



# Using NLP for Time Series Forecasting on Oil Prices

Robert Fang  
June 20th, 2019

# Sentiment Impacts Prices



The New York Times

*Trump Accuses Iran in Explosions  
That Crippled Oil Tankers*



An image provided by the semiofficial Iranian Students' News Agency appears to show an oil tanker on fire in the Gulf of Oman on Thursday. Iranian Students' News Agency, ISNA, via Associated Press

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ENERGY

**IEA sees oil demand growth falling to lowest level in years as global economy stalls**

PUBLISHED FRI, JUN 14 2019 • 4:01 AM EDT | UPDATED FRI, JUN 14 2019 • 5:37 AM EDT



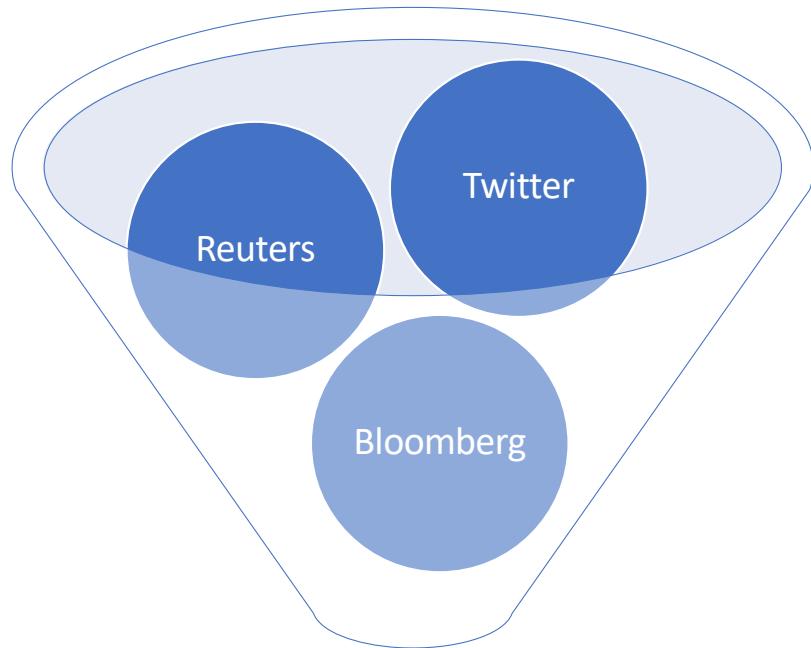
Sam Meredith  
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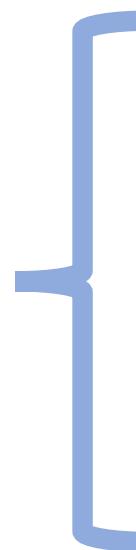
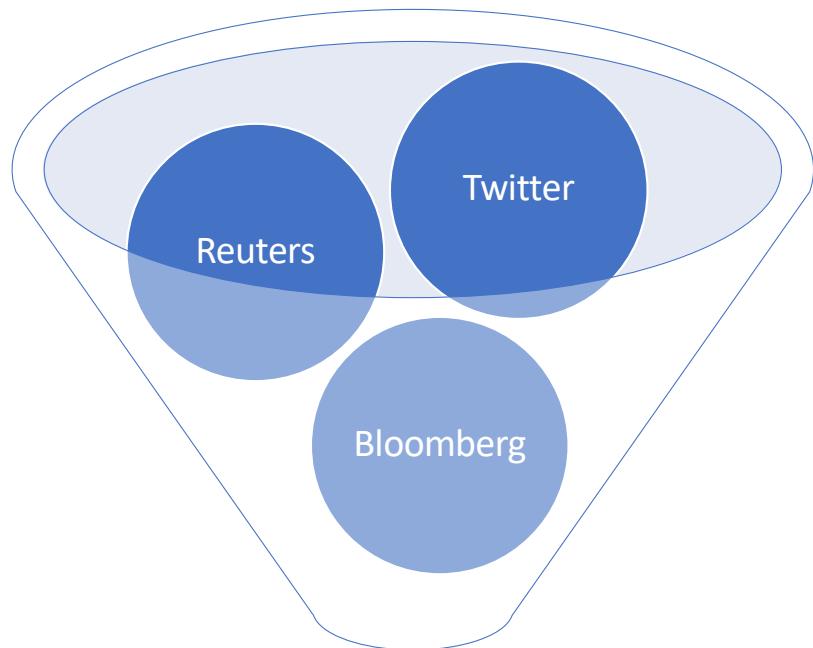
Can I use NLP to augment time series forecasting?



