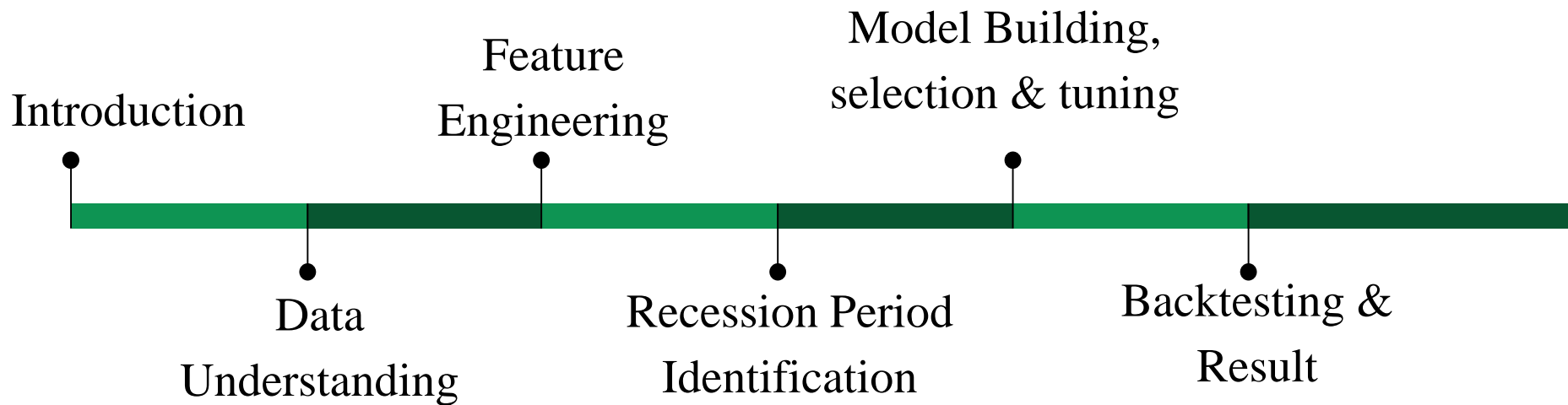
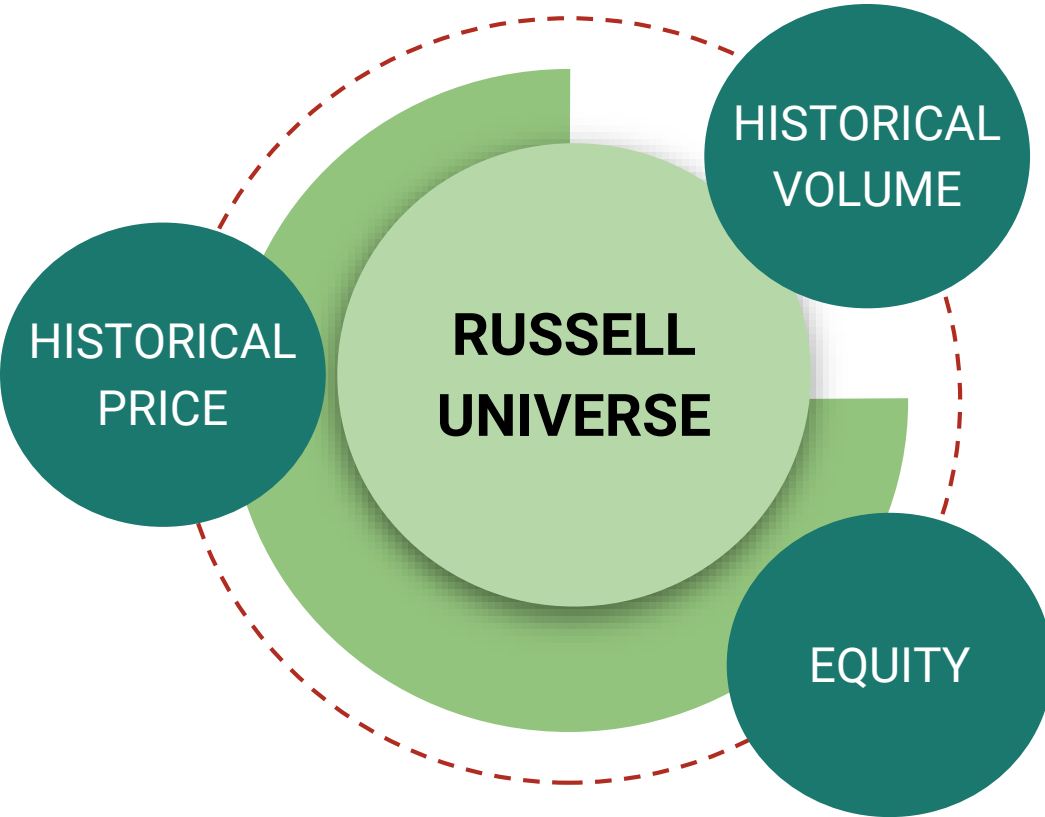


