

# Analysis of Common Trend Strategies Using ML

Christian Ruiz, COMP 642-901

- Trend Strategy
- Objective
- Data Requirements
- Model Analysis
- Model Optimization
- Conclusions

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# Elements of our Trend Strategy

- Capture gains through momentum
- Momentum
- Technical Analysis vs Fundamental
- Moving Averages

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# Objective

Based on daily market close prices of TQQQ, determine if the following 1, 3, 5, 10, or 20-day close price will yield a gain, or a loss compared to the security price at time 0.

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# Data Requirements

- Macro Market Data
- Technical / Trend Feature Engineering
- Investment Simulation



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# Data Pre-Processing

- 20, 60, 120 Rolling Window Period Normalization
  - Min-Max Scaling
- Reshaping Data For RNN
  - 20, 60, 120 period sequence length
  - 26 independent variables
  - 5 dependent variables
- Label Encoding
  - Long, Short, Hold
- Principle Component Analysis

# Model Analysis

- LSTM
- XGBClassifier
- KMeans

# LSTM

- Time Series
- Multi-Output Regressor
- Available Parameter Optimization Techniques

# XGBRegressor

- Tree Based Model
- Robustness to Outliers
- Model Interactions Between Features
- Does not account for Time Series Nature of Data

# KMeans

- Not a Means of Predicting Price
- Clusters For Seasonality or Momentum
- Added Feature for Another Model

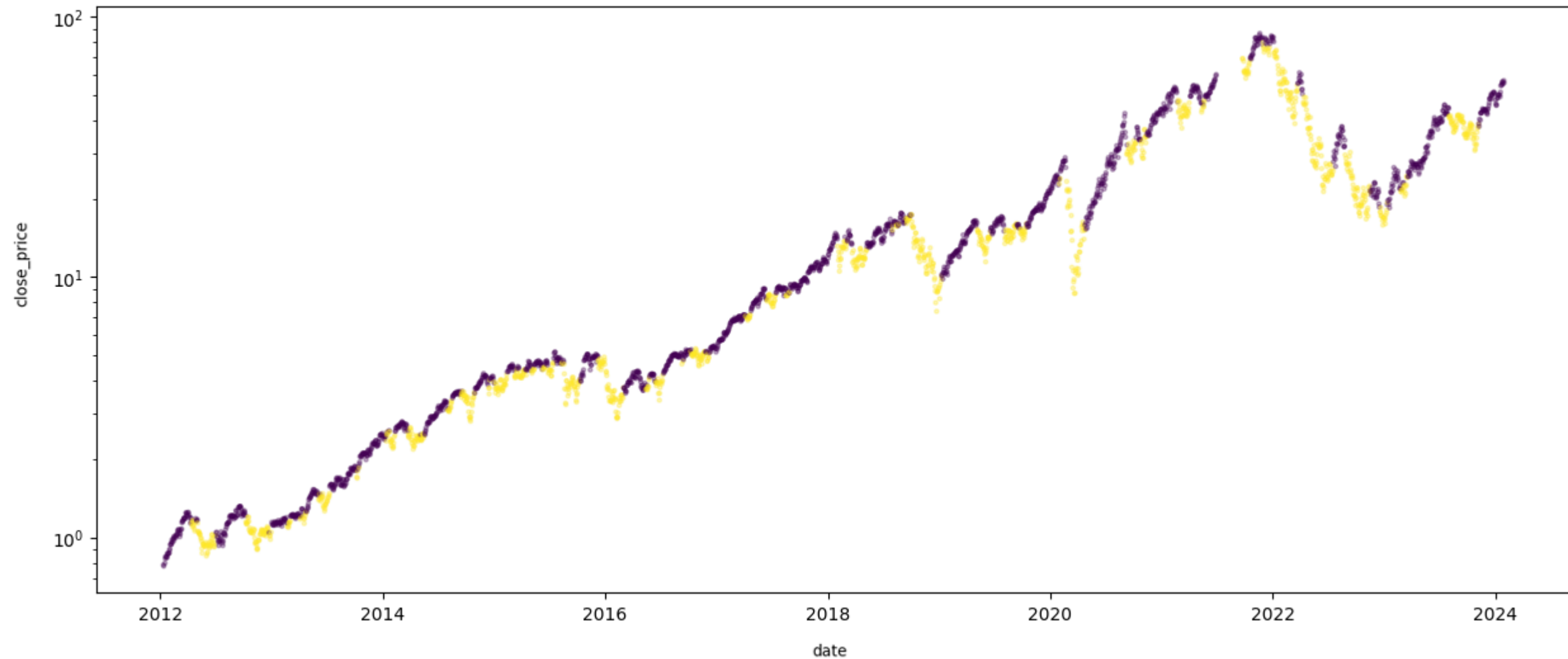
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# Model Optimization