# Methodology



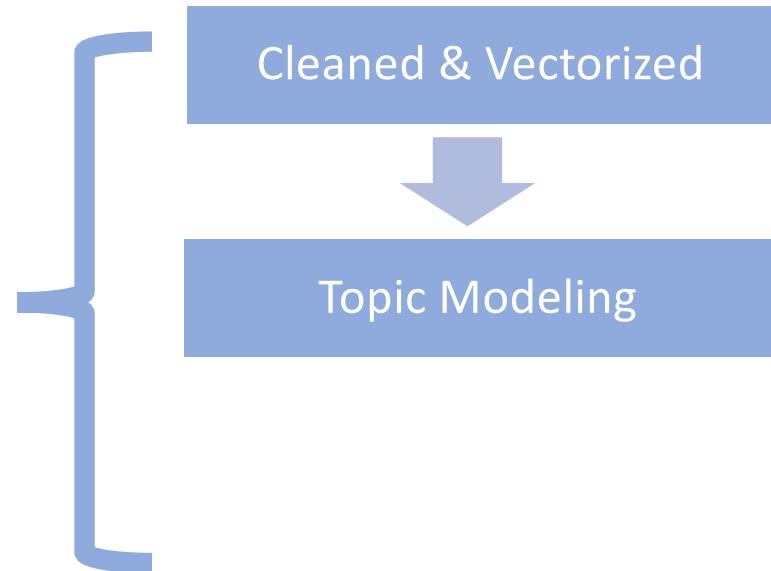
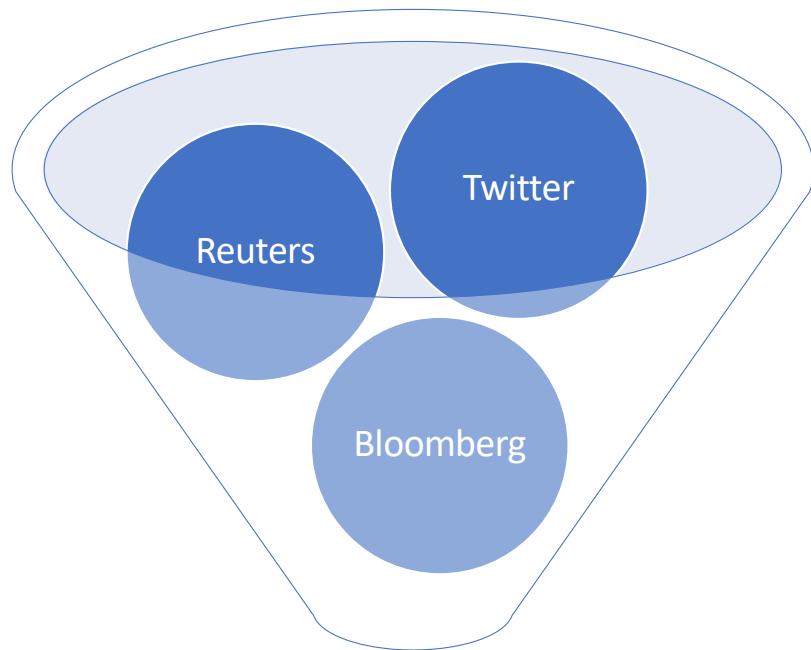
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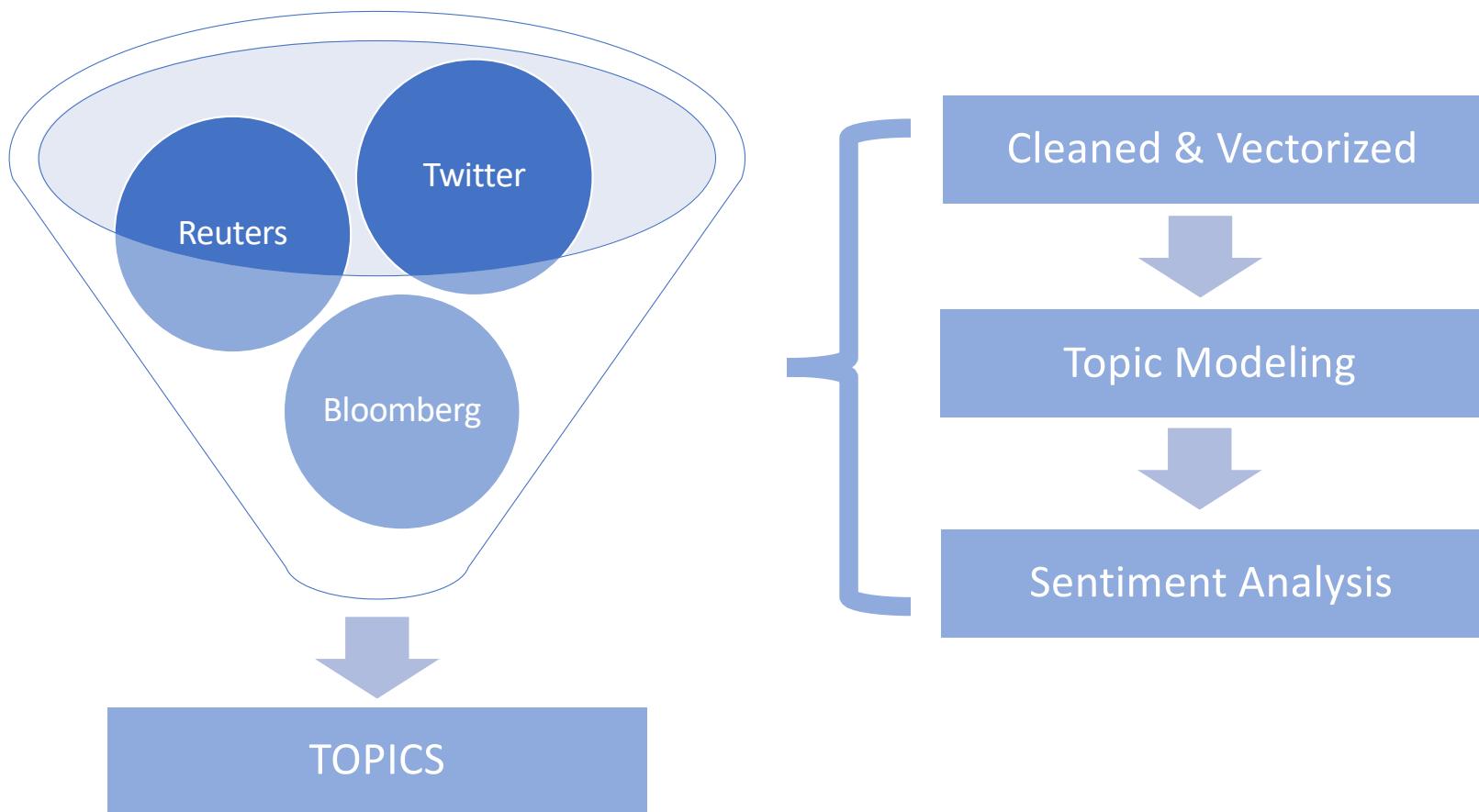
Cleaned & Vectorized



