

Rajesh Rajendran

Staff Data Scientist, Forecasting · Causal Inference · Agentic AI

Bangalore, India

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ABOUT

I have been a data scientist for six years, and an engineer for seven before that. At Avathon I work across supply chain planning: demand forecasting, inventory policy, production and freight planning with mixed integer programs, and LLM agents, including a tariff classification agent in production at a North American customs brokerage. Measured outcomes include median holdout WAPE from 0.574 to 0.451 across 76 weekly retail series, test fill rate of 97.7% against the incumbent policy's 74.5% at lower cost on 9 smooth series of a spares catalogue, and cost per classification from \$0.13 to \$0.09. At Alstom I was a founding member of a data science team that grew to 20 engineers. At Avathon I have recruited five engineers to the planning data science team, and I am one of three seeding members of the AI Center of Excellence.

EXPERIENCE

Avathon (formerly SparkCognition)

Feb 2025 to present

Staff Data Scientist, Bangalore, India

- Cut median forecast error 21% (holdout WAPE 0.574 to 0.451) on a global consumer-devices manufacturer's weekly retail demand portfolio by rebuilding the model-selection criterion: WAPE-primary, gated by event-window WAPE at or below 1.2x WAPE, with a 1.5x per-series degradation cap, after proving the incumbent in-sample criterion disagreed with the true out-of-sample winner on 69 of 76 series.
- Classified 40,447 spares materials for a mining and industrial operator by Syntetos-Boylan demand type and routed each class to its own statsforecast family (AutoETS with forced-seasonal ZZA, AutoTheta, Croston-SBA, TSB) against a pooled global LightGBM, then reframed evaluation from statistical accuracy to inventory outcome: test fill rate 97.7% against the incumbent policy's 74.5% at lower cost, decided under a nested train, validation and test backtest with leakage tripwires and per-series conformal coverage audits.
- Shipped a proprietary tariff-classification agent, now in production at a North American customs brokerage: LLM description enrichment, hybrid BM25 and dense retrieval over pgvector and LanceDB, a Neo4j knowledge graph of customs rulings, and a written justification per code, served as a containerised FastAPI API on GCP Cloud Run. Cut cost to \$0.09 per classification from \$0.13 by re-architecting the monolithic ReAct agent into a LangGraph StateGraph of 7 nodes and 9 edges. Built its 2,603-item evaluation harness and instrumented the stack with Langfuse tracing; fine-tuned an open-source 8B model on a 2-node SLURM cluster as a cost alternative to frontier models.
- Built the rest of the modelling stack for the planning product: multi-echelon deep-learning forecasters in PyTorch for a global PC manufacturer, a multi-level LSTM predicting channel, distribution-centre and manufacturing demand jointly across 80 SKUs over 5 geographic regions, their countries and in-country distribution centres; a multi-agent demand-planning workflow coordinating root, anomaly, causal and forecasting agents under an Observe-Orient-Decide-Act loop; and a Bayesian anomaly service on rolling Normal-Inverse-Gamma regression with a Student-t posterior predictive, live as a FastAPI container on GCP Cloud Run.
- Profiled 36 SAP MM parquet tables covering 130M+ rows across 15 plants and recovered five years of demand history an in-house extract filter had silently dropped (51,461 of 60,022 lines) by running the complement of the team's own filter; caught a covariate leak worth 9.9 WMAPE points in a published benchmark, retracted the claim and recomputed all 16 sweep configurations leak-free; authored the forecasting methodology for a planning discipline that had no owner and is building the team, five engineers recruited to date.

Alstom Transport

Apr 2023 to Feb 2025

Data Scientist Sr, Bangalore, India

- Built a root cause analysis system for service-affecting urban transit failures using causal discovery and a Causal Bayesian Network: interventional and counterfactual queries over Bayesian posteriors returning probability-ranked causes rather than surface correlations. Reduced troubleshooting time by 86% and underpinned the UAI 2024 publication.
- Developed anomaly detection for real-time operational transit data using Bayesian networks and statistical process control, improving early detection ahead of service failures.
- Created and deployed end-to-end pipelines for ingestion, cleaning, transformation and visualisation, plus a web tool sharing results with engineering stakeholders.
- Founding member of the data science team; helped grow it to 20 engineers through technical interviews and quality-focused hiring.

