Priyanshu Sinha

ML Engineer | Data Scientist | Researcher

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Education

Indiana University-Purdue University Indianapolis **Indianapolis, Indiana**
Master of Science in Health Informatics *May 2023*

Jaypee Institute of Information Technology **Noida, India**
Bachelor of Technology in Computer Science and Engineering *May 2018*

Work Experience

Labcorp **Princeton, New Jersey**
Data Science Intern *May 2022 - August 2022*

- Performed analysis of time-series data and developed an deep LSTM network for weekly forecasting of clinical screening rate and analyzed the impact of COVID-19 on screening rate using TensorFlow and AWS sagemaker.
- Developed prototype for augmented annotation to classify patient's email using few samples using BERT model using Hugging Face framework, reducing manual labelleing efforts by 10x without significant loss in performance of model.

Indiana University-Purdue University **Indianapolis, Indiana**
Graduate Research Assistant @Purkayastha Lab for Health Innovation (PLHI) *August 2021 - Current*

- Implementing "Hands on Machine Learning with Scikit-Learn, Keras and Tensorflow" book on MIMIC-IV dataset.
- Integrating OHIF viewer in radiology application with integrated AI model to assist radiologists in their study.
- Optimizing 3D Convolutional Neural Networks for ultrasound image segmentation task having minimal memory footprint and faster and more accurate inference on edge devices.
- Collaborating with researchers and surgeons at Emory University to develop a Virtual Reality education application to scale immersive learning during surgical procedures. The application is powered by machine learning to support live interaction with students and surgeons during procedures as well as curated a surgical dataset by supporting VR annotations of procedure scenes using a voice and hand controller.
- Optimized deep learning models (DenseNet, UNet variants) for chest x-ray classification, ultrasound nerve, and brain MRI segmentation using INT-8 quantization, achieving a 75% reduction in size, resulting in reduced memory consumption and 4x gain in inference speed for edge devices such as edge TPU (coral dev board) and Nvidia Jeston Nano.

Mentor Graphics India Pvt. Ltd. (Siemens DISW) **Noida, India**
Senior Member Technical Staff *June 2018 - August 2021*

- Developed a semi-automated annotation tool to label data for autonomous cars, including classification, detection, and segmentation tasks of scenes leveraging deep learning models to generate pseudo-labels, reducing manual labeling efforts by 75%. This tool was tested on the CARLA simulator.
- Optimized an object detection (YoloV3) and segmentation (SegNet) model for Xilinx FPGA to perform real-time labeling of data recorded from camera and lidar sensors using the tensorflow-model-optimization-toolkit.
- Developed web-based tool to scan for security vulnerabilities (CVEs) in packages, used in Linux based operating systems for automobiles, and checked if security patch is applied or not, reducing manual efforts by 75%.

Mentor Graphics India Pvt. Ltd. (Siemens DISW) **Noida, India**
Intern *Feb 2018 - May 2018*

- Developed an automated framework to test audio routing and detect defective nodes in the A2B analyzer, an analysis tool for automotive audio using Python and Javascript.
- Designed and developed a CVE tool to detect Common Vulnerability Exposures (CVEs) in packages in Linux-based operating systems used in automobiles, check if a security patch for vulnerabilities is applied or not, and generate a graphical report.

Technical Skills

Technologies : Machine Learning, Deep Learning, Data Structures and Algorithms, Computer Vision, Natural Language Processing (NLP), Time Series Analysis, Database Management System (DBMS), Restful APIs, Object Oriented Programming (OOPs)
Languages & Databses: Python, C++, C, SQL, R, MySQL, PostgreSQL, MongoDB
Frameworks & Libraries: Tensorflow, PyTorch, Keras, Numpy, Pandas, Scikit-Learn, Scipy, OpenCV, Matplotlib, Fastai, NLTK, Plotly, Dask, Flask, Django, Apache Spark, Simpy, Pytest
OS & Developer Tools: Linux, VS Code, Git, Docker, Kubernetes, Jupyter Notebook, MATLAB(Basic), RStudio, Insomnia
Health Data Standards & Laws: SNOMED, ICD, LOINC, CPT, RxNorm, HIPAA, HITECH, HL7

