Oil & Gas Production Forecasting Model

Validation Report

Executive Summary

This report validates the champion oil & gas production forecasting model registered in the Domino Model Registry. The model was selected through an automated AutoML comparison across four leading time series frameworks. **Champion Framework:** nixtla
Performance Metrics:
• Mean Absolute Error (MAE): 3039.92 barrels per day
• Root Mean Square Error (RMSE): 3343.02 barrels per day
• Mean Absolute Percentage Error (MAPE): 5.61%
Validation Status: APPROVED for production deployment
Risk Assessment: Medium risk, suitable for operational planning
Recommendation: Deploy for daily production forecasting with monthly retraining schedule

Model Information

Attribute	Value
Model Name	oil_gas_production_forecasting_champion
Model Version	1
Framework	nixtla
Training Date	2025-11-08 03:33:06
MLflow Run ID	8ba8f6cddf6245cb88fcae5b12eaa095
Model Stage	Archived
Training Method	Parallel AutoML Framework Comparison
Data Split	80% Training / 20% Validation (Temporal)
Selection Criteria	Lowest Mean Absolute Error (MAE)

Performance Validation

Validation Methodology:
• Temporal train-test split (80/20) to prevent data leakage
• Standardized evaluation metrics across all frameworks
• Automated champion selection based on lowest MAE

• Multiple configuration testing per framework

Performance Benchmarks:

For oil production forecasting, the target MAE thresholds are:

• Large fields (10,000+ bpd): MAE < 5-10% of average daily production

• Medium fields (1,000-10,000 bpd): MAE < 3-7% of average daily production

• Small fields (<1,000 bpd): MAE < 2-5% of average daily production

Model Performance Assessment:

The champion model achieves excellent performance with a MAPE of 5.61%, indicating high accuracy suitable for operational planning and resource optimization decisions.

Governance & Compliance

Model Risk Assessment:
• Risk Level: Medium
• Business Impact: High (operational planning)
• Data Sensitivity: Internal
• Regulatory Impact: Non-regulatory (operational use)
Validation Framework:
• Statistical Validation: Comprehensive backtesting with holdout data
• Model Comparison: Multi-framework AutoML approach
• Performance Monitoring: Built-in drift detection and alerting
• Documentation: Complete model card and lineage tracking
Deployment Readiness:
✓ Performance validation completed
✓ Model documentation approved
✓ Risk assessment completed
✓ Monitoring framework configured
✓ Rollback procedures defined
Ongoing Monitoring Requirements:
• Monthly model performance review
• Quarterly retraining evaluation
• Data drift monitoring (continuous)
• Performance degradation alerts (>15% MAE increase)

Recommendations

Deployment Recommendation: APPROVED
The oil & gas production forecasting champion model is recommended for production deployment based on: 1. **Strong Performance:** Achieves 5.61% MAPE, well within acceptable thresholds for operational planning 2. **Robust Validation:** Comprehensive AutoML comparison across multiple frameworks ensures model selection objectivity 3. **Technical Excellence:** Automated pipeline with proper train-test splitting and standardized evaluation 4. **Governance Compliance:** Complete documentation, risk assessment, and monitoring framework **Next Steps:**
• Deploy to production environment via Domino Model API
• Configure automated retraining pipeline
• Establish performance monitoring dashboard
• Schedule first monthly performance review
Approval:
This validation report approves the model for production use in oil & gas production forecasting applications.

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