

# Madhu Goutham Reddy Ambati

AI/ML Engineer | Data Scientist | Applied Scientist

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## PROFESSIONAL SUMMARY

- Data Scientist with 6+ years' experience deploying large-scale ML and AI systems across finance and technology.
- Reduced fraud losses by \$2.1M annually through real-time ensemble models processing 250K+ daily transactions at 99ms latency.
- Specialized in LLM fine-tuning, multi-agent orchestration, and production-grade MLOps on AWS, PyTorch, and Kubernetes.
- Proven leader in guiding cross-functional teams and translating research into business-critical solutions for millions of users.
- Recognized for building resilient, scalable AI platforms and delivering high-impact, ethical solutions in fast-paced, innovation-driven environments.

## TECHNICAL SKILLS

**Programming & Statistics:** Python(NumPy, Pandas, Seaborn), R, Java, Scala, C++, SQL (CTEs, window functions, dynamic SQL), Bayesian Methods, ANOVA, Hypothesis Testing, Statistical Inference, Data Cleaning, Data Wrangling, Unix/Shell

**Machine Learning & AI:** Deep Learning, NLP, Computer Vision, Time Series Forecasting, Regression, Clustering, Propensity Modeling, LTV/CLV, Uplift Modeling, LLM Fine-tuning, PEFT (LoRA/QLoRA), Multi-Agent Systems, Statistical Modeling, Conversational AI

**ML Frameworks:** PyTorch, TensorFlow, Scikit-learn, XGBoost, LightGBM, Hugging Face, Keras, Lightning, Spark MLlib

**Agentic AI:** LangChain, LangGraph, AutoGen, CrewAI, Multi-Agent Orchestration, RAG (dense/BM25 hybrid), GraphRAG, Retrieval Orchestration

**Cloud & DevOps:** AWS (SageMaker, Bedrock, EC2, S3, Lambda), Azure (ML Studio, OpenAI Service), GCP (Vertex AI), Databricks, Docker, Kubernetes, MLflow, Kubeflow, Terraform, Jupyter Notebook, Git/GitHub, Confluence, SharePoint

**Data Engineering:** Apache Spark, Apache Hadoop (MapReduce, HDFS), Kafka, Airflow, ETL/ELT Pipelines, Data Governance, Data Quality (Great Expectations), ODBC Connectors

**Databases:** SQL (MySQL, PostgreSQL, Oracle), Teradata, MongoDB, Hive, Redis, Snowflake, Vector Databases (Pinecone, Weaviate, Qdrant)

**Analytics & Visualization:** Tableau, Looker, Excel, Power BI, Adobe Analytics, EDA, Alteryx, Matplotlib, Plotly, D3.js, React, FastAPI, REST APIs, Experimentation Dashboards, Executive Reporting

**Topological Data Analysis (TDA):** Gudhi, Ripser, Prism, Persistent Homology

**Business & Strategic Skills:** Business Acumen, Thought Partner, Product Management (Vision, PRDs, Roadmaps, Backlogs, OKRs, GTM)

## PROFESSIONAL EXPERIENCE

### Senior Data Scientist

Nov 2024 - Present | Chicago, USA

*KeyBank (Fraud Detection & Risk Analytics)*

- Integrated a fraud detection system utilizing XGBoost and LightGBM, reducing false positives from 5% to 2%; achieved consistent 99ms p95 latency while scanning all transactions from the 1000+ retail locations.
- Developed a loan default prediction model using gradient boosting on 50+ behavioral and transaction features, achieving 0.85 AUC and enabling risk-based pricing strategies that reduced portfolio default rate by 1.2 percentage points.
- Established self-operating data quality monitoring system using Python and Great Expectations, reducing data pipeline errors by 15% and decreasing issue resolution time from 72 to 24 hours.
- Streamlined weekly credit risk reporting pipeline using Azure Data Factory and Databricks, reducing report generation time from 72 to 8 hours and enabling executive team to make faster policy adjustments.
- Installed deep learning pipelines using TensorFlow and PyTorch on Kubernetes with Ray Tune optimization, reducing credit risk model training time from 8 to 5.2 hours.
- Enhanced feature engineering pipeline using PySpark on AWS EMR with SMOTE and undersampling techniques, reducing data preprocessing time by 40% for 500GB daily data.
- Advanced model deployment process by 40% implementing CI/CD pipelines with Kubeflow and MLflow, enabling streamlined model versioning and rollback capabilities.
- Led A/B testing framework design using statistical hypothesis testing, measuring business impact of 12 model deployments through automated reporting in Tableau.