# AGENDA



# PROBLEM STATEMENT



- Analyze technical indicators to predict stock price movement
- Generate trading signals

# INITIAL DATA

Ticker	Name	Sector	Industry	FIGI
SDRL UN Equity	Seadrill Ltd	Energy	Energy Equipment & Services	BBG00LBD3K1
AA UN EquityAlcoa Corp	Alcoa Corp	Materials	Metals & Mining	BBG00B3T3HK5
INO UW Equity	Inovio Pharmaceuticals Inc	Health Care	Biotechnology	BBG000BK7763
AXP UN Equity	American Express Co	Financials	Consumer Finance	BBG000BCR153
VZ UN Equity	Verizon Communications Inc	Communication Services	Diversified Telecommunication	BBG000HS79Q4
SABR UW Equity	Sabre Corp	Information Technology	IT Services	BBG005WQVZ21
PEP UW Equity	PepsiCo Inc	Consumer	Beverages	BBG000DH7TN1

Few Equities under Russell Universe

Daily Data for each Stock  
(2000 to 2020)

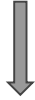
Date	Volume	Closing Price	Low Price	High Price	Opening Price
12/5/2017	58521	90.15	89.97	90.5	90.1
12/6/2017	60591	90.42	89.32	90.5	90.05
12/7/2017	76550	92.05	90.35	92.07	90.38
12/8/2017	58016	91.56	91.53	92.27	92.27
12/11/2017	44817	91.77	91.37	91.81	91.76

# Feature Engineering

## INDEPENDENT VARIABLES

Form several technical indicators based on stock price

SMA  
MACD  
ADX



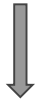
Define simple rules from the indicators and choose top 10

