# Yash Maurya

ymaurya@cs.cmu.edu | yashmaurya.com | LinkedIn: yashmaurya | Google Scholar | +1 412-214-2983

## EDUCATION

**Carnegie Mellon University (CMU)** Pittsburgh, PA
Master of Science in Information Technology - Privacy Engineering (MSIT-PE) | CGPA 3.97 / 4.0 Dec 2024
Graduate Courses: *Federated Learning, Differential Privacy, Prompt Engineering, AI Governance*
Research Areas: Unlearning in LLMs, Fairness, PETs(Privacy Enhancing Technologies), Synthetic Data, Implicit Bias Auditing

## SKILLS

**Programming Languages:** Python, Java, C/C++, JavaScript, SQL, Rust, Bash
**Libraries/Frameworks :** PyTorch, TensorFlow, HuggingFace, OpenAI, Pandas, Scikit-learn, Matplotlib, Numpy, SciPy
**MLOps Tools & Frameworks:** Wandb, Mlflow, Optuna, ZenML, Flask, Django, GCP, AWS, Docker, Kubernetes, Langchain, Streamlit, Node.js

## WORK EXPERIENCE

**Carnegie Mellon University** Pittsburgh, PA
*Research Assistant* Jan 2024 - Present

- Designed a practical, user-oriented threat modeling framework to identify privacy and AI threats related to notices and choices.
- Built on the Privacy-by-Design(PbD) principle to systematically tackle deceptive designs and protect user privacy.
- Conducting user studies for compare our framework with existing privacy threat modeling frameworks like LINDDUN and PANOPTIC

**Samsung Electronics** Noida, India
*R&D Engineer* July 2022 - Aug 2023

- Developed an image narrative generation module for Samsung Discover 2.0, using knowledge graphs & panoptic segmentation.
- Built large-scale data extraction, processing & ingestion engine for news articles using Selenium, BS4, handled 100k+ articles daily.
- Engineered Unsupervised Topic Taxonomy construction pipeline using 10+ Million articles for Samsung News' recommendation system.

**Samsung Electronics** Noida, India
*R&D Intern* Feb 2022 - June 2022

- Developed an efficient LSTM-based network for next-activity prediction, optimized for on-device mobile deployment.
- Designed a ResNet-based CNN to predict COVID-19 from cough sounds by analyzing MFCC images, achieving 83% accuracy.

**DynamoFL (YC W22)** San Francisco, CA | Remote
*Federated Learning Researcher* Feb 2021 - Aug 2021

- Implemented multiple state-of-the-art Federated Learning algorithms from scratch including FedAvg, FedProx, FedMD, and FedHE.
- Evaluated epsilon values for various differential privacy techniques with novel Laplacian and Gaussian noise addition algorithms.
- Engineered a PII sanitization portal leveraging Microsoft Presidio API and CTGAN for generating clean synthetic tabular data.
- Utilized PySyft, Flower, Opacus, PyTorch, Python, JavaScript, HTML, CSS, and AWS to accomplish project goals.

## PROJECTS

**Prompt-Driven Synthetic Data Augmentation for Bias Correction with Differential Privacy Alternative** March 2024

- Developed a secure data interface leveraging Streamlit, enabling efficient bias detection in datasets with Python, regex, and Sentence-BERT.
- Utilized LLMs to generate and apply regex queries for precise bias detection, enhancing fairness in machine learning models.
- Created synthetic counterfactuals using GPT-3.5, balancing datasets while preserving data privacy with differential privacy techniques.
- Ensured data privacy through differential privacy, employing an innovative epsilon-setting mechanism for synthetic data generation.

**Unmasking Threats in Topics API (Replacement of Ad Cookies)** | CMU Sept 2023 - Dec 2023

- Calculated Topics API's epsilon(privacy leakage budget) at 10.4 per week (epsilon > 10 signifies inadequate privacy protection)
- Identified edge cases and niche topics that would lead to users having a high probability of being re-identified.
- Our LLM based on Hierarchical BERT achieved 95.41% accuracy and 86.73% specificity for Membership Inference Attacks(MIA).
- Achieved 68.19% re-identification on an anonymized German Browsing Dataset, far surpassing Google's 1% claim.

**Is it worth storing historical gradients to identify targeted attacks in Federated Learning?** | CMU Sept 2023 - Dec 2023

- Improved label flip attack detection by up to 25% in FedAvg using current weights, not historical gradients for N=20,50,100 clients.
- Achieved an improvement of up to 15% for targeted attack detection in FedAvg with Differentially Private-SGD(DP-SGD) integration.
- Promotes data minimization for improving privacy of users and overall reducing storage costs.

**End-to-end production customer satisfaction prediction using MLOps** Dec 2023

- Improved customer product satisfaction regression R2 score by 12% applying ML algorithms like LightGBM, XGBoost, RandomForests.
- Conducted hyperparameter optimization with Optuna, monitored training with MLflow and Wandb for best hyperparameter identification.
- Implemented data ingestion, processing, train-test-split steps, followed by automatic model training & evaluation using RMSE, R2 scores.
- Enabled CI/CD support with automatic model inference API deployment using MLflow and Docker using model performance triggers.

## CERTIFICATIONS

**Certified Information Privacy Technologist (CIPT)** | IAPP - International Association of Privacy Professionals | Credential Jan 2024

## SELECTED PUBLICATIONS

P. Thaker, **Y. Maurya**, and V. Smith, "Guardrail Baselines for Unlearning in LLMs," **SET LLM@ICLR 2024**. https://arxiv.org/abs/2403.03329

**Y. Maurya**, P. Chandrahasan and P. G, "Federated Learning for Colorectal Cancer Prediction," 2022 **IEEE** 3rd Global Conference for Advancement in Technology (GCAT), pp. 1-5, doi: 10.1109/GCAT55367.2022.9972224

Rakshit Naidu, Soumya Kundu, Shamanth R Nayak K, **Yash Maurya**, Ankita Ghosh. "Improved variants of Score-CAM via Smoothing and Integrating". **Responsible Computer Vision(RCV) Workshop at CVPR 2021**. 10.13140/RG.2.2.23611.54563.