# Optimizing Trading Strategies with Reinforcement Learning

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# Agenda

- Background

- Domain and Architecture Models

- Data Pipelines

- Results

- Demo

- Conclusion and Future Work

# Background

# Proposed Project

- Develop an agent to learn trading strategies for the DJI stocks leveraging reinforcement learning.

- Create a system that can adapt to market changes and optimize strategic decisions in real time aiming to maximize returns.

- Evaluate trading strategy performances using metrics and choose which the model will use.
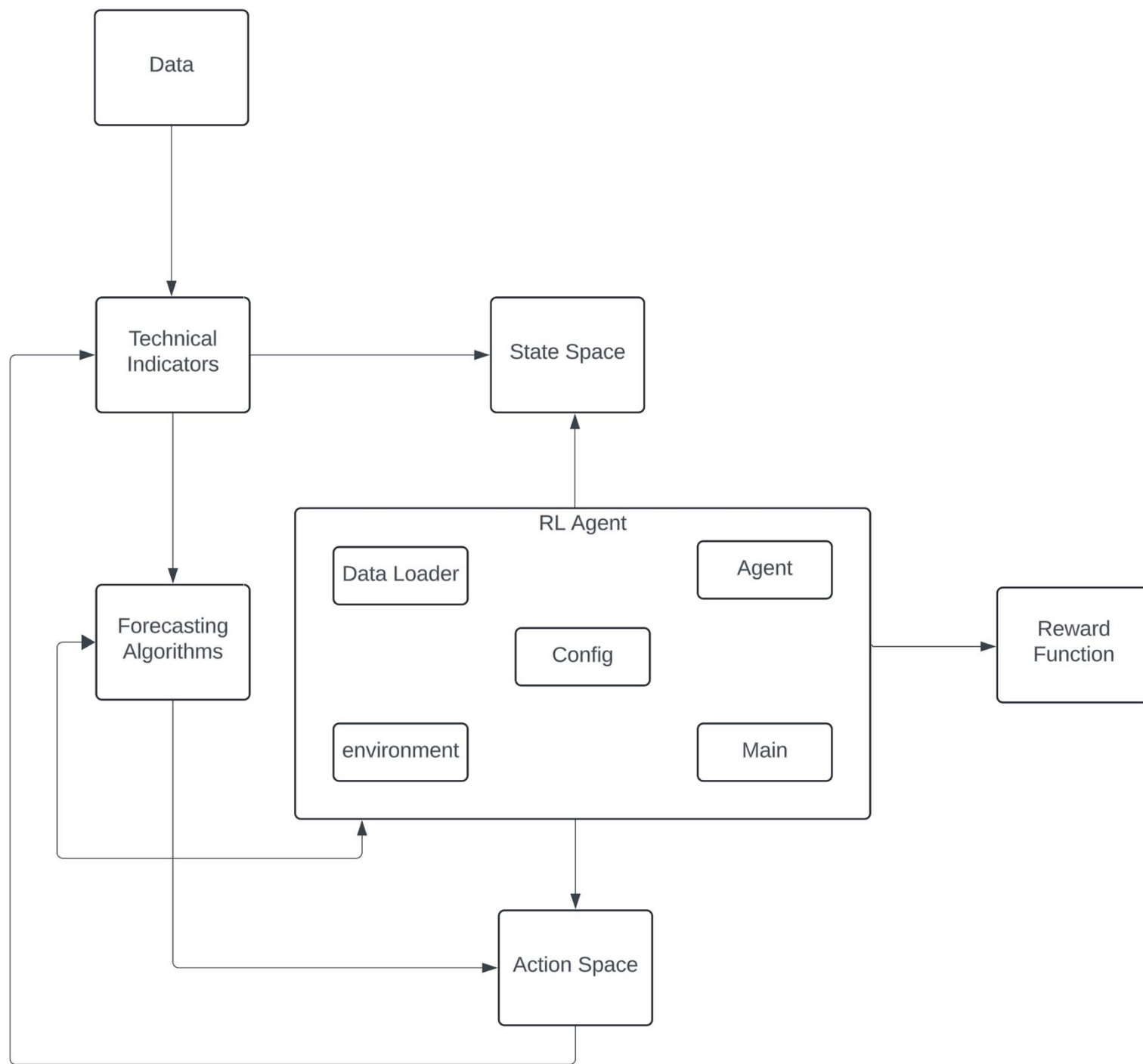
# Optimizing + Reinforcement Learning