TEMA  
Bollinger Bands



Using the simple rules form 2-way and 3-way complex rules

EMA5-10+EMA20+EMA10  
CMO\_crossover+SMA5-10+BB\_crossover

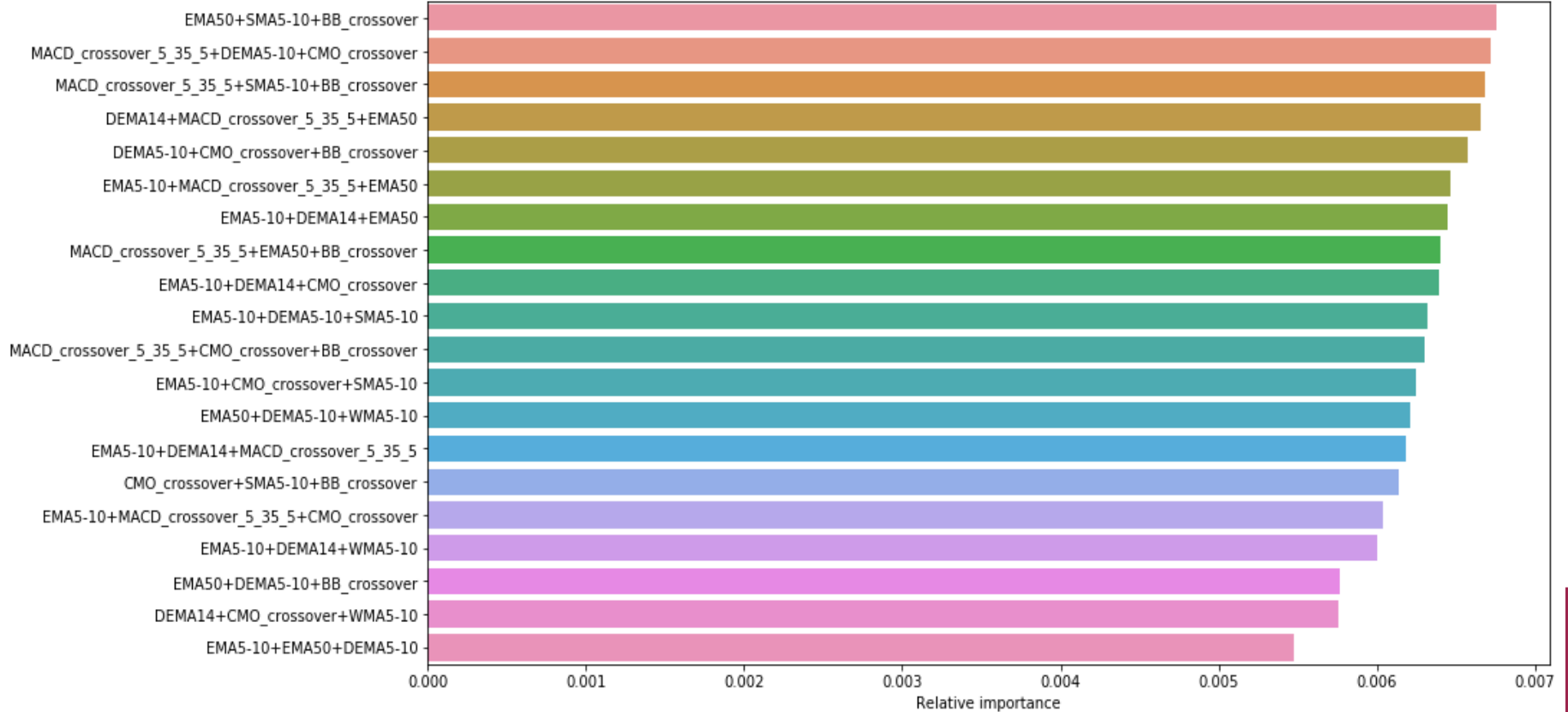


