Mohit Mittal

Senior AI Data Scientist, Ph.D.

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Overview

Senior AI Data Scientist with a Ph.D. in Computer Science and 7+ years of experience delivering production-grade AI/ML solutions across industry and research. Proven expertise in building end-to-end ML systems—automated data pipelines, model training/optimization, deployment, and monitoring—with deep specialization in LLM fine-tuning (LoRA/QLoRA), RAG pipeline architecture, agentic AI workflows, self-hosted LLM inference, and production MLOps. Experienced with cloud platforms (Azure, AWS), containerized deployments (Docker), and DevOps practices (CI/CD, DVC, GitOps). Published researcher with 1,900+ citations, focused on explainable, trustworthy AI with measurable business impact.

Professional Experience

2025–Present **Senior AI Data Scientist**, *Smart Labs AI GmbH*, Augsburg Germany

[1] AI-Driven Behavioral Biometrics for Secure Authentication

- Designed and benchmarked deep learning architectures (CNN, LSTM, Siamese Networks) for user recognition in behavioral biometrics-based authentication systems.
- Built similarity-based verification pipelines and evaluated security metrics (FAR/FRR) alongside usability, achieving production-ready performance thresholds.
- Conducted systematic ablation studies and hyperparameter optimization, improving model accuracy through structured experimentation and CI-integrated testing. .

[2] Self-Hosted AI Agent for Secure Documentation (RAG)

- Architected a full RAG pipeline: document ingestion, intelligent chunking, embedding generation (HuggingFace/OpenAI), and vector storage with access-controlled retrieval.
- Built agentic AI workflows using n8n for automated document processing, query routing, and multi-step reasoning over enterprise knowledge bases.
- Deployed self-hosted LLM stack (Ollama/vLLM) with Docker Compose, implementing guardrails, structured output validation, and automated quality assurance.

2022–2025 **Data Scientist**, *Shiratech Knowtion GmbH*, Karlsruhe, Germany

[2.9 years]

[1] Integrated LLMs into an AI-powered assistant to streamline requirement analysis in Jira-based workflows.

- Extracted key insights from Jira tickets using LLMs.Translated unstructured text into structured requirements and user stories.
- Identified inconsistencies, missing details, and ambiguities in Jira requirements.Suggested clarifications and improvements for better requirement definition.
- Generated requirement summaries and impact analysis reports using LLMs.

[2] Machine learning-based analysis of train information using MLOps and survey data.

- Led the development of ML models for automated data processing, visualization, and predictive analytics in railway operations.
- Designed and implemented MLOps pipelines for automated model deployment, monitoring, and continuous integration.
- Built interactive dashboards that leverage machine learning insights for operational optimization and stakeholder decision making.
- Applied advanced data visualization techniques to optimize railway scheduling, detect anomalies, and improve operational efficiency.
- Developed automated data analysis reports, improving decision-making for railway operations

[3] AI-based predictive maintenance for windmill blade fault detection using radargrams.

- Developed and deployed a Hybrid CNN model to classify faulty and non-faulty windmill plates with 91.8% accuracy.
- Processed radargram images and extracted sensor attributes such as wind speed, rotor speed, pitch, and temperature to enhance model accuracy.
- Implemented Explainable AI (LIME) techniques to highlight critical sensor features that influence fault predictions.
- Designed a scalable and efficient defect detection model, reducing maintenance costs by 30% and improving turbine uptime.
- Optimized AI-powered analytics for real-time monitoring and predictive maintenance.

2020–2022 **Postdoctoral Researcher**, *INRIA*, Lille, France

[2 years] Inspecting and Debugging Visual Question Answering Systems via Post-hoc Explanations.

- **Objective:** To provide detailed insights into the prediction process of a Visual Question Answering (VQA) system by analyzing both **natural language (NLP) and image-based AI models**, enabling end-users to understand how the system processes textual and visual inputs to generate predictions
- **Role and Responsibilities:**
  - Worked on **Natural Language Processing (NLP)** and **image-based AI models** to analyze and explain how multimodal AI systems make predictions.
  - Tackled the challenge of **explainability in deep neural networks**, which is complex due to their black-box nature.
  - Developed post-hoc interpretability methods to generate explanations for VQA model decisions, combining **text and image analysis**.
  - Implemented **attention visualization and feature attribution** to highlight key text-image interactions in model predictions.
  - Ensured that the explainability framework provided **actionable insights** for end-users, making AI systems more transparent.