- What it is : RL + Trading Strategies

- Goals
  - Learning from the Stock Market
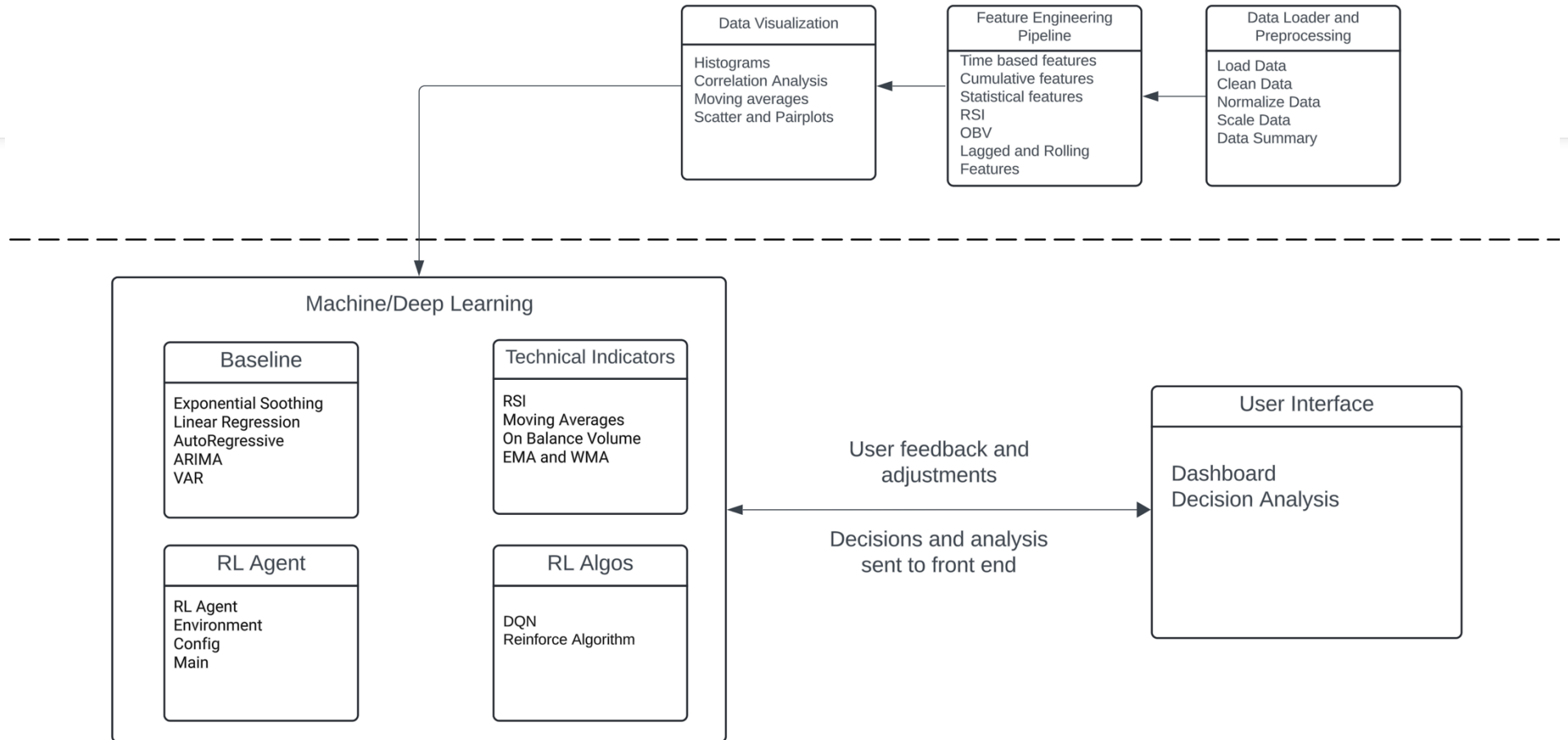  - Trading Decisions
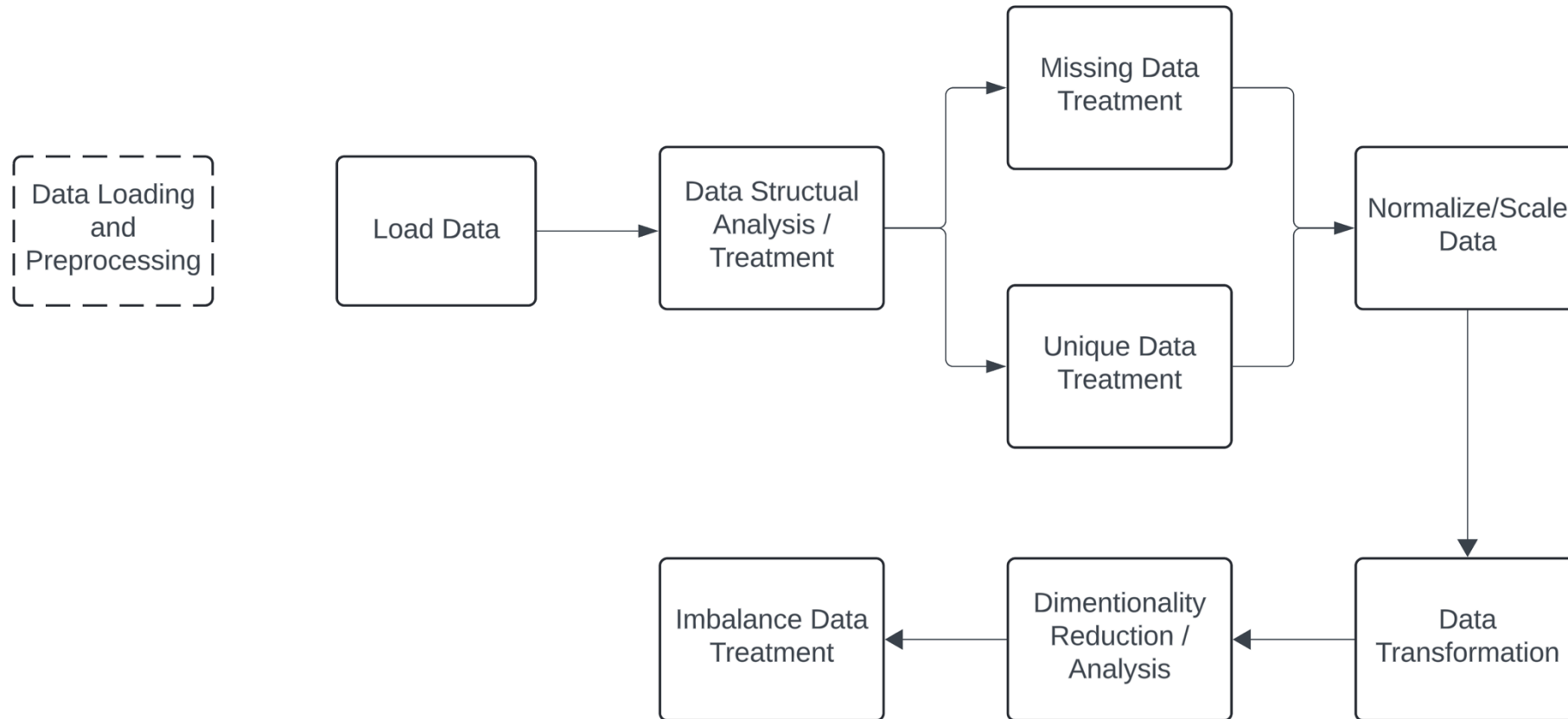