Select top 20 rules as model features

## DEPENDENT VARIABLE

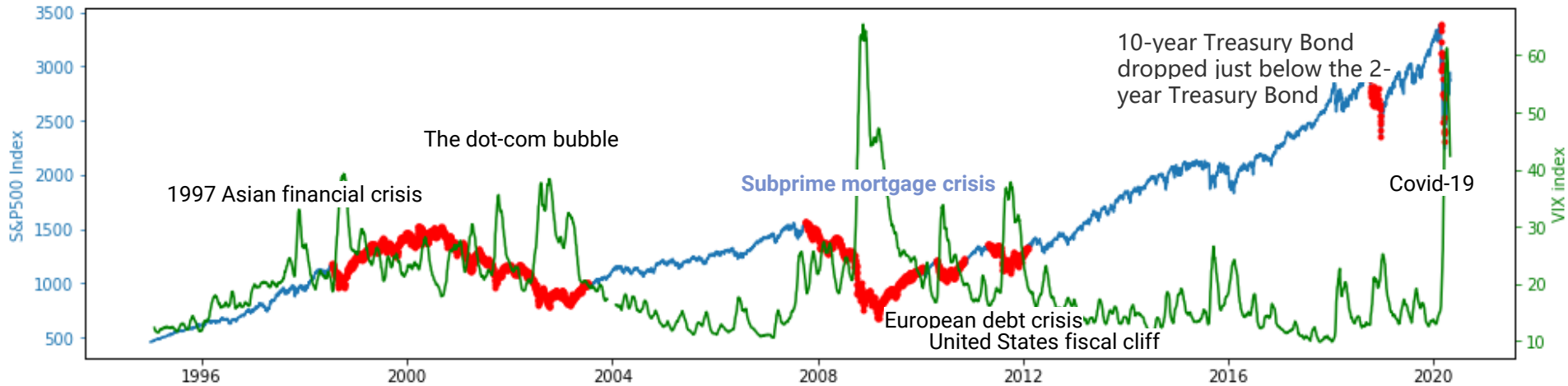
Calculate the 3 day return

# Top 20 rules for the model

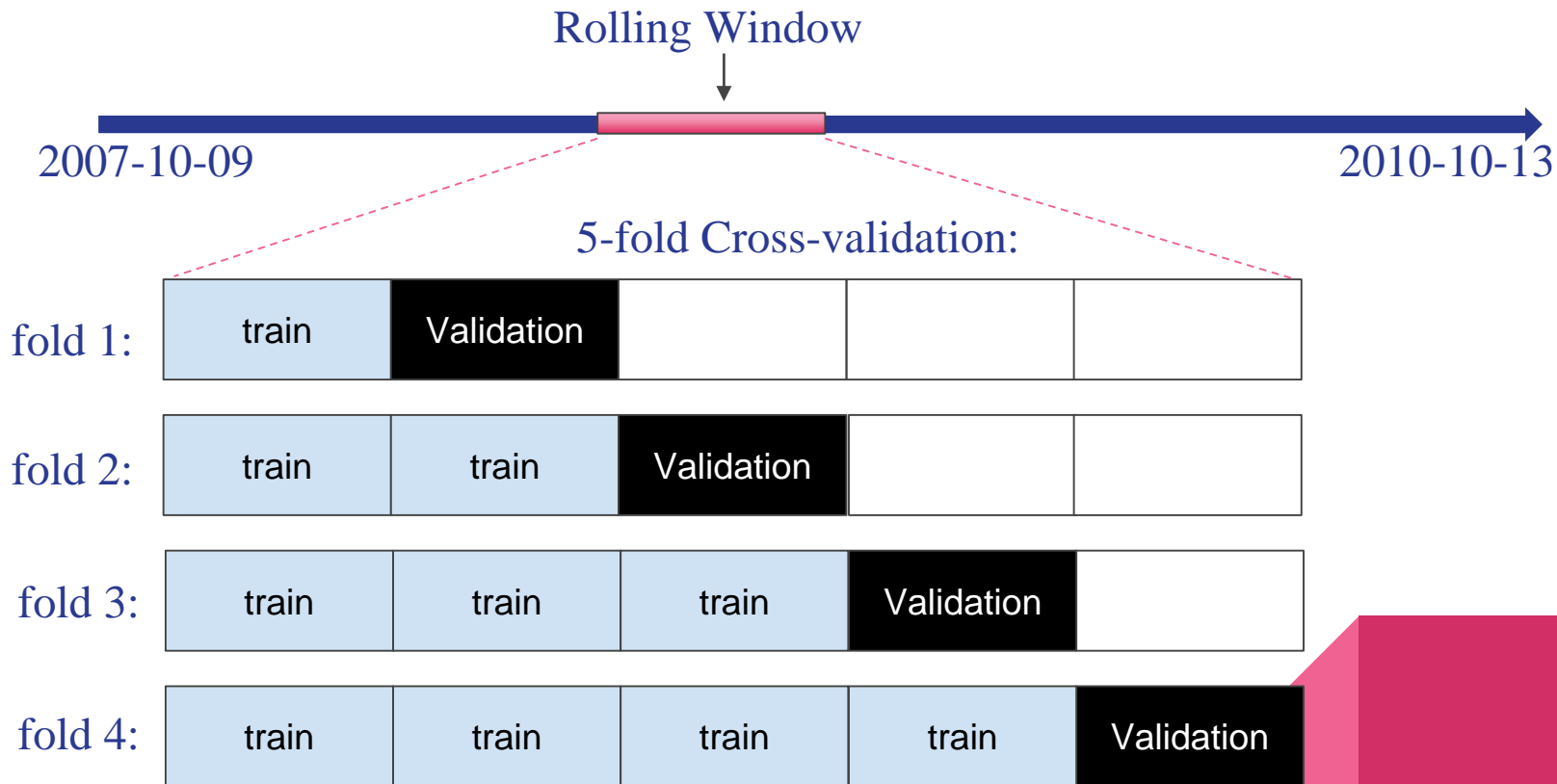