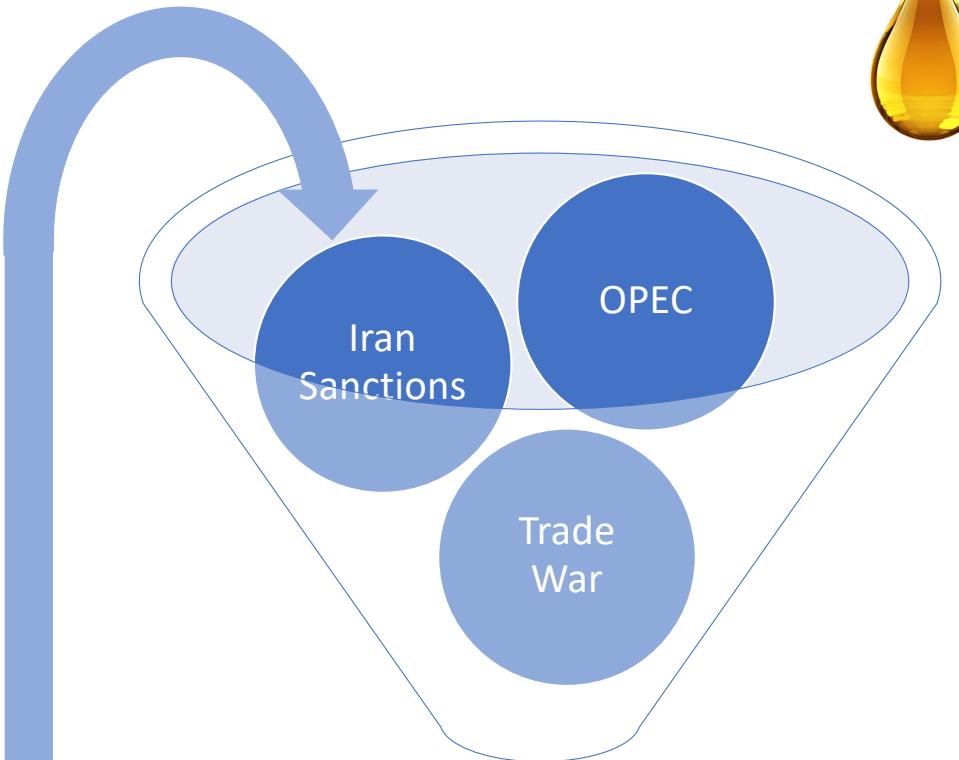
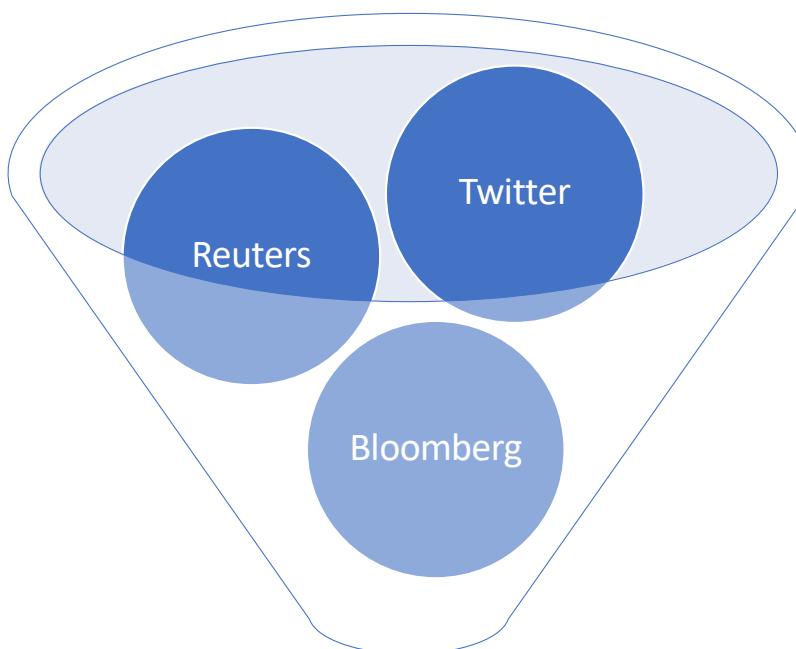
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StatsModels  
Statistics in Python

**PROPHET**

# Topic Modeling Results



## OPEC Supply

production, saudi, cut, increase, iran, output

## Iranian Sanction

iran, sanction, iranian, import, china, trump, export, india

## Demand

demand, growth, global, supply, price, oecd, demand growth

## Trade

demand, year, production, growth, china, average, estimate, import

## Commodity Futures Trading

Commission (CFTC) Report  
position, long, net, net long, net long position, fund, hedge

