ANANNYA POPAT

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EDUCATION

University of Toronto   **Sep 2023 - Jan 2025**
Master's, Applied Computing, AI Concentration   *GPA: 3.94*

PROFESSIONAL EXPERIENCE

NextPathway   **Toronto, ON, Canada**
AI (Automation) Engineer   *Aug 2025 - Present*
- Analyzed client requirements and modernization objectives across diverse ETL and data platforms, including SQL, Hadoop, Spark, and DataStage.
- Designed and implemented custom LLM-powered AI agent pipelines to convert legacy code to Snowflake, extract metadata, and map job lineage with 100% accuracy; reducing manual effort by cutting translation duration on client data from 2 years to 6 months on average.
- Enabled the organization to attain Snowflake's highest partner designation and drive multi-million-dollar revenue growth across enterprise client engagements.

University Health Network (UHN)   **Toronto, ON, Canada**
Machine Learning Specialist   *Feb 2025 - Aug 2025*
- Engineered an interactive 3D anatomical model simulation from CT scans using TotalSegmentator, VTK (C++) and Blender to enhance surgical planning.
- Integrated a fine-tuned GAN model into the backend pipeline via Docker containers to apply realistic medical textures onto anatomical structures.
- Currently working on integrating the MedSAM2 API into the backend pipeline using CI/CD principles, as a part of the 3D modelling web application.
- Contributing to the development of a Tool-Tissue Interaction (TTI) detection model using YOLOv11 (transfer learning) and training a Vision Transformer (ViT) model using Focal Loss for precise tool and interaction classification to advance surgical practice in real-time.

University Health Network (UHN)   **Toronto, ON, Canada**
AI Research Intern   *May 2024 - Dec 2024*
- Led the development of an interactive 3D anatomical model from patient-specific CT scans to enhance surgical planning.
- Leveraged nnU-Net based TotalSegmentator for precise tissue segmentation and implemented interactive 3D modeling using Visualization Toolkit (VTK).
- Performed a comparative study on texture extraction and mapping for medical images using Wavelet Transform, Gabor Filters, fine-tuned Neural 3D Style Transfer, and fine-tuned GramGAN, where deep learning techniques performed 61.4% better than traditional methods.

AdGlobal360   **Gurugram, HR, India**
Data Science Intern   *May 2022 - Jul 2022*
- Developed an lead scoring prediction model using XGBoost to identify potential buyers based on website activity with 95% F1 score.
- Worked with big data and performed exploratory data curation and analysis using SQL, Spark and Python frameworks for accessing client data entries for ML modeling.

PROJECTS & OUTSIDE EXPERIENCE

Ink-To-Tint: Manga Artisan - *Link to project*   **Toronto, ON, Canada**
Master's Academic Project, University of Toronto
- Automated manga colorization and style conversion to enhance readability and ease artists' workload.
- Optimized image processing techniques like dodging and dilation to decolorize colored manga datasets.
- Trained a Pix2Pix conditional GAN from scratch using quantization to colorize black-and-white manga pages with a 55% decrease in MSE loss.
- Applied knowledge distillation using a pre-trained Stable Diffusion model (MeinaMix v10) to enable manga style transfer across four distinct art styles.

Pocket Comedian: BosonAI Hackathon Winner - *Link to project*   **Toronto, ON, Canada**
BosonAI Hackathon Project
- Developed a real-time "pocket comedian" application using Audio LLMs, Flask and Socket.IO, enabling seamless speech-to-speech comedic interactions in an engaging UI.
- Integrated the Higgs Audio Understanding Model for speech input processing, Qwen3 for generating context-aware comedic responses, and the Higgs Audio TTS Model for expressive comedic response.
- Implemented features such as response-voice selection based on your favorite comedian, different comedic modes, multi-turn conversation memory for better banter and integration of Mandarin and French input and audio responses.

Text-based 3D Gaussian Splatting Object Segmentation - *Link to project*   **Toronto, ON, Canada**
Master's Academic Project, University of Toronto
- Developed a 3D Gaussian Splatting segmentation model using LangSAM for multi-model text-driven 3D segmentation.
- Devised an optimized prompt initialization strategy employing K-means clustering for optimal view selection and point sampling.
- Improved IoU by 3%, accuracy by 1%, and reduced computational load by 50% while maintaining ear-optimal results.
- Improved results for the paper "SAGD: Boundary-Enhanced Segment Anything in 3D Gaussian via Gaussian Decomposition".

Optimized LLM and RAG Modeling: Classification and Instruction Fine-Tuning - *Link to project*   **Toronto, ON, Canada**
Personal LLM and RAG Project
- Integrated attention mechanisms like causal, multi-query, and grouped multi-query attention with KV cache optimization.
- Experimented with positional embedding strategies in Transformers such as sinusoidal, learned, and relative position embeddings.
- Implemented classification and instruction fine-tuning of GPT2 using different prompt styles and data processing techniques.
- Deployed on AWS Sagemaker using an MLOps pipeline for automated training, validation, and deployment.
- Built a RAG agent (Agentic AI) for Pokemon Battle Analysis using Gemini API, LangChain and Streamlit: https://pokemon-rag-agent.streamlit.app/

Qualitative Badminton Player Detection and Analysis   - *Link to project*   **Vellore, TN, India**
Bachelor's Capstone Project, Vellore Institute of Technology
- Detected the exact boundary points of the badminton court using Probabilistic HoughTransform and K-means Clustering.
- Tracked near and far-side badminton players in videos using the Particle Filter algorithm with 99% accuracy.
- Predicted badminton strokes (net-drop return, defense, smash) of near-side player using Pillow and CNNs, with 81% accuracy, with the aid of pose estimation algorithm using OpenPos.

SKILLS

Skills: Python, R, Java, SQL, HTML/CSS, Pytorch, Tensorflow, OpenCV, Scikit-learn, Streamlit, Flask, Blender, Git, Linux/Unix, Docker, Computer Vision, Machine Learning, Pandas, NumPy, Natural Language Processing (NLP), C/C++, Blender, VTK, NiBabel, Deep Learning, Spark, AWS Sagemaker, REST APIs, NLTK, Large Language Models, LangChain, Computer Graphics, Kubernetes, Hadoop

PUBLICATIONS

Movie Poster Genre Classification using Federated Learning, ICMLDE 2022, Elsevier
Published paper (11 citations): doi.org/10.1016/j.procs.2023.01.177
- Designed a decentralized federated architecture for movie genre classification, achieving 81% accuracy with local CNN training, enhanced privacy and reduced storage requirements (Google Scholar Profile).

An optimized handwritten polynomial equations solver using an enhanced inception V4 model, *Multi-media Tools and Applications 2023, Springer*
Published Paper (9 citations): doi.org/10.1007/s11042-023-17574-1
- Web-based system that uses an enhanced Inception V4 CNN to recognize and solve handwritten polynomial equations. The model is trained on data from MathNet (arithmetic symbols), MNIST (digits), and EMNIST (alphabet characters) (Google Scholar Profile).

Histology Classification for Early Gastric Cancer using AI Model, SAGES 2025 *Conference Presentation, UHN*
- Fine-tuned ResNet50 model to classify histologic types in early gastric cancer (EGC) from endoscopic images, achieving 91% specificity for undifferentiated types and 87% specificity for differentiated type (Google Scholar Profile).