# Recession Period

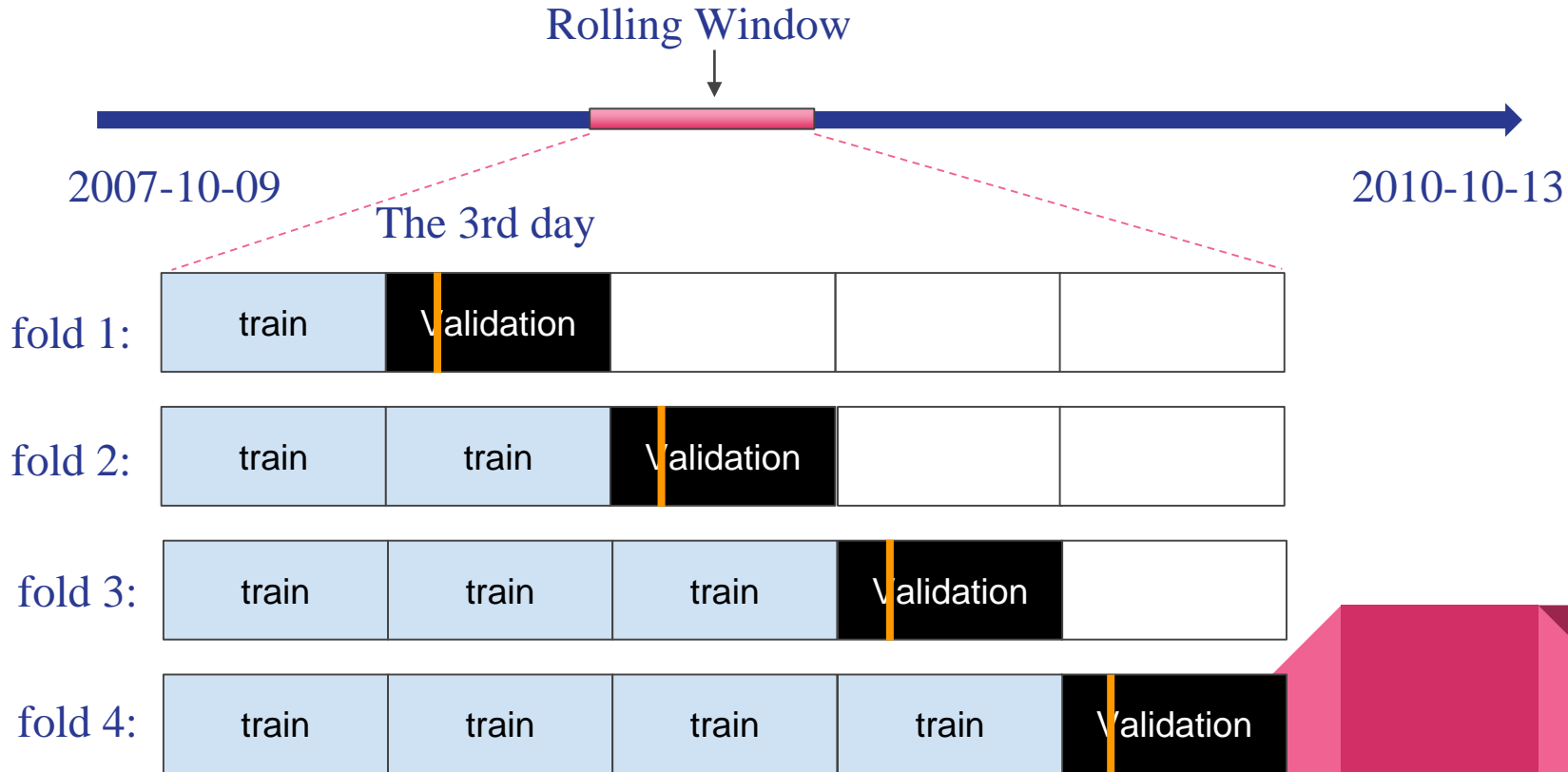
Recession Period = Drawdown + Recovery



# Forward Rolling Model Analysis



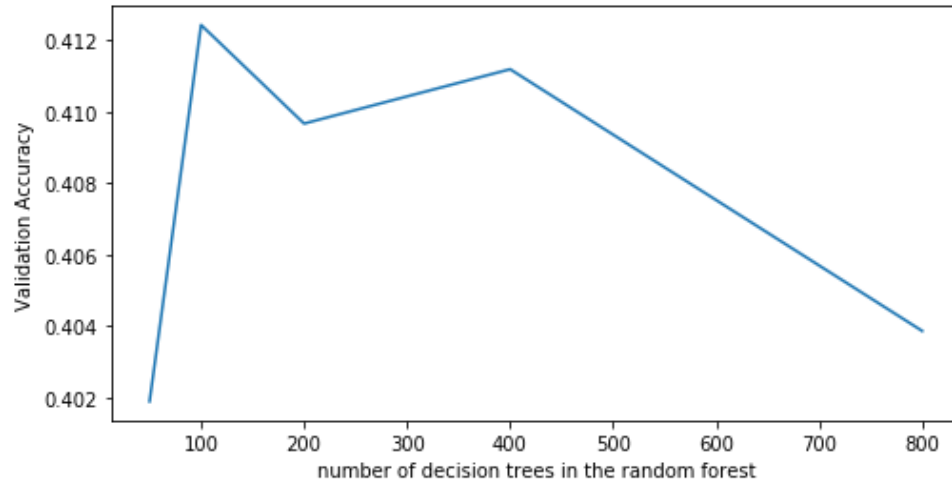