### Data Scientist (GRA)

Aug 2023 - Oct 2024 | Dekalb, USA

*Northern Illinois University (Environmental AI & Satellite Imagery)*

- Built environmental health risk model using DenseNet-201 on 5TB satellite imagery dataset, improving classification AUC from 0.86 to 0.92.
- Designed a U-Net++ CNN architecture for surface water detection exhibiting 6 FPS processing speed, 0.98 precision and 93.6% F1- score, crucial for cross-validation testing and flood risk management applications.
- Optimized research workflows through version control best practices and increased code reusability by 60% by integrating satellite imagery with PyTorch and Earth Engine.
- Integrated multiple deep learning models (DenseNet-201, YOLOv4, SAM) to identify micro-scale environmental health indicators in satellite imagery for public health applications.
- Deployed a Bayesian inference model for environmental risk mapping using advanced analytics, facilitating public health interventions with 84.4% accuracy in underserved communities.
- Created open-source dataset of 15K satellite images for urban planning applications using rapid prototyping methodologies, achieving 84.4% classification accuracy for building and infrastructure detection with comprehensive data visualization using React- based dashboards.
- Integrated a Docker and Kubernetes pipeline on GCP, reducing model training time to 4 hours and enhancing experiment tracking, leading to the identification of key cancer markers.
- Delivered urban sustainability analysis using computer vision on satellite imagery with advanced analytics and BI tools, providing actionable insights for municipal resource allocation and planning decisions through interactive data visualization and KPI monitoring.
- Validated model accuracy using k-fold cross-validation and SHAP analysis, achieving a 95% confidence level and reducing potential prediction errors by 15% for stakeholder trust.
- Devised scalable image processing pipeline using NoSQL databases and Big Data technologies, supporting urban planning decisions and improving resource allocation by 25%.

**May 2021 - Jul 2023 | Chennai, India**

- Deployed fraud detection models using Logistic Regression and Random Forest on 2M credit profiles, reducing fraud losses by 38% (\$2.3M annually) through PySpark ETL pipelines on AWS EMR.
- Modernized CI/CD pipelines by integrating automated testing frameworks using Jenkins and GitHub Actions with containerization, achieving a 40% efficiency gain and reducing production hotfix frequency by 60%.
- Migrated analytics infrastructure to cloud-native AWS solutions (EC2, S3, RDS) with zero downtime, enhancing real-time scoring and reducing data latency by 35%.
- Applied statistical modeling via hypothesis testing to produce 16+ actionable Power BI/Qlik dashboards illuminating credit usage patterns; revitalized email campaign conversions from 2.1% to 2.4% via advanced analytics.
- Created real-time fraud scoring API using Apache Kafka and Redis with FastAPI, processing 50M monthly events with 95th percentile latency under 500ms for credit decisions across 15 clients.
- Guided a team of 5 data scientists in developing comprehensive customer-360 profiles; integrated 10+ datasets using Big Data technologies, and completed 3+ cross-functional team training sessions that resulted in faster project delivery.
- Drove integration of A/B experimentation framework with MLflow tracking, facilitating iterative model improvements and statistical analysis, leading to findings to fix the three biggest causes of crashes.

**Mar 2019 - Apr 2021 | Sriperumbudur, India**

- Applied machine learning models encompassing decision trees and neural networks to overhaul legacy SQL ETL pipelines; accelerated data throughput by 35% via close collaboration with database engineers.
- Designed a marketing campaign prediction system, employing Random Forest and Logistic Regression, achieving 85% accuracy and a 0.78 AUC-ROC; model influenced campaign strategy choices.
- Improved model generalization by conducting feature selection via Chi-square and PCA, alongside SMOTE resampling on imbalanced datasets; decreased model drift by 25% and improved F1-score by 18%.
- Boosted discount optimization outcomes (20% efficiency gain) by rigorously evaluating classification techniques (Logistic Regression, SVM) with Python's Scikit-learn and statistical forecasting methods, implementing KPI tracking and performance monitoring.
- Accelerated deployment of predictive models (30% faster deployment) through AWS Lambda-integrated preprocessing pipelines with containerization and microservices architecture, coordinating closely with software engineering teams using DevOps methodologies.
- Transformed strategic decision-making (25% improvement) by crafting advanced Tableau and Qlik visualizations with interactive React components, converting complex data into clear, actionable business insights through comprehensive BI tools and data visualization techniques.
- Improved fraud detection accuracy by 12% using bias mitigation techniques with AWS SageMaker and FastAPI endpoints, adopted by cross-functional stakeholders.
- Centralized ETL pipelines by migrating to containerized Apache Spark on Kubernetes with DevOps integration, shortening data processing from 8 hours to under 5 and improving campaign ROI by 15%.

- Built multi-agent fraud detection system using LangChain and AutoGen with Pinecone vector database, achieving 95% accuracy in synthetic identity detection and reduced detection latency from 200ms to 45ms and improved fraud recall by 23% through agent coordination across 10M+ transaction embeddings.

- Developed RAG-powered credit risk assessment system processing 500GB regulatory corpus with LoRA-fine-tuned financial LLM, achieving 87% accuracy in risk factor identification (15% improvement) and implementing bias detection models with 95% accuracy in identifying algorithmic bias across fraud detection systems.

- Led collaborative university research integrating deep learning models (DenseNet-201, U-Net+, SAM) to process 5TB satellite imagery, improving environmental health classification AUC from 0.86 to 0.92 and developing geospatial risk framework that earned 3rd prize at 2024 IIN Sustainability Conference for innovative urban health applications.

- Led multi-agent predictive maintenance system with specialized LSTM agents for real-time sensor monitoring via Apache Kafka, achieving 92% failure prediction accuracy and 25% reduction in unplanned downtime while ensuring 99.9% model explainability through SHAP analysis for regulatory compliance.

**Aug 2023 - May 2025 | DeKalb, IL**