2019–2020 **Postdoctoral Researcher**, *Kyoto Sangyo University*, Kyoto, Japan

[1.7 years] **Accurate Social Media Mapping with Physical Location Based on Machine Learning.**

- **Objective:** To improve the accuracy of geo-tagged data from social media, which is often too imprecise for microscale analysis by leveraging **machine learning, natural language processing (NLP), and geospatial analysis.**
- **Role and Responsibilities:**
  - Addressed the limitations of geo-tagged data, which frequently restricts its usefulness in location-based studies due to inaccuracies.
  - Applied NLP techniques to analyze social media text, extracting location-related context and improving geospatial mapping accuracy.
  - Conducted a study to demonstrate how text-based analysis and machine learning can align social media data with precise physical locations, improving its application for microscale analysis.
  - Explored methods to correct and refine location data by integrating textual and geospatial information, providing a more reliable dataset for researchers and urban planners focusing on location-specific insights.

2019 **Machine Learning Engineer & Educator**, *Chitkara University*, India

[3 months] Educate and mentor students on Machine Learning, AI, and Deep Learning, bridging the gap between theoretical knowledge and real-world applications.

- Designed and delivered courses on Machine Learning, AI, and Deep Learning.
- Conducted hands-on workshops on AI applications for real-world problem-solving.
- Supervised students in research projects involving computer vision and NLP applications.

2018–2019 **Machine Learning Engineer & Educator**, *AKGEC*, India

[7 months] Build a strong AI and data science foundation for students by integrating TensorFlow, PyTorch, and NLP techniques into the curriculum.

- Taught AI, Deep Learning, and NLP, guiding students through practical ML projects.
- Developed an AI-based curriculum integrating TensorFlow & PyTorch for hands-on learning.
- Mentored research on neural network optimization and development.

2017–2018 **AI Researcher & Educator**, *MIET*, India

[1.5 years] Advance research in AI, computer vision, and NLP, while mentoring students in real-world AI problem-solving techniques.

AI research initiatives, focusing on computer vision and NLP applications.Developed custom AI models for text classification and sentiment analysis. Taught Deep Learning, Data Science, and AI methodologies to graduate students.

Education

2012–2018 **Ph.D Computer Science**, *Gurukul Kangri University*, India

Study and Analysis of Quality of Services Provisioning in Wireless Sensor Networks Using Artificial Intelligence Techniques.

- AI-Driven Network Optimization: Designed machine learning-based models to improve data routing, reduce latency, and enhance network reliability.
- Energy Efficiency Enhancements: Developed intelligent algorithms to optimize power consumption, extending the lifespan of sensor nodes.
- Real-Time Decision Making: Applied AI techniques to predict network congestion and proactively manage sensor data flow.

2010–2011 **M.Tech Computer Science**, *Guru Nanak Dev University*, India

2006–2010 **B.Tech Computer Science**, *Guru Nanak Dev University*, India

Technical Skills

[1] Generative AI & Large Language Models (LLMs)

- **LLM APIs & Platforms:** OpenAI API, Claude API, Azure OpenAI, HuggingFace Inference.
- **LLM Frameworks:** LangChain, LangGraph, LlamaIndex.
- **Large Language Models:** LLaMA, Mistral, GPT, Phi, Gemma.
- **LLM Fine-Tuning:** LoRA, QLoRA, PEFT, Retrieval-Augmented Generation (RAG).
- **LLM Evaluation & Safety:** Prompt Engineering, Guardrails, Hallucination Detection, Structured Output Validation.
- **Vector Databases:** ChromaDB, Qdrant, Weaviate, Pinecone.

[2] Agentic AI & Workflow Automation

- **Agent Frameworks:** n8n AI Agents, CrewAI, Multi-Agent Orchestration.
- **Self-Hosted AI Infrastructure:** vLLM, Ollama, LocalAI, Docker Compose Deployments.
- **Capabilities:** Tool-Use / Function-Calling, Query Routing, Multi-Step Reasoning, Agentic RAG.

[3] Machine Learning & Deep Learning

- **Classical ML:** Logistic Regression, SVM, Random Forest, XGBoost, Gradient Boosting.
- **Deep Learning:** CNN, RNN, LSTM, Transformers, Siamese Networks.
- **NLP:** BERT, Text Classification, Sentiment Analysis, Named Entity Recognition, Chatbots.
- **Computer Vision:** Image Classification, Object Detection, Attention Visualization, Grad-CAM.
- **Explainable AI (XAI):** SHAP, LIME, Feature Attribution, Integrated Gradients.

