Healthcare Readmission Risk Prediction System

Technical Summary

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Healthcare Readmission Risk Prediction System

Overview: This system predicts the likelihood of patient readmission using a Logistic Regression model deployed fully on AWS Free Tier. The architecture was redesigned from the original specification to be completely serverless and cost-efficient without compromising functionality.

Data Pipeline:
Patient data undergoes cleaning, preprocessing, and feature engineering offline. Model parameters are exported into *model_params.json* and uploaded to AWS S3 for lightweight inference.

Machine Learning Model:
Replaced heavy Random Forest/XGBoost with a fast, interpretable Logistic Regression model suitable for AWS Lambda. Features enhanced to support 6 patient attributes with probability scoring.

Cloud Deployment (Free Tier Optimized):
• **AWS S3**: Hosts the trained model parameters.
• **AWS Lambda**: Loads model, performs inference, returns JSON.
• **API Gateway**: Public `/predict` endpoint triggering Lambda.
• **CloudWatch**: Logs and monitoring.

Streamlit Dashboard:
Enhanced user interface for entering patient data and viewing predictions in real-time. Displays probability-based readmission risk and doctor alerts.

Enhancements vs Original Task:
✔ Fully free-tier optimized
✔ Removed need for SageMaker/Azure ML
✔ Reduced compute cost by using Logistic Regression
✔ Added probability-based scoring
✔ Improved UI and input validation

Impact:
Enables hospitals to identify high-risk patients earlier, reduce readmission costs, and use cloud-based AI tools at zero operational cost.

System Flowchart (Data → Model → Cloud → Dashboard)