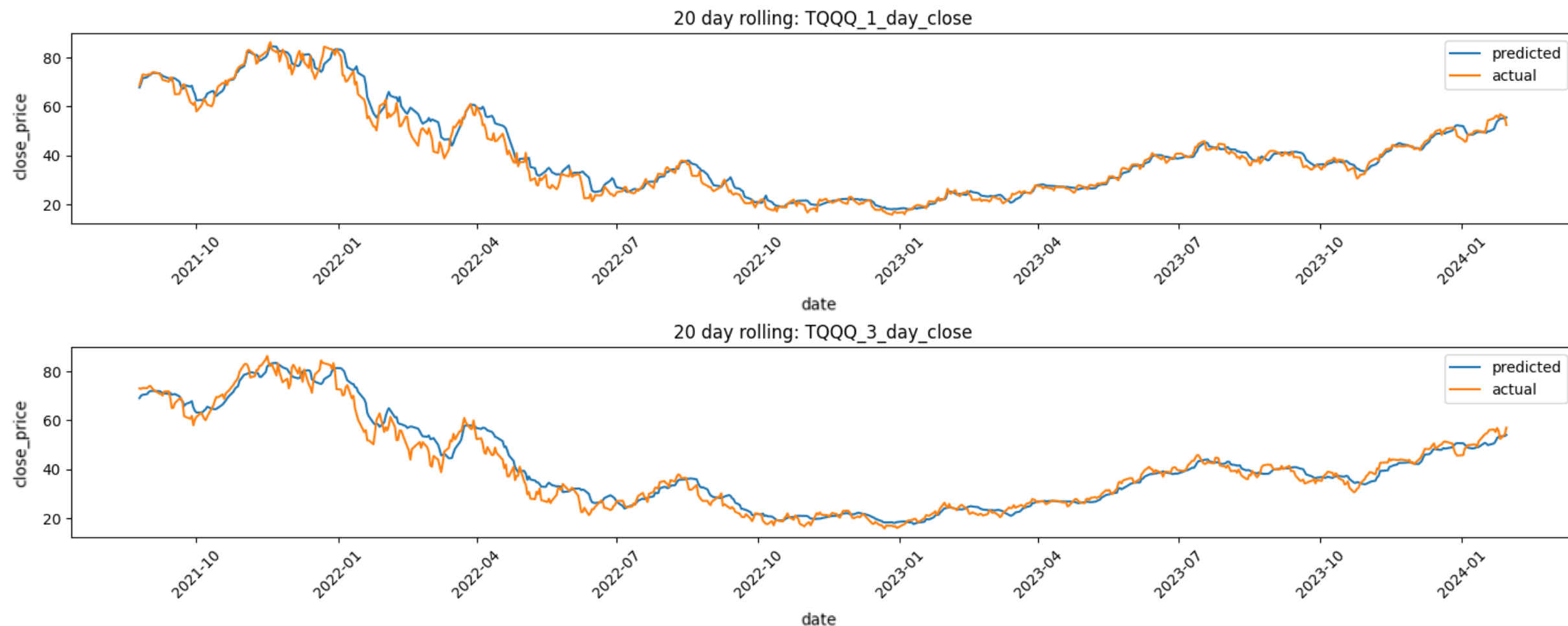
- Kmeans
  - optuna module
  - n\_clusters, init, n\_init
  - Silhouette = 0.45
- LSTM
  - keras\_tuner module
  - units, dropout, optimizer
  - MSE = 0.12