## Weekly Energy Statistics

barrel, data, api, inventory, build, weekly, draw, today, doe

## Monthly Agency Reports

demand, year, production, growth, china, average, estimate, import

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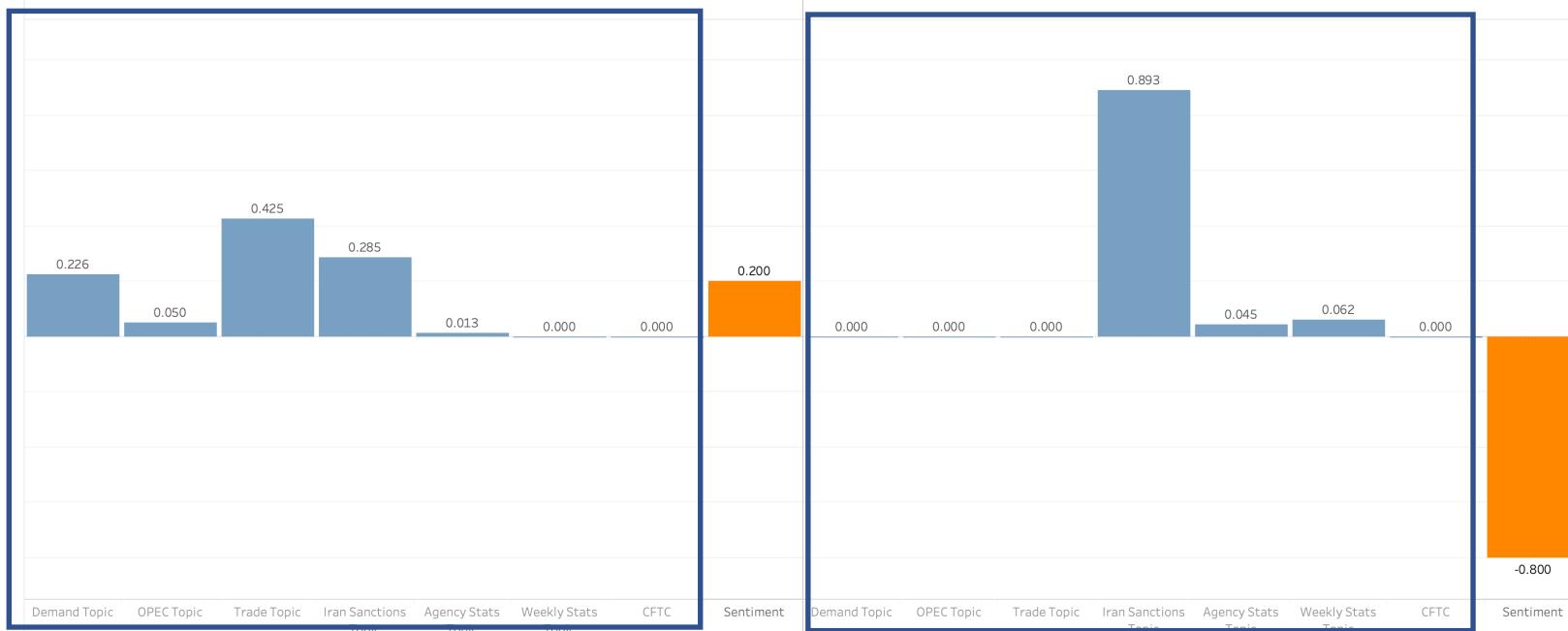
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# News Broken Out by Topics

## News Headlines

birol say geopolitics to drive global market in near term in an interview with platts iea executive director fatih birol say geopolitics will be the key factor in oil market for the next quarter to come cite decline in iran and venezuela and uncertain situations in libya and algeria birol also say that he see russian and opec move toward a more strategic partnership but expect oil market to move into the market direction rather than the resolution direction as us shale continue to dominate international price developments

bolton warn of strong us response to attack by iran's proxies bloomberg write that us national security adviser john bolton warn iran's proxies not to attack us interest and say any assault on their patron's behalf would risk a very strong response bolton also say yesterday that the us be very concern the iranian revolutionary guard corps would use ally shiite militia group in iraq to attack us target in baghdad recall us officials include trump and bolton have continue to signal caution over tensions with iran in recent days wsj