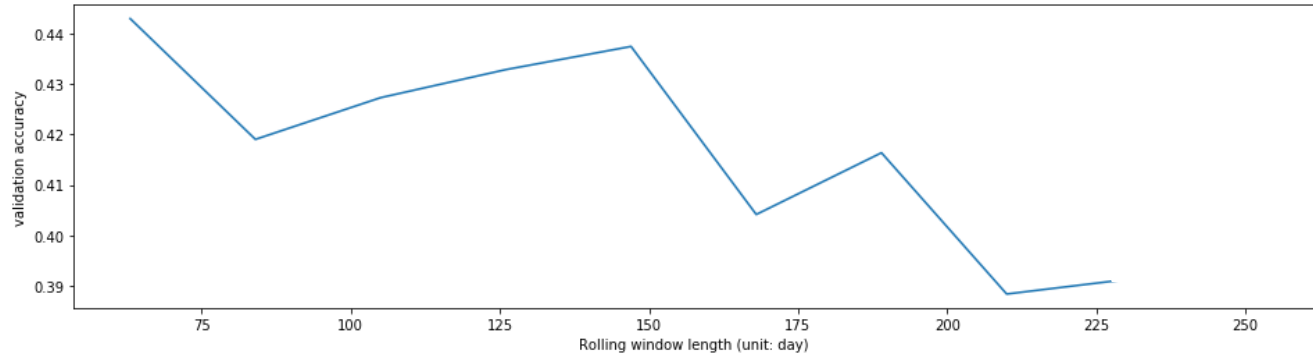
# Forward Rolling Model Analysis





# Parameter Tuning

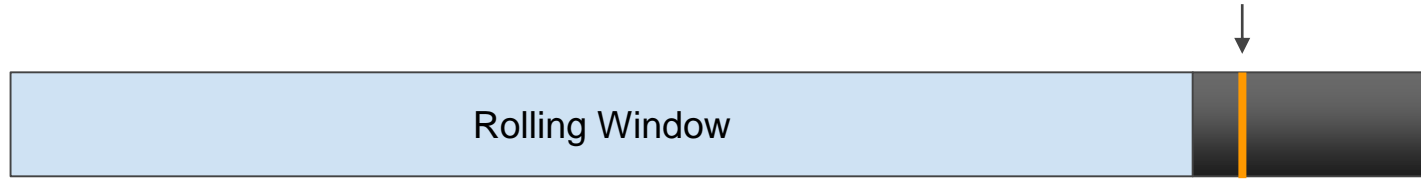
Length of rolling window:  
63 days (3 months)