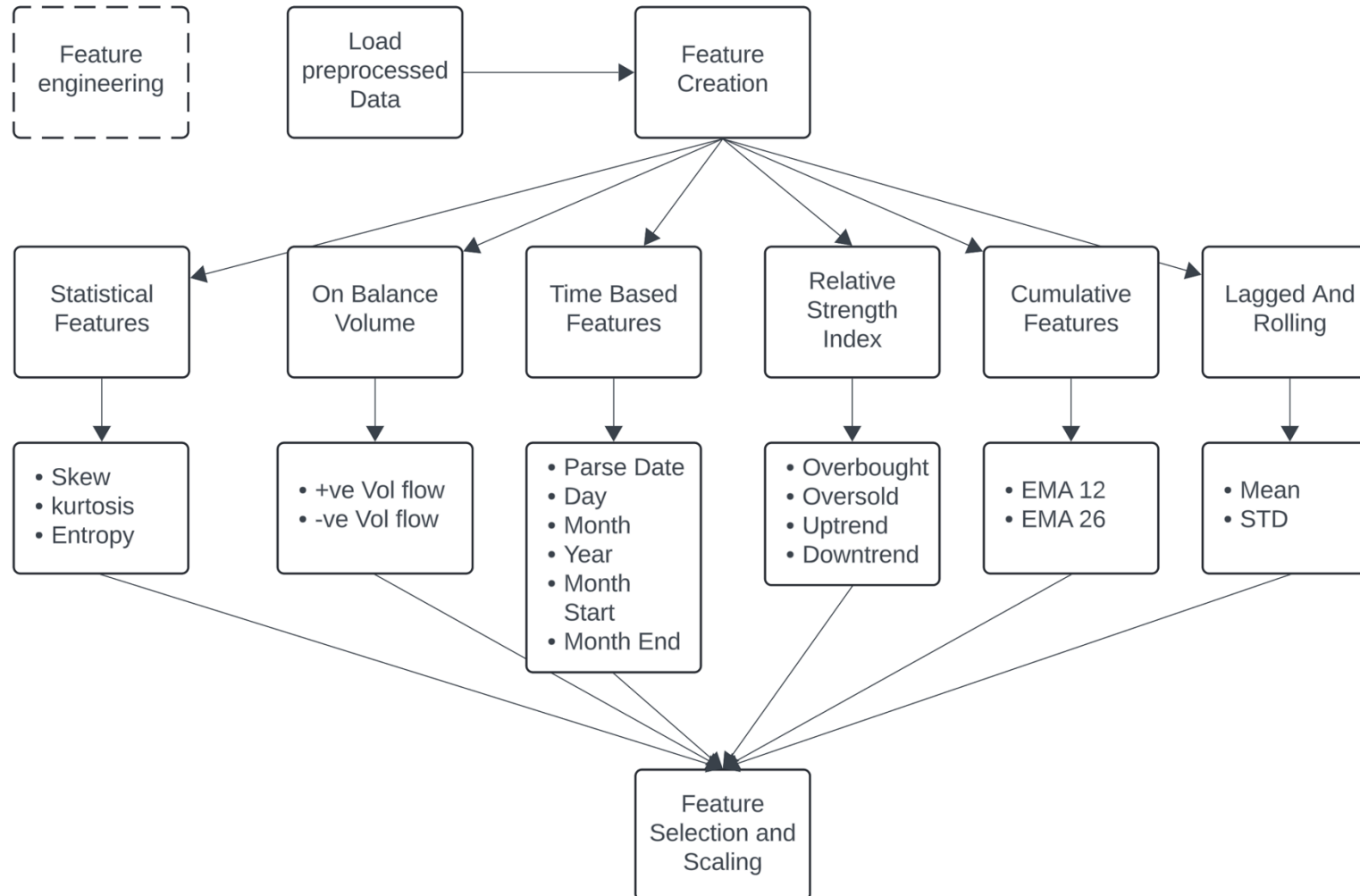  - Increase Profitability

