Riyank Mukhopadhyay

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EDUCATION

M.S. Computer Science *(specialization in Artificial Intelligence)* **Aug 2021 - May 2023**
Arizona State University, Tempe, AZ 3.93 / 4.00 GPA
Core Courses: Artificial Intelligence, Machine Vision & Pattern Recognition, Data Intensive Systems for Machine Learning, Data Science, Cloud Computing

B.Tech. Computer Science (*First class with distinction*) **May 2016 - Aug 2020**
Amrita University, Coimbatore, India 3.75 / 4.00 GPA
Core Courses: Data Structures & Algorithms, Operating Systems, Compiler Design, Computer Networks, Computer Organization & Architecture

TECHNICAL SKILLS

Areas of Interest	Generative AI, Computer Vision, Backend Development, Cloud & Security
Programming Languages	Python, Java, C/C++, Bash, SQL, Terraform, MATLAB
Frameworks	TensorFlow, PyTorch, AutoGen, Hadoop, MongoDB, Node.js
Libraries	Opensearchpy, unstructured.io, composio, OpenCV, Transformers, OpenPose, Boto3, LlamaIndex, Hugging Face, Ray, FastAPI
Software	Docker, Jenkins, Git, Kubernetes, Datadog, Postman, Intel CVAT, Blender
AWS	OpenSearch, Lambda, SQS, S3, SageMaker, DynamoDB, IAM, EC2, EKS, Bedrock Knowledgebase, API Gateway, Glue, Redshift

PROFESSIONAL EXPERIENCE

Arizona State University, Tempe, AZ: Machine Learning Engineer Oct 2023 – Present

- Automated cloud infrastructure provisioning using **Terraform** and **Jenkins**, deploying **ASUGPT**, **MyAIBuilder**, and custom APIs across POC, Beta, and Production environments on **AWS**.
- Developed a serverless **Data Indexer** leveraging data ingestion in **AWS OpenSearch Serverless/Cluster**, **MemoryDB**, **Azure Cognitive Search**, and **Milvus** vector databases, enabling scalable indexing of **35+** file formats via multi-stage Docker builds on **Kaniko**.
- Designed and implemented a custom vector index for **multi-agent RAG-based search and retrieval**, optimizing **context-aware** responses for the **DSL AI Companion Chatbo**t using course materials from **BIO-181** (**Canvas LMS**).
- Architected the **Integration Engine**, an API-based **ETL** platform for real-time data ingestion into vector databases from data sources such as **Guru**, **ServiceNow**, **Canvas**, and **iSearch**, leveraging a serverless architecture with a cron-based scheduling system.
- Developed a scalable **OCR** endpoint for multimodal LLM support, enabling advanced text extraction from handwritten documents and images in a fully serverless environment.
- Enhanced ingestion speeds by **3x** for large-scale **RAG** applications, reducing bottlenecks in **chunking**, **tokenization**, and **embedding** stages using parallel processing, batching, and optimized multi-threading techniques.

Sportsbox.AI, Bellevue, WA: ***Machine Learning Engineer Intern*** Jun 2022 – Aug 2022

- Optimized and scaled ML infrastructure supporting **2D/3D** human pose estimation models for **Golf swing detection** and **ball tracking**, improving responsiveness for **2k+ users** across Android and web applications.
- Trained **OpenPose** model for single-camera human motion analysis, improving pose estimation accuracy metric for **Golf biomechanics** applications.

Centre for Artificial Intelligence & Robotics (CAIR), Bangalore, India: ***Computer Vision Engineer*** Dec 2019 – Jun 2021

- Developed a **biometric computer vision system** combining **3D spatial gait and face recognition** for real-time identification of person of interest, achieving **85%+ rank-1 accuracy** in real-world deployments.
- Implemented multi-camera tracking and recognition, deploying the system **on-premises** across multiple **AXIS M55 PTZ** cameras, ensuring consistent identity tracking across different viewpoints.

PROJECTS & RESEARCH

SARAH: Semi-Automated Rehabilitation at Home – ASU (GRA at Geometric Media Lab) Fall 2022 – Spring 2023

- Developed a computer vision-based rehabilitation system to assess upper extremity movement quality in stroke survivors, improving adaptive therapy assessments based on the **Action Research Arm Test** (ARAT).
- Implemented a **Detectron2-based** object detection model with an intelligent tracking algorithm, achieving **90%+** accuracy in detecting **16** different ARAT objects from three viewing angles across **106** patients.
- Enhanced **3D hand-mesh reconstruction** using **RGBD** image data, refining hand-object interaction tracking with **transformer-based models**.

Interactively Summarizing Reinforcement Learning Policies (RLHF) – Data Visualization, ASU Spring 2023

- Developed a *visualization interface* that lets a user interactively manipulate and tweak the Comprehensible Abstract Policy Summaries (CAPS) algorithm for training RL agents on popular Open AI Gym environment domains.
- Conducted detailed exploration and analysis of *RL models policies*, including **Action/Reward/Value** distribution, leading to enhanced *model understanding* and contributing to a **20%** improvement in *policy optimization*. (Journal Paper submitted to Visual Informatics 2024)

Anomaly Detection: How to find rare/unusual instances/groups – Statistical Machine Learning, ASU Spring 2022

- Applied various supervised machine learning algorithms, including **XGBoost**, **SVM**, **Multilayer Perceptron**, and **KNN**, to *detect anomalies* in time-series Walmart data, improving model performance using **MAE**, **MSE**, and **F1** performance metrics.
- Utilized unsupervised learning techniques, such as **One-Class SVM**, **Isolation Forest, DBSCAN**, **FB Prophet**, and **GluonTS**, for detecting anomalies in labeled and unlabeled data, focusing on efficiency and computational complexity.