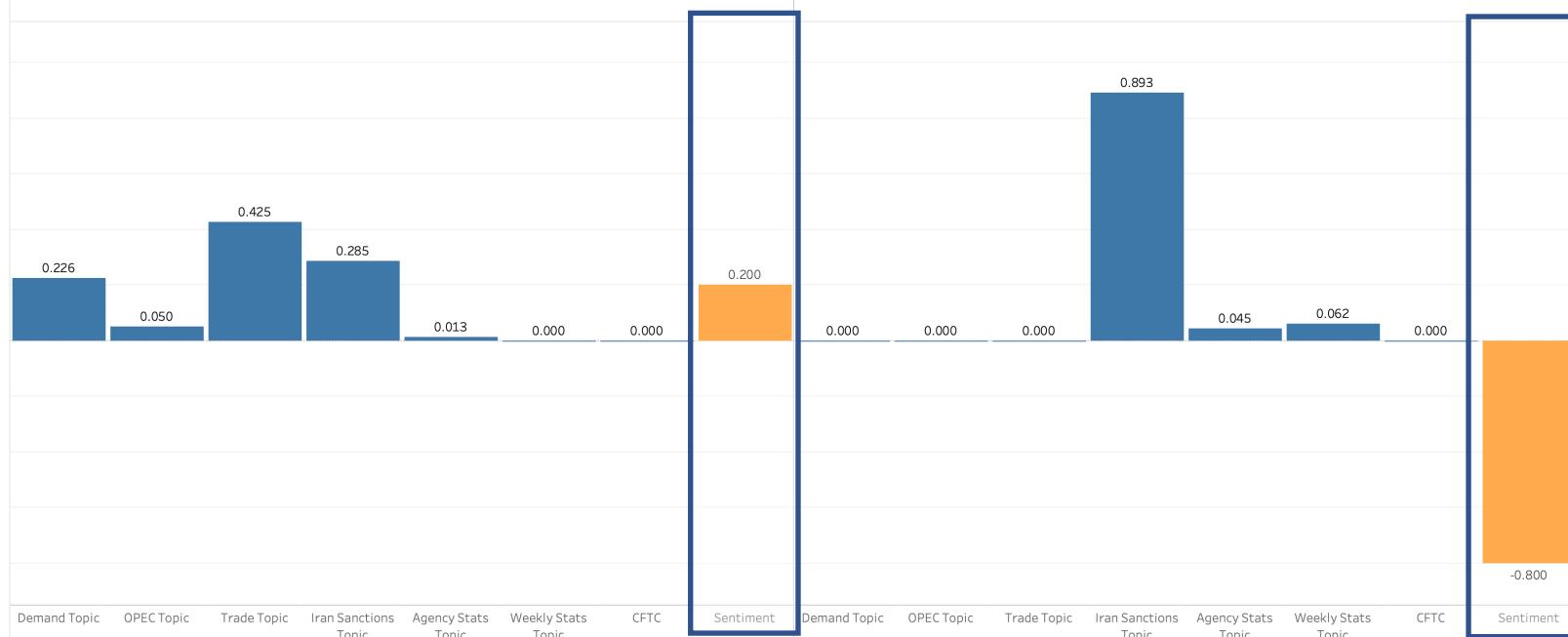


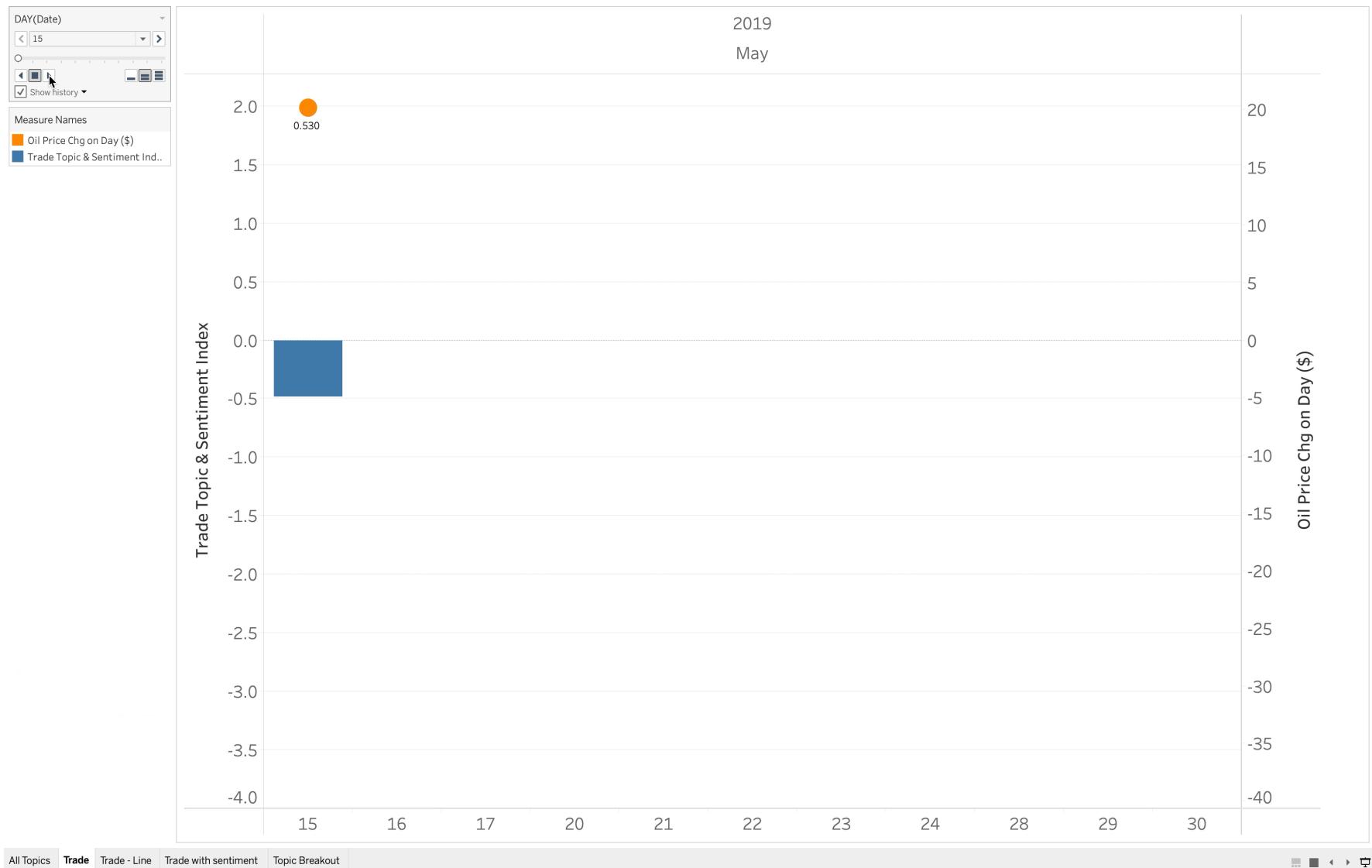