# Domain Model

# Architecture Model

## Data Visualization

Histograms
Correlation Analysis
Moving averages
Scatter and Pairplots

## Feature Engineering Pipeline

Time based features
Cumulative features
Statistical features
RSI
OBV
Lagged and Rolling
Features

## Data Loader and Preprocessing

Load Data
Clean Data
Normalize Data
Scale Data
Data Summary

## Machine/Deep Learning

### Baseline

Exponential Soothing
Linear Regression
AutoRegressive
ARIMA
VAR

### Technical Indicators

RSI
Moving Averages
On Balance Volume
EMA and WMA

### RL Agent

RL Agent
Environment
Config
Main

### RL Algos

DQN
Reinforce Algorithm

## User Interface

Dashboard
Decision Analysis

User feedback and
adjustments

Decisions and analysis
sent to front end
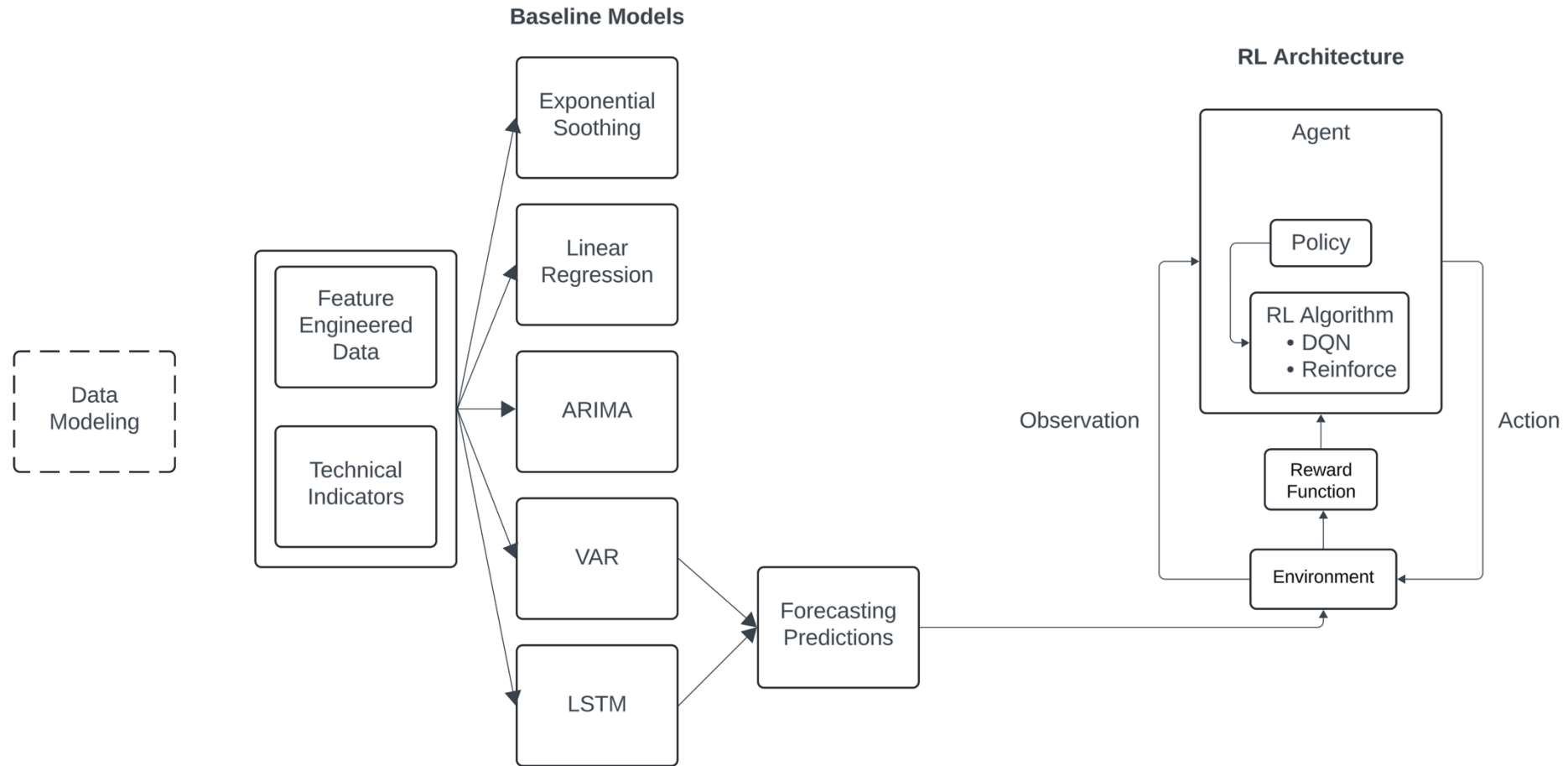
# Data Loading and Preprocessing Pipeline

