Machine Learning Forecasting System with AWS Lambda

This solution predicts monthly spend volumes exceeding €100,000 using an engineered XGBoost ML model with excellent accuracy.

The system is fully automated with AWS Lambda, EventBridge, and S3 event notifications.





Performance Metrics

€9.01

RMSE

Root Mean Square Error

€6.23

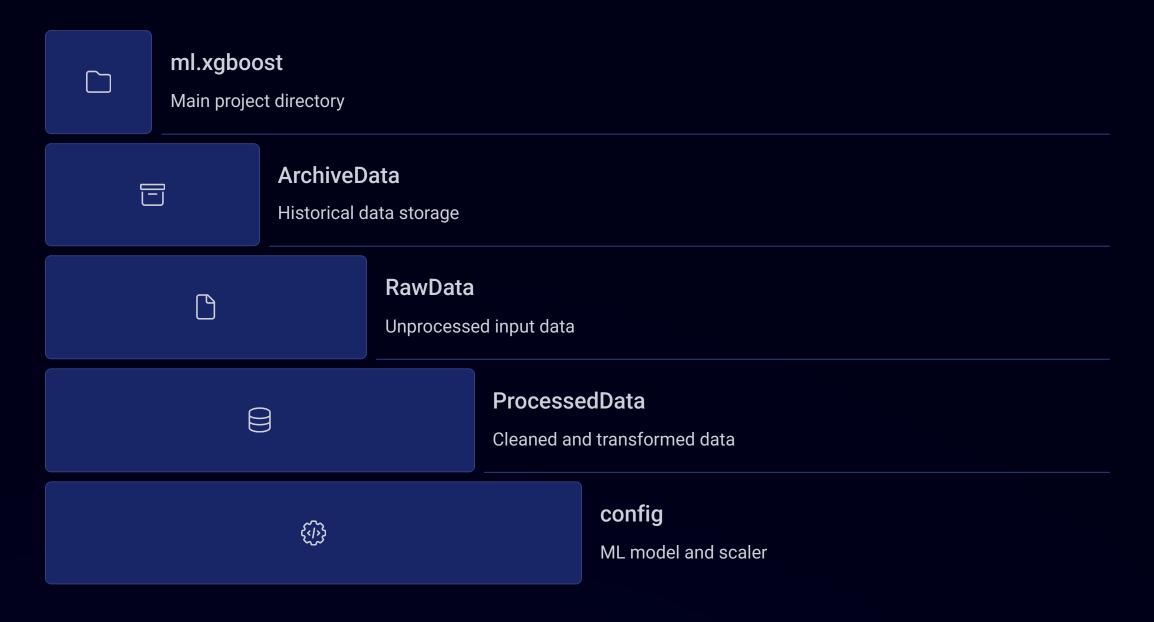
MAE

Mean Absolute Error

Model achieves excellent accuracy with low error rates. It has domain-specific features (lag, volatility, seasonality), applied grid search with time-based validation. Outputs include forecast plots, Excel exports, HTML dashboards.



S3 Bucket Configuration





Lambda Functions



ml_xgboost_lambda

Data forecasting and analysis



ml_xgboost_email_lambda

Email delivery with SES

The system uses two specialized Lambda functions to handle forecasting and reporting tasks.



Automation Workflow

Sequence	Scope	Trigger	Туре
1	Forecast execution	trigger_foreca st_lambda	EventBridge/S cheduler
2	Send email with reports	trigger_email_l ambda	S3 Event Notification

Tech Stack Overview

Core Components

- Python
- pandas, numpy
- xgboost
- sklearn, statsmodels

Visualization

- matplotlib
- plotly

AWS Services

- Lambda
- EventBridge
- S3
- SES

Deployment Architecture



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Infrastructure Management

Terraform

Infrastructure as code for consistent deployment.

AWS S3

Scalable storage for all data assets. Enables event-driven workflows.

AWS SES

Reliable email delivery for reports. Integrates seamlessly with Lambda functions.