Ashtik Mahapatra

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Education

University at Buffalo (SUNY Buffalo) *Aug 2024 - Present*

- Masters of Science in **Computer Science & Engineering (AI/ML)** – GPA – 3.917/4.0

Work Experience

Data Science Intern – Magnit (*Wolters Kluwer - NYC***)** *June 2025 – August 2025*

- Developed extraction pipelines and automated business licenses using Langchain, RAG, VectorDB.

Data Scientist II - Wolters Kluwer *August 2021 – June 2024*

Platforms/Frameworks – Pytorch, NumPy, AWS, Azure, Dataiku, Apache Solr, MySQL, MSSQL

- **Borrower Analytics – Collateral Intel (Patent-pending, $6M+ in revenue)**
  - Winner of the **Global Innovation Awards (GIA) 2023** for architecting and implementing a data ingestion and extraction pipeline processing **22M+ UCC Lien Filings across 50 US states** spanning 23 years.
  - Implemented a form classifier pipeline containing Document Understanding Transformer (DONUT) achieving **98%+ F1 scores** across 20+ form categories, and an extraction model using LiLT for section detection and regex-based text extraction, achieving **90%+ F1 scores** in multiple fields.
  - Created POCs multiple open-source LLMs for extracting structured information from unstructured UCC images, and built workflows for performance monitoring, quality assessment, and error reporting.
- **Wolters Kluwer LegalView BillAnalyzer ($20M+ in revenue):**
  - On-boarded multiple clients and law firms onto the LBA Data Service by fine-tuning models and modifying business logic for complex free-text billing guidelines, achieving **80% precision and 70% recall**, leading to significant cost savings.
  - Designed a billing rate management system processing over **1M records per minute** and revamped classification models for the Prior Approval module using Spacy and Fasttext, improving precision by **14% and recall by 10%,** and migrated the module to Dataiku for enhanced MLOps and governance.

IBM (multiple internships): *May 2020 – July 2020, Jan 2021 – July 2021*

Platforms/Frameworks – OpenCV, Pytorch, AWS

- Document Denoiser using OpenCV and CNNs, as well as classifying documents for denoising with **95.4% accuracy.**
- Built automated pipelines using Step Functions and CloudFormation to tie S3, EMR and Redshift for the backend of an upcoming Asset Management business. Researched AI strategies and integration opportunities in Asset Management

Lawnics:

Sep 2020 – Jan 2021

Platforms/Frameworks – Pytorch, Scikit-Learn, ElasticSearch

- Created Named Entity Relationship Recognizer using Spacy and BERT for Information Retrieval of Legal Documents and achieved an accuracy of **85%+ in 5 target values** (Cases, Sections, Acts, Articles and Citations) and implemented a model for ranking of documents based on similarity index of the query using BM25 and indexed them into ElasticSearch.

Research and Conference Presentations

A Novel Approach for Identifying Social Media Posts Indicative of Depression *May 2020 – August 2020*

- Published as the **first author** in IEEE Xplore and presented at the 2020 IEEE International Symposium on Sustainable Energy, Signal Processing, and Cyber Security (iSSSC).
  https://ieeexplore.ieee.org/abstract/document/9358866

Academic Projects

Text-to-ASL Video Generation using Diffusion Models *March 2025 – April 2025*

- Developed an end-to-end deep learning pipeline for generating realistic American Sign Language (ASL) videos from text inputs. Leveraged Stable Diffusion fine-tuned with Low-Rank Adaptation (LoRA) to efficiently produce accurate, fluent, and visually coherent ASL gestures. Implemented Mediapipe for precise 2D skeleton extraction, ensuring consistent gesture representations. Enhanced video fluency through sophisticated frame blending and transition strategies, achieving high-quality sentence-level ASL videos suitable for accessibility applications, educational tools, and assistive technology.

Memory-Augmented Multi-Hop QA System on HotPotQA *March 2025 – April 2025*

- Built a **multi-hop QA system on HotpotQA** using a Memory-Augmented Neural Network with BERT embeddings, dual LSTM controllers, and a Neural Turing Machine-style memory for reasoning across paragraphs. Integrated BM25/BERTScore for paragraph retrieval and optimized training with mixed precision and learning rate scheduling. **Achieved 62.5% Exact Match and 90.5% F1 on the validation set.**

NY Taxicab
Feb 2025 – March 2025

- Built an end-to-end ML pipeline on the NYC Taxicab dataset to predict trip durations, using **LightGBM with FFT-based feature engineering for temporal patterns**. Achieved an **average MAE of 1.9**, significantly improving baseline performance. Managed features and model lifecycle with **Hopsworks (feature store, model deployment, and tracking**). Developed a public Streamlit app for real-time predictions and insights. Automated workflows via **CI/CD pipelines in GitHub Actions. Utilized AWS Glue for scalable ETL and AWS Lambda** for event-driven processing. Created a Power BI dashboard with multiple visualizations.

Image Classification with VGG-16 and ResNet-18 *Feb 2025 – Mar 2025*

- Implemented VGG-16 and ResNet-18 from scratch in PyTorch for a 3-class image classification task, comparing standard CNNs with residual networks. The best VGG-16 model achieved **95.1% accuracy**, outperforming ResNet-18 (92.6%) on a small dataset.

Time-Series Forecasting of Air Pollution using LSTM Networks *Feb 2025 – Mar 2025*

- Developed a time-series forecasting model using a multi-layer bidirectional LSTM on the **Air Quality UCI dataset**, achieving **R^2 score of 0.80 and MAE of 0.035**, with extensive preprocessing, hyperparameter tuning (grid search), and early stopping to optimize performance.

Sentiment Analysis of Airline Tweets using LSTM with Attention and TF-IDF Features *Feb 2025 – Mar 2025*

- Developed a sentiment analysis system on the Airline Twitter Sentiment dataset using LSTM-based architectures. Built a baseline multi-layer LSTM model achieving **76% accuracy**, then significantly improved performance by integrating **a bidirectional LSTM with an attention mechanism, pretrained GloVe embeddings, and TF-IDF** features, **reaching 81% test accuracy**. Applied text augmentation, n-gram extraction, and class balancing techniques to enhance model generalization, particularly for underrepresented sentiment classes. Leveraged early stopping, AdamW optimizer, learning rate scheduling, and extensive hyperparameter tuning to optimize training and prevent overfitting, resulting in improved F1-scores for neutral and positive sentiment detection.

Medical Image Classification (OCTMNIST) *Jan 2025 – Feb 2025*

- Built a custom CNN with dropout, batch normalization, and ReLU activations for multi-class classification on 28x28 retinal OCT images. **Achieved 93.64% test accuracy**, optimized using Adam and cross-entropy loss. Evaluated using F1-score, ROC, and confusion matrix.

Sign Language Recognition in Odia *(Final semester project)* *Dec 2020 – June 2021*

- Envisioned and developed a solution for recognizing sign language in Odia using a 7-layered Bi-directional LSTM to detect 21 palm coordinates in 3D from video streams, achieving **80.64% accuracy in continuous video** and over **90% in individual word prediction**.

Audio Event Detection and Obstacle Avoidance Mobile Robot – IIT Kanpur *June 2019 – July 2019*

- Worked on Machine Learning, Natural Language Processing, and various IoT components, successfully completing a CNN-based Audio Event Detection project using Mel Frequency Cepstral Coefficients (MFCC) and implementing linear gradient and back-propagation models in Raspberry Pi to create a Mobile Obstacle Avoidance Robot using IR sensors, Sonar, and NODE MCU.