Pranav Shridhar Kowadkar

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AI Engineer with 5+ years building production machine learning systems, multi-agent architectures, and transformer-based models across healthcare, finance, and scientific computing domains.

Professional Experience

AI Engineer | New Jersey Institute of Technology — Mar 2025 – Present

- **PyTorch, Transformers, fMRI:** Developed transformer architecture mapping fMRI signals to brain regions achieving 89% classification accuracy across 4 cohorts, processing 651 subjects with spatiotemporal deep neural networks for clinical insights.
- **RAG, Vector Embeddings, LangChain:** Engineered RAG pipeline with custom chunking and spatial-aware embeddings delivering 31% faster document search and 18% higher QA accuracy, integrating multi-provider LLM orchestration (Claude, GPT-4, local models).
- **LoRA Fine-tuning, LLaMA, Mistral:** Fine-tuned LLaMA 3.2 (3B) and Mistral (7B) using parameter-efficient LoRA on Neurosynth dataset achieving 12% improvement in neuroimaging-specific QA tasks over base models.
- **Model Optimization, Knowledge Distillation:** Implemented knowledge distillation from DeepSeek R1 (671B) to LLaMA 3.2 (3B) reducing inference costs by 85% while maintaining 94% of original performance through GPTQ/AWQ quantization techniques.

Programmer Analyst (Contract) | Vaandu — Nov 2024 – Feb 2025

- **Oracle, PL/SQL, Unix:** Revamped Oracle-driven data pipelines using advanced PL/SQL and Unix scripting, boosting query speed by 20% and streamlining batch financial processes.
- **Prometheus, Monitoring, Exporters:** Deployed custom Prometheus exporters for Oracle, capturing KPIs like query latency and tablespace usage to drive real-time performance monitoring.
- **Grafana, Dashboards, Alerting:** Built Grafana dashboards and set proactive alerts, reducing system outages by 45% through real-time visualization of pipeline health.

Data Scientist | JerseySTEM — Feb 2024 – Nov 2024

- **Statistical Analysis, Predictive Modeling:** Analyzed engagement patterns across 10,000+ students using statistical modeling and scikit-learn, developing predictive models for performance forecasting enabling data-driven curriculum optimization and 15% engagement increase.
- **Airflow, AWS EC2, MLOps:** Designed and maintained Airflow pipelines on AWS EC2 automating ML model training and evaluation workflows, reducing manual reporting effort by 40% and increasing operational efficiency by 25%.
- **Experimentation, A/B Testing:** Designed and executed A/B experiments measuring learning outcome improvements across program iterations, communicating actionable insights to product teams through statistical hypothesis testing.

Data Engineer | Bayer — Sep 2023 – Dec 2023

- **Databricks, Spark, Snowflake:** Built end-to-end data pipelines using Databricks and Snowflake processing 100GB+ healthcare marketing data, delivering high-accuracy marketing personas through ML-driven segmentation across 20+ Bayer brands.
- **PowerBI, DAX, Analytics:** Developed PowerBI dashboards with advanced DAX visualizing 121+ consumer behavior metrics, driving 22% ROI boost in marketing campaigns through data-driven advertising strategies.
- **Azure Data Factory, ETL, ML Integration:** Optimized real-time ETL pipelines for point-of-sale data using ADF and Python, integrating ML models for campaign effectiveness prediction increasing ad performance by 18%.

R&D Software Engineer | Dassault Systems — Apr 2020 – Jul 2022

- **Python, Test Automation, CI/CD:** Developed automated test framework for CADAM software using Python and pytest, shrinking execution time by 87% and increasing code coverage by 35% through intelligent test orchestration.
- **Apache Spark, Data Analytics:** Leveraged Apache Spark to accelerate team performance reporting by 32% processing 5GB+ daily engineering metrics, utilizing statistical analysis for efficient data exploration and decision-making.
- **Python, Pandas, Matplotlib, Analytics:** Automated team analytics processing JSON data into reports with pandas and matplotlib, saving 3+ hours weekly and enabling data-driven decisions across distributed engineering teams.
- **Statistical Analysis, Product Strategy:** Applied statistical analysis to software usage data surfacing trends that shaped product development priorities and informed strategic roadmap decisions for enterprise CAD products.