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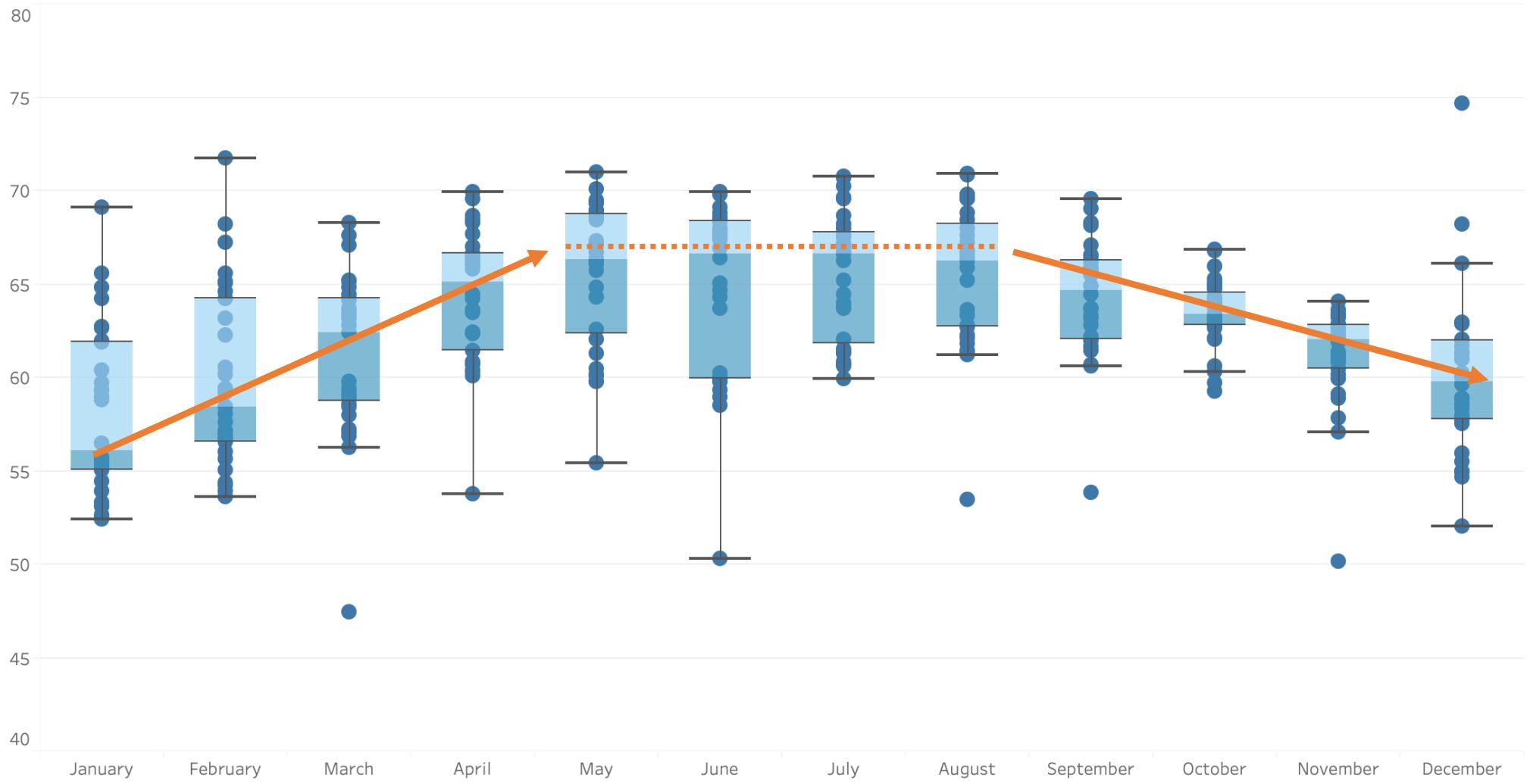