[4] MLOps, DevOps & Cloud Infrastructure

- **Experiment Tracking:** MLflow, Weights & Biases, DVC (Data Version Control).
- **CI/CD & GitOps:** Jenkins, GitHub Actions, GitLab CI/CD, GitOps Workflows.
- **Containerization & Orchestration:** Docker, Docker Compose, Kubernetes (Basics), Helm.
- **Cloud Platforms:** Azure (AI Studio, ML), AWS (SageMaker, EC2), Google Cloud Basics.
- **Infrastructure:** Terraform (Basics), Airflow, Model Registry, Drift Monitoring, Automated Retraining Pipelines.

[5] Programming & Frameworks

- **Languages:** Python, SQL, PySpark, C, C++, Java, Bash, YAML.
- **ML/DL Frameworks:** PyTorch, TensorFlow, Scikit-learn, HuggingFace Transformers.
- **Development Tools:** FastAPI, Streamlit, Git, Docker, Jupyter, VS Code, JetBrains, Linux/Unix CLI.

[6] Data Science & Engineering

- Data Preprocessing, Feature Engineering, Statistical Analysis, A/B Testing.
- Time Series Forecasting, Anomaly Detection, Parametric Data Analysis.
- Data Visualization (Matplotlib, Seaborn, Power BI), Streamlit Dashboards.

[7] Project Management & Collaboration

- Agile / Scrum Methodologies, Kanban, Jira, Bitbucket, Confluence.
- Cross-functional Team Collaboration, Stakeholder Communication, Technical Documentation.

Research Publications

[1] M.Mittal, P.Siriaraya, C.Lee, Y.Kawai, T.Yoshikawa and S.Shimojo, **"Accurate Spatial Mapping of Social Media with Physical Locations"**, IEEE BSD, Big Data, Los Angeles, USA, 9-12 Dec 2019.

[2] P.Siriaraya, Y.Zhang, Y.Wang , Y.Kawai, M.Mittal, P.Jeszenszky and A.Jatowt, **"Witnessing Crime through Tweets: A Crime Investigation Tool based on Social Media"**, 27th ACM SIGSPATIAL, Chicago, Illinois, USA, 5-8 Nov 2019.

[3] T. Omura, K. Suzuki, P. Siriaraya, M. Mittal, Y. Kawai, and S. Nakajima **"Ad Recommendation utilizing user behavior in the physical space to represent their latent interest"**, IEEE International Workshop on Big Spatial Data (BSD 2020),USA.

[4] Y.Wang, P.Siriaraya, M.Mittal, H. Xie and Y.Kawai **"Understanding Multilingual Correlation of Geo-tagged Tweets for POI Recommendation"**, W2GIS,2020, China

[5] T.Kiriu, M.Mittal, P.Siriaraya , Y.Kawai and S.Nakajima, **"Development of an Acoustic AR Gamification System to Support Physical Exercise"**, ACM Multimedia, Nice, France, Oct 21-25, 2019.

Workshops

2020 Participated in a online workshop on "Recent Trends in Computer Science & IT", Raj Kumar Goel Institute of Technology, Ghaziabad, India, from 13th Jul 2020 to 17th Jul 2020

2019 Completed e-Learning Course on "Research Ethics", Japan Society for the Promotion of Science.

2018 Participated in a workshop on "Machine Learning and Data Analytics with Python", at Ajay Kumar Garg Engineering College, Ghaziabad, India, from 4th Dec 2018 to 08th Dec 2018.

2017 Participated in a workshop on "Big Data", at Graphic Era University, Dehradun, India, from 18th Dec 2017 to 23rd Dec 2017.

2017 Participated in a workshop on "Practical Hands on Machine Learning", at Inmantac Institutes, Ghaziabad, India, from 6th July 2017 to 10th July 2017.

Certifications

2023 Python OOP : Object Oriented Programming in Python (Udemy)

2024 Microcontroller Embedded C Programming (Udemy)

2024	Embedded Driver Development (Udemy)
2025	Complete Guide to Building, Deploying, and Optimizing Generative AI with Langchain and Huggingface (Udemy)

Personal Details

Born	2 May 1988
Nationality	Indian
Languages	English (Professional), Hindi (Native)
Visa Status	EU Blue Card (Germany)
Linkedin	https://www.linkedin.com/in/dr-mohit-mittal-phd-2b662749/
Personal Website	https://mohitmittal1988.github.io/mm/