Rajat Goyal

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PROFESSIONAL EXPERIENCE

AI Engineer, *Graymatics*   Mar 2024 – present | United Kingdom
- *Sembcorp Waste Management*: Optimised waste management processes by training a YOLO model on 14 recycling classes and automating object counting and weight estimation using Python, reducing manual labour and processing time by 45%.
- *BEL Mall Monitoring*: Enhanced customer analytics by implementing a real-time tracking algorithm to count visitors and identify gender and age groups, resulting in a 25% improvement in customer segmentation accuracy and actionable insights for targeted marketing.
- *Indian Government Smart City*: Working on an object detection alert system for crowd management, abandoned objects, purse snatching, and accidents using bounding boxes attributes reducing incident response time.
- *Wincanton*: Streamlined warehouse safety by preprocessing data and training a YOLOv7 model for deployment with ONNX Runtime and Triton Inference Server, implementing ROI-based safety alerts that reduced pallet obstructions and improved safety by 40%.
- *Indonesian Government Smart City:* Developed a custom AI model for issuing parking violation tickets by detecting vehicle types (including auto-rickshaws) and recording their parking duration. Collected vehicle-specific data from multiple sources, deriving relevant images from the original COCO dataset, projected to improve parking violation detection efficiency by 35%.

Operational Support Administrator, *Homes for Students*   Sep 2023 – Mar 2024 | United Kingdom

Residential Assistant, *University of Nottingham*   Sep 2022 – Sep 2023 | United Kingdom

EDUCATION

University of Nottingham, *MSc Machine Learning in Science*   Sep 2022 – Sep 2023 | United Kingdom
- Achieved **high merit**.
- Studied Machine Learning as a core component across multiple modules, including Deep Learning, Big Data, Computer Vision and Applied Statistics.

Manipal University, *BSc Computer Science*   Jul 2018 – Jun 2022
- Achieved a **First Class** UK degree equivalent with a CGPA of 8.87/10.

PATENT

Brain Tumour Detection, *Indian Patent Office*   Dec 2023
- Collaborated with Manipal University on a patent application, **published** on 22nd December 2023 by the Indian Patent Office.
- Developed a classifier to distinguish malignant from benign brain tumours using various CNN models, transfer learning, ensemble stacking, and GAN-generated MRI data (**novel**) for improved generalisation.

PROJECTS

2D and 3D Diffusion to Simulate the Universe, *Postgraduate Dissertation*   Jun 2023 – Aug 2023
- Replicated 2D and 3D Universe simulations using latent diffusion and a **novel** point voxel diffusion approach, focusing on dark matter particle coordinates.
- Achieved significant correlations between simulations and real data with a closely matching power spectrum, showcasing the potential of machine learning in efficient universe simulations.

DEBUGGATI: Autonomous Driving PiCar   Mar 2023 – May 2023
- Developed and evaluated CNN architectures for autonomous driving, combining self-made and transfer learning models.
- Achieved fourth place in a Kaggle competition with an MSE of 0.01455 using InceptionResNetV2; deployed MobileNet on a Picar using Linux for live demos with self-collected data.

Identifying Ransomware Payment within Bitcoin Transaction, *Big Data*   Mar 2023 – May 2023
- Used big data and machine learning to identify ransom-related Bitcoin transactions in a dataset of 2.9 million instances.
- Compared ML models, with decision trees outperforming others by achieving 95.65% accuracy and a macro F1 score of 0.46. Addressed data imbalance using the SMOTE-ENN technique.

SKILLS

Machine Learning — Supervised and Unsupervised Learning, Deep Learning, CNN, Generative Models (GANs, Diffusion), Tensorflow, Keras, Pytorch, TensorRT, Cuda toolkit, Applied Statistics

Computer Vision — Image Classification, Object Detection, Object Segmentation, Object Tracking

Big Data — Map-Reduce, Hadoop, SQL, Pyspark, Microsoft Azure

DevOps — ONNX, Docker, Triton Inference Server, Conda Environment

Data Engineering — Data Visualisation, Exploratory Data Analysis, Data Pre-processing, Annotations, Undersampling and Oversampling

Programming — Python (numpy, matplotlib, pandas, openCV, einops), C++, Object Oriented Programming, Data Structures and Algorithms, Matlab, R, Linux, Bash

Soft Skills — Problem solving and Critical thinking, Communication skills, Collaboration and Teamwork, Adaptability and Flexibility