

AMAN KUMAR

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RESEARCH AREAS

Visual Analytics, Advanced Analytics, Interactive Machine Learning, Human-Computer Interaction, Explainable AI, Uncertainty, Time Series, Decision Sciences, Large Language Models (LLMs), and Multi-Criteria Decision Support.

EDUCATION

University of Leeds

Master of Science in Business Analytics and Decision Sciences

September 2023 – December 2024

Leeds, United Kingdom

- Graduated with Distinction; GPA: 4/4.
- Courses: Quantitative Analysis, Advanced Predictive Analytics, Consultancy, Multi-Criteria Decision Analysis, Time Series Forecasting, Advanced Management Decision-Making, Data Visualization, Text Analytics, Machine Learning.

Indian Institute of Science Education and Research Bhopal

BS-MS Dual Degree in Mathematics

August 2017 – July 2022

Bhopal, India

- Graduated with Distinction; Master's Grade: 10/10.
- Courses: Probability and Statistics, Data Structures & Algorithms, Advanced Linear Algebra, Artificial Intelligence, Machine Learning, Biostatistics, Cryptography, Computational Linguistics, ODEs & PDEs.

TECHNICAL SKILLS

- **Programming & Data Management:** Python, R, SQL, MATLAB, GitHub, Pandas, NumPy, Apache Spark, Databricks, ETL Pipelines, FastAPI, Flask, Django, Node.js, REST APIs, GraphQL.
- **Data Analysis & ML:** Predictive Analytics, A/B Testing, Multivariate Analysis, Feature Engineering, Time Series, Ensemble Methods, NLP, TensorFlow, PyTorch, AutoML, LLM Integration (OpenAI API, Anthropic API), LangChain, Prompt Engineering, RAG Systems.
- **Visualization & Deployment:** Power BI (DAX), Tableau, Looker, Matplotlib, Seaborn, Streamlit, QlikView, Docker, Kubernetes, JavaScript, React, HTML/CSS, Bootstrap, Tailwind CSS.
- **Business Frameworks:** SWOT, PESTEL, Root Cause & Cost-Benefit Analysis, KPI Development.

RESEARCH EXPERIENCE

Researcher: Personalized Visual Analytics

University of Zürich

March 2025 – Present

Zurich, Switzerland

- Identified shortcomings in current multi-criteria decision systems that lead to suboptimal, non-transparent rankings.
- Developed an interactive VA framework to capture complex user preferences via explicit inputs and implicit feedback.
- Engineered a prototype with advanced attribute scoring, uncertainty visualization, and LLM-powered natural-language explanations in a human-in-the-loop system.
- Established a scalable, transparent prototype improving decision accuracy and user trust for real-world applications.

Researcher: Evaluating the Stability of SHAP Under Class Imbalance

University of Leeds

January 2024 – October 2024

Leeds, United Kingdom

- Developed and executed an experimental framework to assess the stability of SHAP values across machine learning models (SVM, KNN, Decision Trees, XGBoost) using an imbalanced diabetic and financial credit fraud dataset.
- Developed SMOTE-Tomek hybrid sampling to create datasets with varying class imbalance ratios (1%, 5%, 10%, till 50%) and introduced a novel metric, Coefficient of Variation (CV), for quantifying SHAP value stability.
- Generated visual insights using SHAP plots and box plots to communicate the impact of class imbalance on feature importance stability, aiding stakeholders in balancing accuracy and interpretability in machine learning models.

Researcher: Fourier Analysis and Roth's Theorem

Indian Institute of Science Education and Research Bhopal

July 2021 – July 2022

Bhopal, India

- Studied Fourier analytic techniques and applications to Roth's Theorem in additive combinatorics.
- Explored recent advancements in the finite field setting and breakthroughs in upper bounds for the Cap-set problem using the polynomial method.
- Developed understanding of mathematical proofs in additive combinatorics and the elegance of solving problems.

PROJECTS

Machine Learning Model for Predicting ICO Success

January 2024 - May 2024

- Develop a model to predict the success of Initial Coin Offerings (ICOs) to assist investors and fundraising teams.
- Analyzed 2767 ICOs rows of data using models like Logistic, Decision Trees, Random Forest, SVM, and ANN.
- Recommendations were provided for investors and fundraising teams, suggesting the adoption of specific machine learning models (e.g., ANN for investors and Decision Trees for fundraising teams) based on goals and risk tolerance.

Universal Exports Business Operations Analysis

January 2024 - May 2024

- Extract, clean, transform, and integrate data from five disparate sources to develop an interactive Power BI dashboard.
- Using DAX measures to calculate key metrics (e.g., profit margins, monthly sales, transaction counts) and automating financial performance tracking through visual trends and comparisons.
- Secured £249M in UK sales with a 9.28% increase in air shipments, highlighting a need for sustainability.

Forecasting for PCE

January 2024 - May 2024

- Prepared a seasonally adjusted time series dataset of PCE to evaluate trends, volatility, and forecasting methods.
- Created forecasting models (Drift, Holt's Linear, ARIMA) & validated models using MAPE and MASE metrics.
- Designed an ARIMA (3,2,2) model with the lowest MAPE (5.30%), delivering precise forecasts for October 2024.

Hotel Review using Topic Modelling

January 2024 - May 2024

- Proposed customer feedback to improve service quality and align with guest expectations.
- Preprocessed 2,000 reviews created Document-Term Matrices for both positive and negative reviews then applied LDA.
- Identified "Service Quality" as the most praised feature (14.41% prevalence) and "Food and Dining" as the most criticized (14.53%), empowering hotel management to enhance strengths and address weaknesses.

Autonomous Shipment Roll-out Project

September 2023 - January 2024

- Analyze performance metrics and allocate resources to maximize delivery efficiency within a budget of £250,000.
- Applied the VIKOR and TOPSIS methods for multi-criteria decision-making, balancing cost, reliability, and operational efficiency across four robot prototypes.
- Allocated 29 Deviant as a robust choice, achieving a total of 221 orders per day while staying within 97.72% of the allocated budget.

TEACHING ASSISTANT

Indian Institute of Science Education and Research Bhopal

Bhopal, India

- * Introduction to Programming
- * Linear Algebra
- * Artificial Intelligence and its Scientific Applications

University of Zürich

Zurich, Switzerland

- * Interactive Visual Data Analysis

STUDENT SUPERVISION

- Bachelor's Thesis: Inference of Attribute-Based Ranking Models from Item-Based Preferences
- Master's Independent Study: Training Item-Based Rankers from Attribute-Based Preferences
- Master's Project: Personalized Ranking: Human Preference Elicitation for Multi-Criteria Decision Making

CONFERENCES AND WORKSHOPS

EuroVA 2025 | 16th International EuroVis Workshop on Visual Analytics

June 2025

Winter School on Deep Learning | Indian Statistical Institute

December 2023

- * Reinforcing Science with Foundation Models: Towards an Amazing Confluence

Machine Learning for Cryptology (ML4Crypto) | ISI Kolkata

December 2022

- * Advanced workshop on applications of machine learning in cryptology

Summer Workshop in Applied Mathematics (SWAM) | TIFR Bangalore

July 2021

- * Intensive summer program focused on advanced topics in applied mathematics

LEADERSHIP & AWARDS

- * Top 6 in IIM Calcutta Datathon 2.0 for innovative analytics solutions.
- * 6th place out of 1,500+ in Machine Learning in Agriculture Hackathon.
- * Ranked in the top 1% among 1.5M candidates in JEE Advanced.
- * Delivered data-driven solutions improving efficiency and reducing costs by 10% in key projects.