.

Oct. 2023

*Purdue University, USA*

### *CutLang V2: Advances in a runtime-interpreted analysis description language for HEP data*

*Frontiers in Big Data, 4, 27. Ünel, Sekmen et al.*

- Developed Interpreter Functions through lexical analysis using Flex & Bison (.cpp).
- Setup CI/CD Scripts w/ Automated Email Delivery using GitHub Actions & SendGrid.

Jul. 2021

*CERN, Switzerland*

## WORK EXPERIENCE

### Machine Learning Engineer

*DagsHub*

- Developed PyTorch and TensorFlow dataloaders leveraging intelligent prefetching, automatic path-column and datatype detection, data streaming and automated tensorization towards the [Data Engine](#).
- Developed a [data streaming client](#) by monkeypatching Python's `open()` and extending FUSE to lazily pull files from a specified remote using DagsHub's web APIs.

Jun. 2022 – Aug. 2024

*Tel Aviv, Israel*

## CONFERENCE PRESENTATIONS

### *The Machine Learning Angle for Open Source Science*

*The Linux Foundation Member Summit (LFMS) 2023*

25<sup>th</sup> Oct. 2023

*Monterey, CA, USA*

### *Interpretability Tools as Feedback Loops*

*Toronto Machine Learning Summit (TMLS) 2022*

30<sup>th</sup> Nov. 2022

*Toronto, Canada*

## TECHNICAL SKILLS

**Languages:** Python, C, C++, x86 Assembly, Java, Kotlin, Bash, JavaScript, MATLAB, R, SQL, ROS2

**Frameworks:** PyTorch, JAX, TensorFlow, Keras, NumPy, Pandas, Pillow, ROOT, Matplotlib, FUSE, Node.js

**Tools:** Git, MLFlow, DVC, Docker, Radare2, Ghidra, TravisCI, GitGuardian, Kubernetes, Gazebo

**Cloud Utilities:** Google Cloud Console (Compute, Networking, Storage), Amazon Web Services (Redshift, ECR, ECS, S3, Sagemaker, CodePipeline, CodeCommit, CloudWatch, CloudFormation, Lambda), Azure Pipeline, GitHub Actions

<sup>1</sup>detailed benchmarks to be released Jan. 2025.