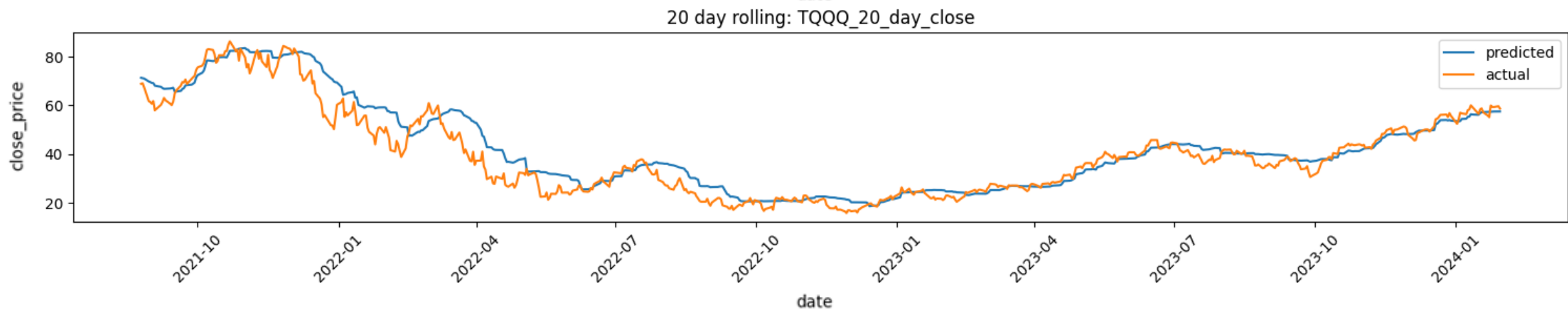
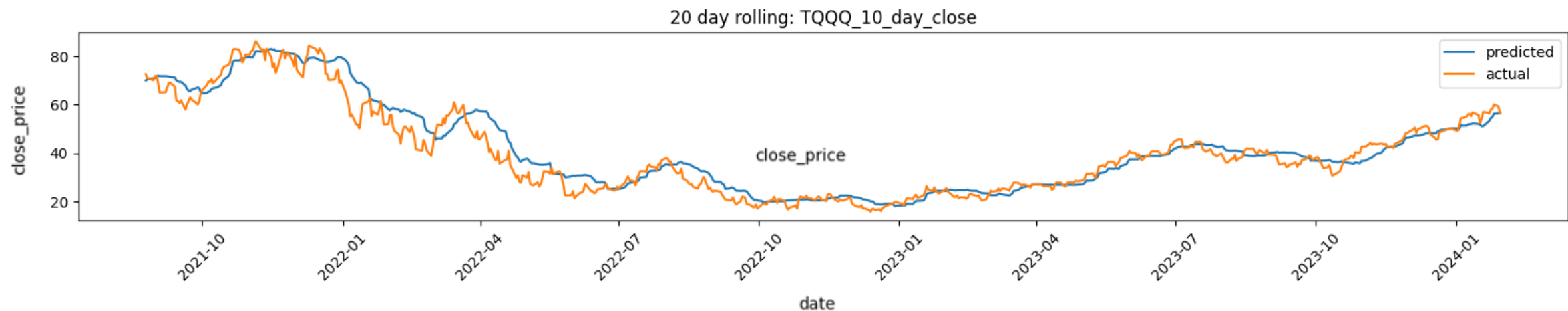
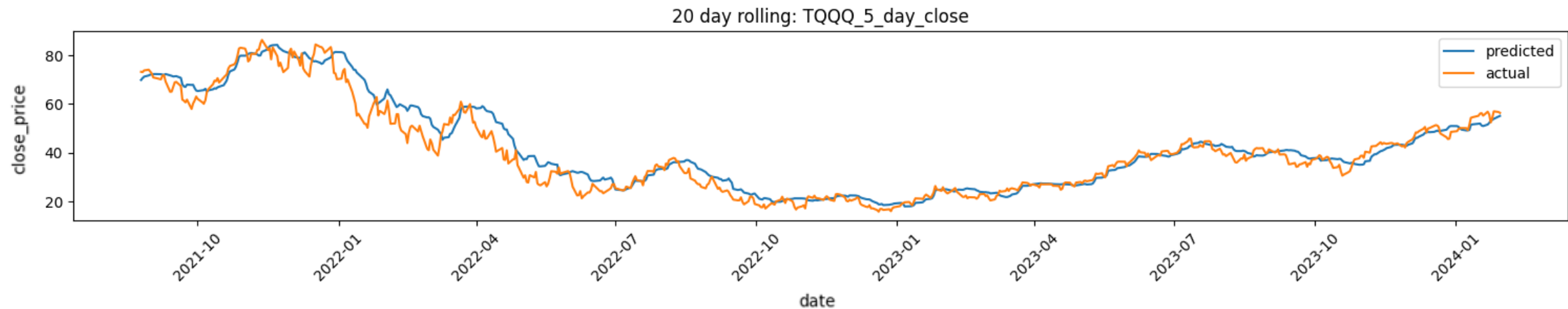


# Results - KMeans



# Results - LSTM





# Conclusions

- Kmeans Does Not Improve LSTM
- Model Momentum Classification
- Back Testing

# Questions?

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