AI-Powered Mill Contract Evaluation Tool

Saher Thekedar Nitai Shah Aniruddh Adiga Ankita Aswathanarayana

Capstone Project Presentation
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Agenda

Project Overview

- The current mill contract evaluation at American Lumber is manual and reactive, requiring managers to track delays, fluctuating margins, and inconsistent performance without automation.
- This project builds an AI-powered decision support tool using contract and shipment data to compute KPIs (shipment times, margins, carrier efficiency) and apply machine learning to predict profitability, recommend renewals, segment mills, forecast margins, and detect anomalies.
- Results will be delivered through an interactive Streamlit dashboard for transparent, data-driven decisions.

KPIs and Capabilities

Key Performance Indicators:

- Avg. days between creation, dispatch, and delivery
- Percentage of loads successfully shipped
- Avg. gross profit and profit % per load
- Carrier efficiency (revenue vs. expense vs. miles)

Planned Capabilities:

- Predict profitability
- Recommend renewals/expansions
- Segment mills and carriers
- Forecast margins and shipment trends
- Detect anomalies in costs, delivery times, or margins

Project Goals

- Automate contract & shipment evaluation
- Forecast profitability and margins
- Support decisions with recommendations & segmentation
- Ensure transparency (feature importance, rationale)
- Deliver reproducible prototype bridging theory & operations

Deliverables

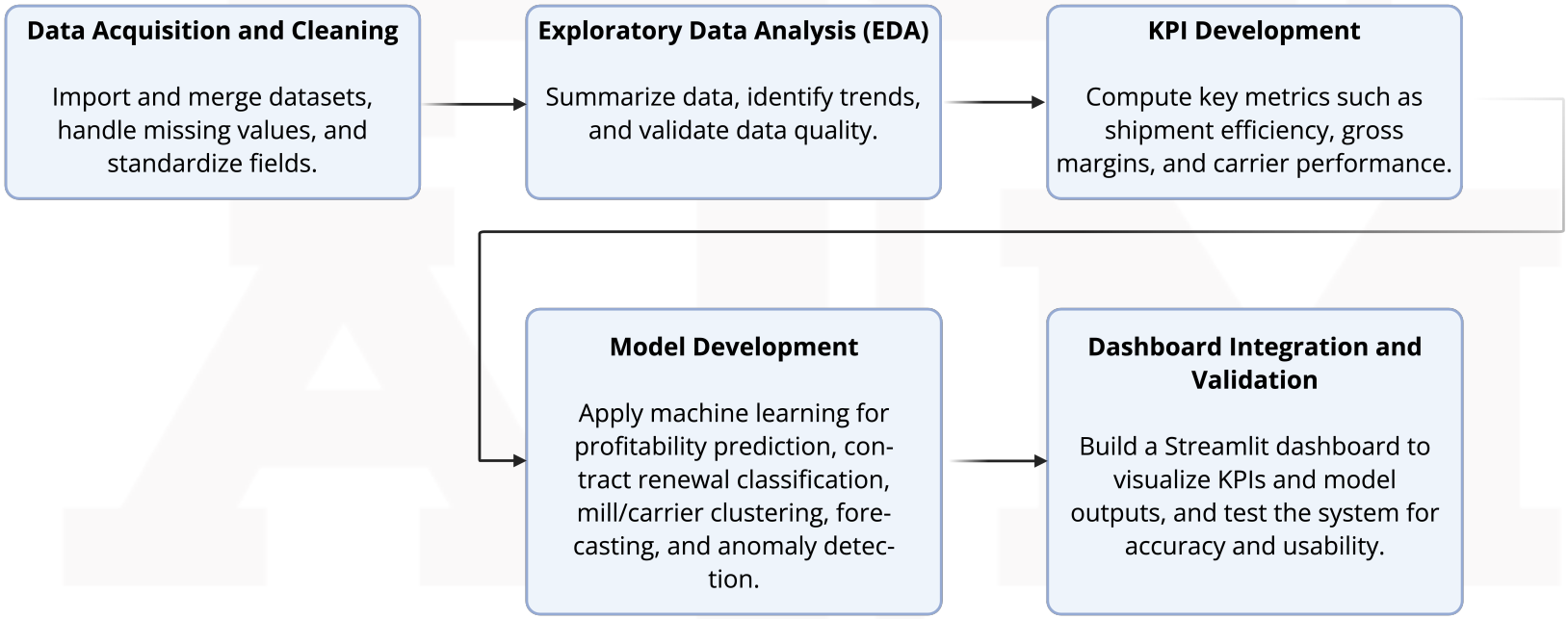
- Streamlit dashboard (KPIs, clustering, forecasting, anomaly detection)
- Research paper (methods, results, ethical considerations)
- GitHub portfolio (clean, reproducible code)

Data Sources

Excel/CSV structured datasets:

- Contract Load Details:
  - Mill name, material type, grade
  - Purchase/sales price, origin/destination
- Freight Shipment Records:
  - Pro #, shipment type, created/dispatch/delivery dates
  - Pickup/consignee locations, carrier info
  - Miles, projected revenue/expense, gross profit, profit %

High-Level Methodology



Model Development Details

- **Regression & Classification (PyTorch):** predict profitability, renewal likelihood
- **Clustering (NumPy – K-means):** segment mills/carriers
- **Forecasting (statsmodels – ARIMA):** forecast margins, expenses, revenues
- **Anomaly Detection (SciPy – Z-score):** identify irregular costs, delays, margins

Ethical Considerations

- Transparency: highlight KPIs driving predictions
- Fairness: unbiased evaluation of all mills/carriers
- Privacy & Confidentiality: shipment/financial data must not be shared or uploaded on public platforms without prior approval
- Reliability: validate models, provide confidence scores
- Human Oversight: dashboard presents insights, managers decide

Project Timeline

1. Phase 1 (Weeks 1–2): Setup & Proposal
2. Phase 2 (Weeks 3–4): Data Access & EDA
3. Phase 3 (Weeks 5–7): Modeling & KPI Development
4. Phase 4 (Weeks 8–9): Dashboard Development
5. Phase 5 (Weeks 10–12): Validation & Deliverables

Conclusion

- AI-powered decision support for contract evaluation
- Predicts profitability & renewals, segments mills/carriers
- Provides forecasts and anomaly detection
- Delivers actionable insights with transparency and confidentiality

Thank You!