Alstom Transport

Jan 2020 to Mar 2023

Data Scientist, Bangalore, India

- Developed unsupervised anomaly detection on time-series signals using autoencoder and textual Transformer architectures for train odometry and ATC subsystems, achieving over 99% recall and identifying failures rule-based monitoring missed.
- Deployed a statistical fault-detection model into the fleet management system, improving maintenance efficiency by 30%.
- Built log analytics on big-data infrastructure using Spark (Scala), defining health indicators with system experts and reducing failure detection time by 53%.

- Automated the ingestion and processing pipeline with Apache Airflow and shipped Power BI dashboards that cut troubleshooting time by 80%.

Alstom Transport

Apr 2018 to Jan 2020

Software Architect, Bengaluru, India

- Architected diagnostic and simulation tools for train control subsystems in C++ (MFC) and C#, covering architecture, implementation and validation.

Alstom Transport

Sep 2015 to Mar 2018

Software Designer, Bangalore, India

- Built simulators and automated factory acceptance testing for railway signalling equipment.

Blue Triangle Innovations

Jul 2014 to Jul 2015

Product Engineer, Ruhr Region, Germany

- Ran MATLAB simulations supporting the prototyping of a cancer diagnostic device.

German Aerospace Center (DLR)

Dec 2012 to Jun 2014

Research Assistant, Munich, Germany

- Developed state estimation for the under-actuated degrees of freedom in humanoid robots, in MATLAB and Simulink.

EDUCATION

Technical University of Dortmund

2010 to 2013

M.Sc. Process Automation, Germany

MIT, Anna University

2006 to 2010

B.E. Electronics & Instrumentation, India

SKILLS

Programming & Data	PythonSQLPySparkSpark (Scala)PandasNumPyPyArrowSciPystatsmodelsC++C#
	R
Statistical & Time Series	ARIMA / SARIMAXAutoETSAutoThetaCroston-SBACroston-OptimizedTSBProphet
	NeuralProphetstatsforecastChronosconformal predictionP10/P50/P90 quantiles
	WAPE / MASE / CRPSrolling-origin backtesting
Classical ML	scikit-learnXGBoostLightGBMCatBoostRandom Forestquantile regressionclustering
	feature engineeringnested backtesting
Deep Learning	PyTorchTensorFlowKerasmulti-level LSTMMLPBayesian neural networksautoencoders
	TransformersCUDA
Causal & Bayesian	Causal Bayesian Networkscausal discoverydo-calculuscounterfactual queries
	CausalImpactNormal-Inverse-Gamma updatingBayes factorsABIC rankingPyMC
	statistical process control
GenAI & Agentic Systems	LangChainLangGraphStateGraphRAGGraph RAGagentic RAGhybrid BM25 + dense retrieval
	multi-agent orchestrationReActOODA-loop planningSLM fine-tuningGPT-4o
	Gemini 2.5 ProClaudeLangfusepgvectorLanceDBNeo4j
Optimisation & OR	LP / IP / MILP (PuLP)set partitioningfacility assignment(s,S) policyreorder point
	EOQnewsvendorQ-learning
MLOps & Cloud	DockerFastAPIREST API designGCP (Cloud Run, BigQuery, GCS, Compute Engine)Azure
	AWSAirflowPostgreSQLequivalence-gated pipelinesleakage tripwires
	prediction-interval coverage auditingproduction code review
Domains	Supply chain (demand, materials, inventory, logistics)customs and trade compliance
	railways and urban transitconsumer electronicsmining and industrialautomotive and EV
Languages	EnglishGerman (working)TamilKannada

PUBLICATION

Industrial-Grade Time-Dependent Counterfactual Root Cause Analysis through the Unanticipated Point of Incipient Failure
Uncertainty in Artificial Intelligence (UAI) 2024, Barcelona

RECOGNITION AND CERTIFICATIONS

- Seeding member, AI Center of Excellence**, Avathon (Aug 2026) One of three seeding members.
- World Class Expert**, Alstom (Mar 2024) Recognised for developing data solutions.
- Winner, SoftWar 2.0**, Alstom (Aug 2023) Applied AI to estimate odometry system tuning parameters. I drove the product design and the presentations.

Machine Learning Specialization (DeepLearning.AI) · Foundations of Causality (causaLens) · Mathematics for Machine Learning and Data Science (DeepLearning.AI) · Data Science Specialization (Johns Hopkins University)