# Feature Engineering Pipeline

# Data Visualization Pipeline
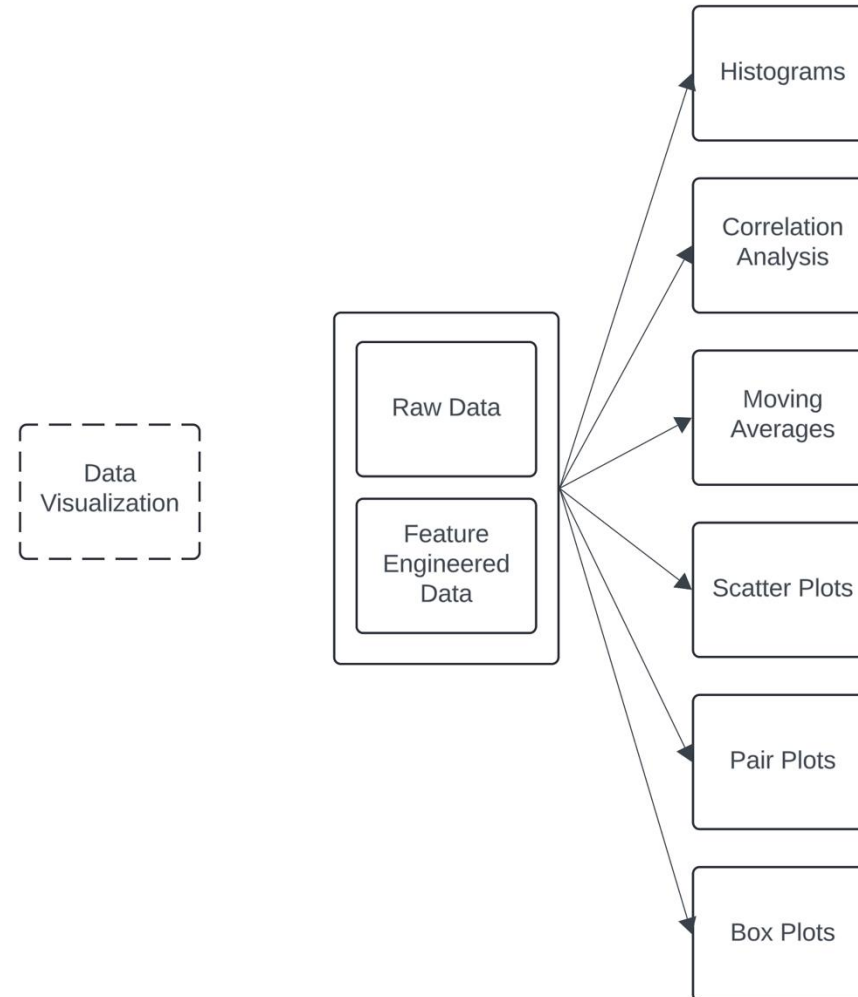
# Data Modeling Pipeline

# Results

# Forecasting and RL Algorithm Results

| Model | 50 Epoch R - Squared | 100 Epoch R - Squared | 500 Epoch R - Squared |
|---|---|---|---|
| LSTM | 0.4585 | 0.4759 | 0.5199 |

| Model | 50 Episode Cumulative Return | 100 Episode Cumulative Return | 500 Episode Cumulative Return |
|---|---|---|---|
| Deep Q Network | - 5 % to – 3 % | - 3% to – 2 % | - 2% to – 0.9 % |
| Reinforce | - 2 % to – 0.29% | -1.5 % to 0.18 % | - 0.3 % to -0.07 |

# Demo

# Future Work

- Additional Feature Engineering

- Hybrid model Integration : LSTM + RL

- A/B Testing of RL Algorithms

- Enhanced UI with reporting features

# Thank you

# Gantt Chart