Projects

Financial Document Analysis System   **Jan 2026**
- **C++17, RAG, TF-IDF, LLM Integration:** Architected production-grade system with SEC EDGAR API integration for real-time 10-K/10-Q acquisition, processing 5MB+ financial documents in <500ms using custom TF-IDF embeddings and OpenRouter multi-provider LLM orchestration.
- **Document Processing Pipeline, Query Optimization:** Engineered multi-stage ETL pipeline (extraction → parsing → embedding → retrieval) achieving sub-100ms query response time for similarity search across 100+ documents with natural language querying capabilities.
- **Full-Stack Architecture, CI/CD, Production Deployment:** Built comprehensive system with C++17 backend, Python Flask web interface, automated GitHub Actions CI/CD pipeline, comprehensive testing suite (unit, integration, system), and multi-platform deployment (Windows/Linux/macOS).

PrometheusAI – Self-Improving Research System   **Nov 2025**
- **Multi-Agent Systems, You.com APIs, RLAIF:** Built AI research system for You.com Agentic Hackathon integrating 4 You.com APIs (Web Search, News, Express, Custom Agents), improving research relevance from 4% baseline to 85% through continuous learning and RLAIF-style feedback loops (21x improvement).
- **Agent Orchestration, Parallel Processing:** Designed 8-agent system with specialized roles (Architect, Scout swarm, Analyst pool, Validator, Synthesizer) coordinating through intelligent rate limiting and parallel execution, achieving 3-5x speedup and 40% API cost reduction through caching strategies.
- **Self-Improving ML, Production Infrastructure:** Implemented continuous learning framework with multi-component reward scoring improving system performance 2.4x (0.33 → 0.80 scores), reducing research time from 15+ minutes to under 2 minutes through continuous self-learning, unified LLM infrastructure supporting Meta's free Llama models, OpenRouter free tier, and local model deployment with automatic failover.

Gravitational Wave Detection – Deep Learning for Astrophysics   **Dec 2022**
- **TensorFlow, Keras, Signal Processing, Deep Learning:** Developed robust deep learning model for gravitational wave detection in LIGO/VIRGO data achieving 86.84% accuracy on test data through sophisticated neural architecture combining EfficientNetB7 for feature extraction with custom recurrent neural networks.
- **PySpark, Distributed Computing, Large-Scale Data:** Processed 76GB+ astronomical time-series data using PySpark and custom transforms, overcoming memory limitations through distributed computing clusters enabling large-scale analysis of low signal-to-noise ratio events.
- **Ensemble Methods, Model Optimization:** Created ensemble model approach improving detection sensitivity by 22% over baseline methods, with interactive visualization tools using Plotly and Dash for real-time analysis and scientific interpretation.

Awards

Winner, n8n Sponsor Prize – ElevenLabs Global Hackathon 2024 (EZ OnCall: Voice-first DevOps agent)
GitHub | Demo Video | Presentation Deck

Technical Skills

AI/ML Frameworks: PyTorch, TensorFlow, Hugging Face Transformers, Scikit-learn, LangChain, LangGraph
LLM Technologies: RAG Pipelines, LoRA Fine-tuning, Knowledge Distillation, Quantization (GPTQ/AWQ), Prompt Engineering
Multi-Agent Systems: Agent Orchestration, RLAIF, LLM-as-Judge, Custom Message Passing, Parallel Execution
Programming Languages: Python, C++, SQL, R, JavaScript, Bash
Data & MLOps: Apache Spark, Airflow, Databricks, Snowflake, Docker, Kubernetes, MLflow, Git
Cloud Platforms: AWS (SageMaker, EMR, S3, Lambda), Azure (Data Factory, Databricks), GCP

Education

Master of Science | Data Science | New Jersey Institute of Technology   Dec 2023
Bachelor of Engineering | Mechanical Engineering | Visvesvaraya Technological University   Jul 2018