Number of decision trees: 100

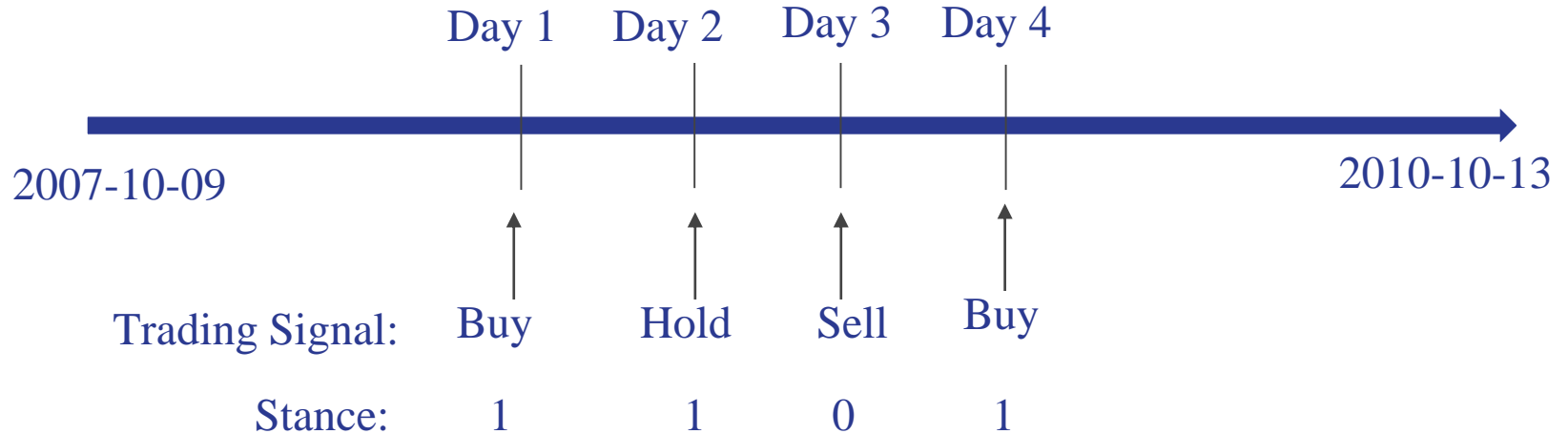
# Model Results

Test Date: The 3rd day after the Rolling window



We used random forest and got an accuracy **47.5%**.

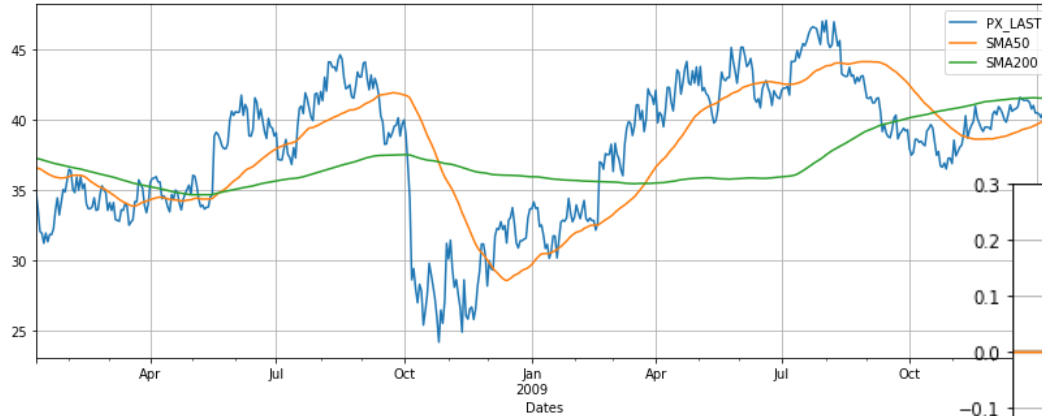
# Trading Strategy



daily return  $\equiv \log(\text{close price of today} / \text{close price of yesterday})$

Cumulative return  $\equiv \text{cumsum}(\text{Stance} \times \text{Daily return})$

# Backtesting



Ticker: **AAP**

Company Name:

Advance Auto Parts Inc Advance