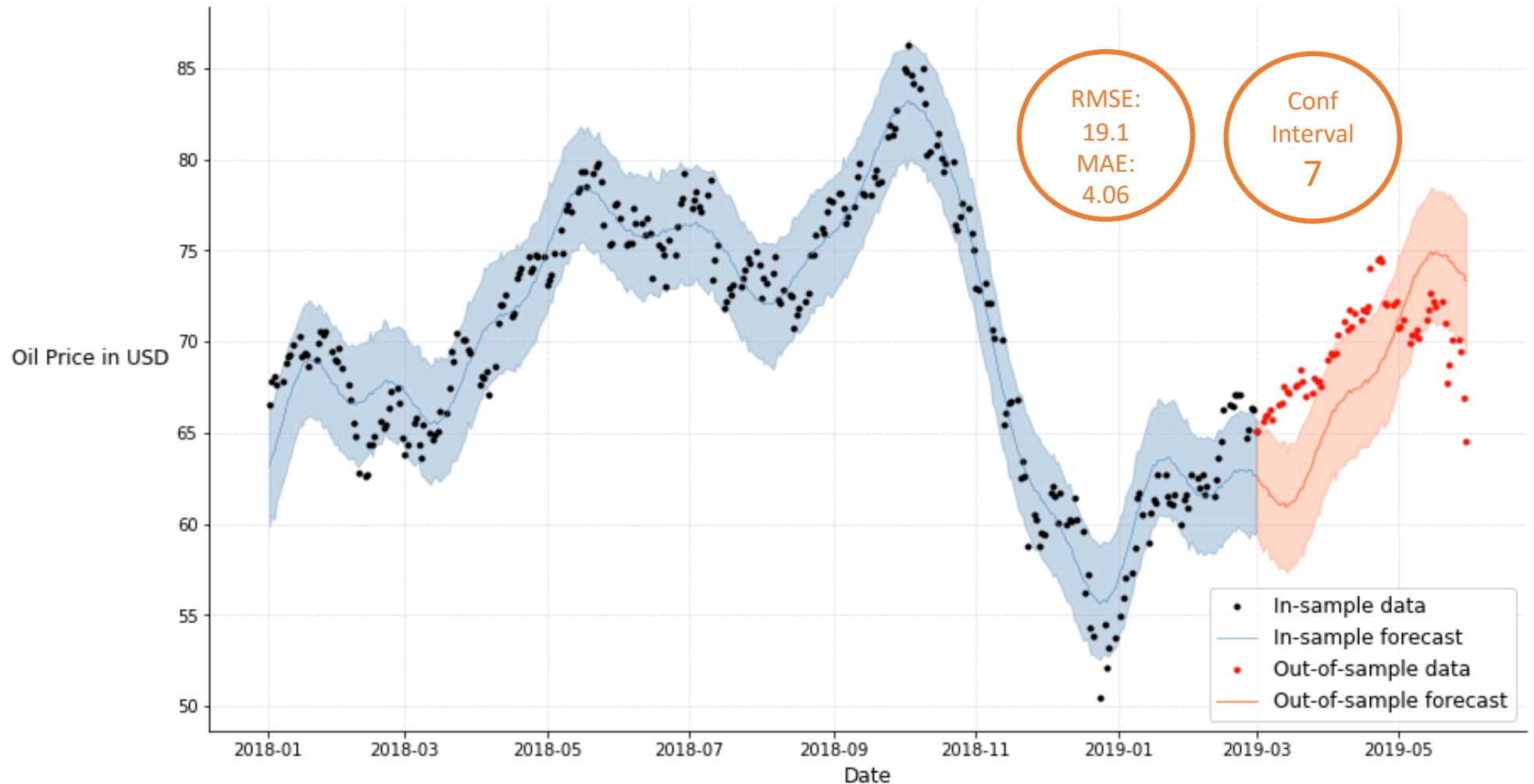
## Oil Price Chart



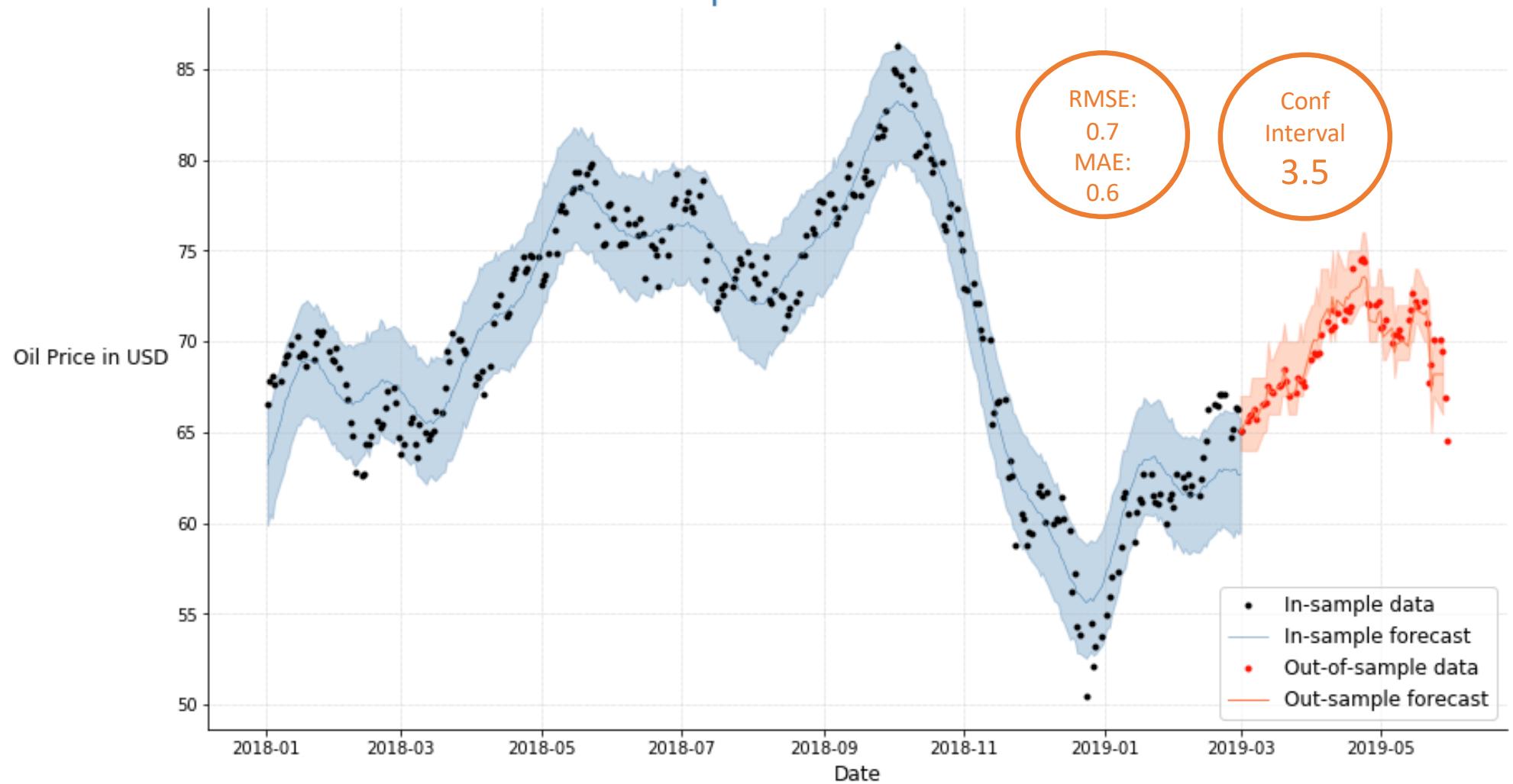
## Monthly Oil Prices for Past 20 Years



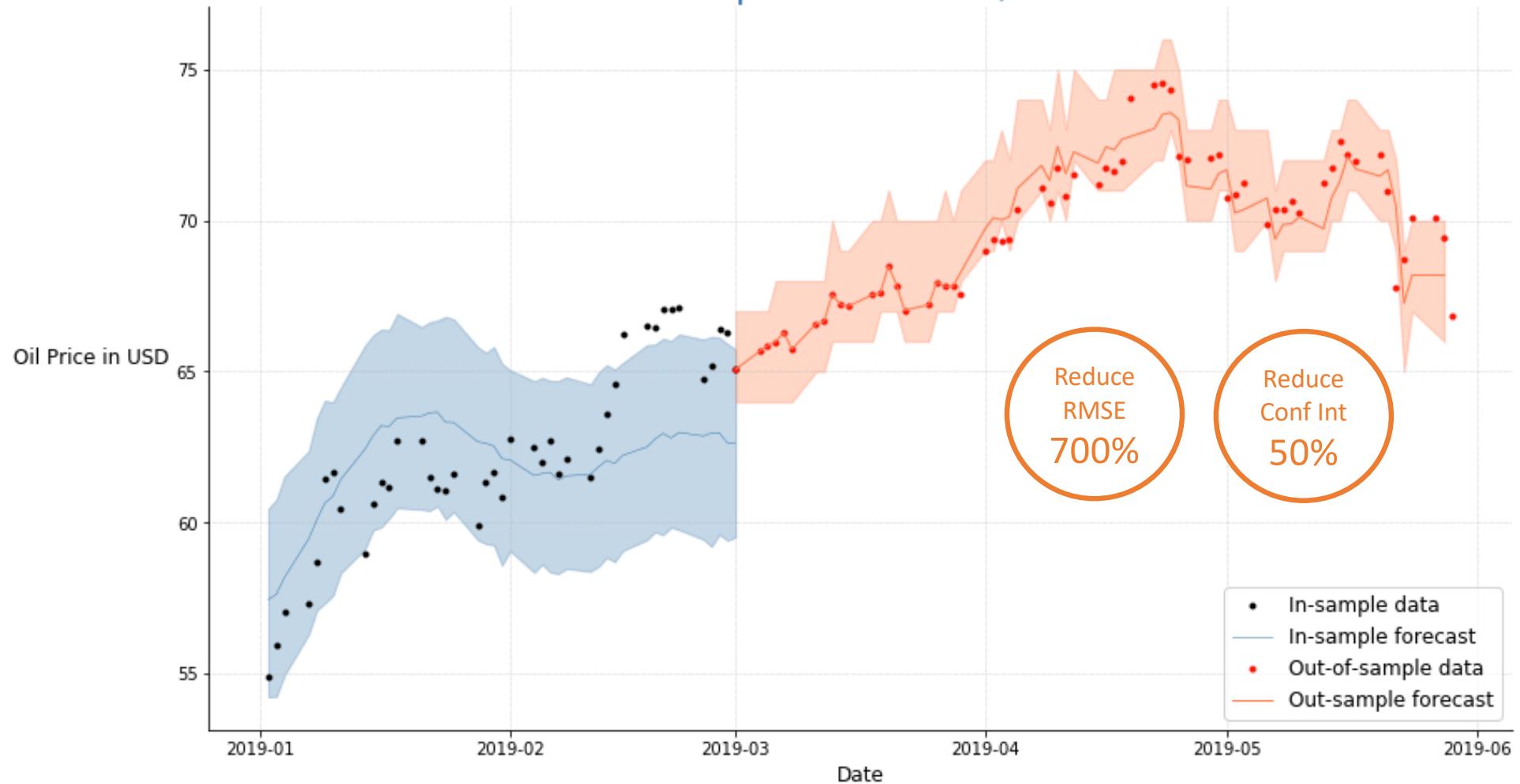
## Base Model Without NLP



## Champion Model With NLP



## Champion Model w/ NLP



# Takeaways



- Validates use of alternative data
- Adds qualitative dimension to fundamental approach
- Wide range of applications across industries



✉ robcfang@gmail.com  
🌐 robcfang.com  
📞 914-882-1834  
LinkedIn robert-fang  
🌐 robcfang.github.io

Thank you

## Champion Model w/ NLP Regressor : RMSE .8 MAE 0.68