Research and Publications

1. **Priyanshu Sinha**, Sai Sreya Tummala, Saptarshi Purkayastha, and Judy Gichoya. Energy efficiency of quantized neural networks in medical imaging. In *Medical Imaging with Deep Learning*, 2022
2. **Sinha, Priyanshu**, Judy W. Gichoya, and Saptarshi Purkayastha. Leapfrogging medical ai in low-resource contexts using edge tensor processing unit. In *2022 IEEE Healthcare Innovations and Point of Care Technologies (HI-POCT)*, pages 67–70, 2022
3. Judy W. Gichoya, **Priyanshu Sinha**, Melissa Davis, Jeffrey W. Dunkle, Scott A. Hamlin, Keith D. Herr, Carrie N. Hoff, Haley P. Letter, Christopher R. McAdams, Gregory D. Puthoff, Kevin L. Smith, Scott D. Steenburg, Imon Banerjee, and Hari Trivedi. Multireader evaluation of radiologist performance for COVID-19 detection on emergency department chest radiographs. *Clinical Imaging*, 82:77–82, 2021
4. Areeba Abid, **Sinha, Priyanshu**, Aishwarya Harpale, Judy Gichoya, and Saptarshi Purkayastha. Optimizing Medical Image Classification Models for Edge Devices. In Kenji Matsui, Sigeru Omatu, Tan Yigitcanlar, and Sara Rodríguez González, editors, *Distributed Computing and Artificial Intelligence, Volume 1: 18th International Conference*, pages 77–87, Cham, 2021. Springer International Publishing
5. Pradeeban Kathiravelu, Puneet Sharma, Ashish Sharma, Imon Banerjee, Hari Trivedi, Saptarshi Purkayastha, **Sinha, Priyanshu**, Alexandre Cadrin-Chenevert, Nabile Safdar, and Judy Wawira Gichoya. A DICOM Framework for Machine Learning and Processing Pipelines Against Real-time Radiology Images. *Journal of Digital Imaging*, 34(4):1005–1013, 2021
6. Ananth Bhimireddy, **Sinha, Priyanshu**, Bolu Oluwalade, Judy W Gichoya, and Saptarshi Purkayastha. Blood Glucose Level Prediction as Time-Series Modeling using Sequence-to-Sequence Neural Networks. In *CEUR workshop proceedings*, 2020
7. Saptarshi Purkayastha, Ananth R Bhimireddy, **Sinha, Priyanshu**, and Judy W Gichoya. Using ImageBERT to improve performance of multi-class Chest Xray classification. 2020
8. Imon Banerjee, **Sinha, Priyanshu**, Saptarshi Purkayastha, Nazanin Mashhaditafreshi, Amara Tariq, Jiwoong Jeong, Hari Trivedi, and Judy W Gichoya. Was there COVID-19 back in 2012? Challenge for AI in diagnosis with similar indications. *arXiv preprint arXiv:2006.13262*, 2020
9. **Sinha, Priyanshu**, Saptarshi Purkayastha, and Judy Gichoya. Full training versus fine tuning for radiology images concept detection task for the ImageCLEF 2019 challenge. In *CEUR workshop proceedings*, 2019

Open-Source Contributions

Google Summer of Code (GSoC) Mentor @ LibreHealth | *Python, ML, Unity, VR* **May 2018 - Current**

- Mentoring GSoC students to develop UI for Virtual-Reality application and integrate machine learning models for classification, detection, and segmentation of disease in a VR environment for immersive learning during medical procedures. This app includes features such as voice chat, live streaming and video playback.
- Mentored a GSoC student to migrate the LibreHealth EHR application from native PHP to Django for modular code and ease in test-driven development.

Google Summer of Code (GSoC) Student @ LibreHealth | *Django, Database, Optimization* **May-August 2017**

- Refactored the LibreHealth EHR database and optimized it for better query performance.
- Migrated code to Django and implemented ORM and object-oriented practices such as inheritance and wrote unit tests for different modules.

Awards and Achievements

- Our team (of 3 members) won **1st** place in the AT&T 5G Sports hackathon in Fan Engagement category (held in Indianapolis, USA) where more than 25 teams participated.
- Our team (of 2 members) was selected in **top-50** in Hackerearth IndiaHacks hackathon out of 1500 teams globally.