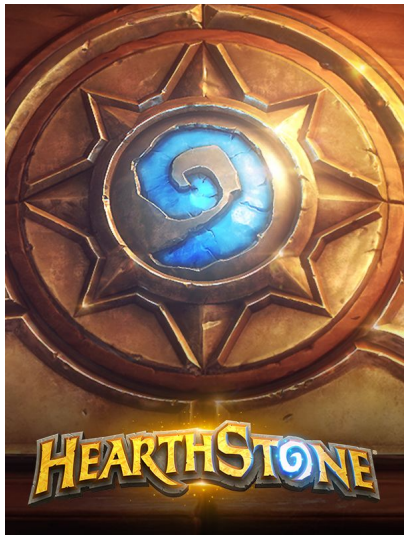
# Twitch Plays Data Science

**Benjamin Leung**

# Objective

➢ Predict one day ahead single game total viewership using time series data



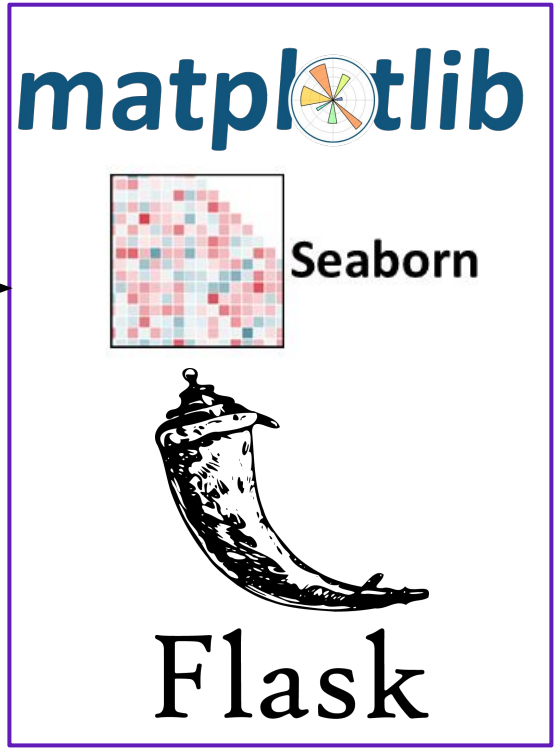


# Tools

**Data Collection**

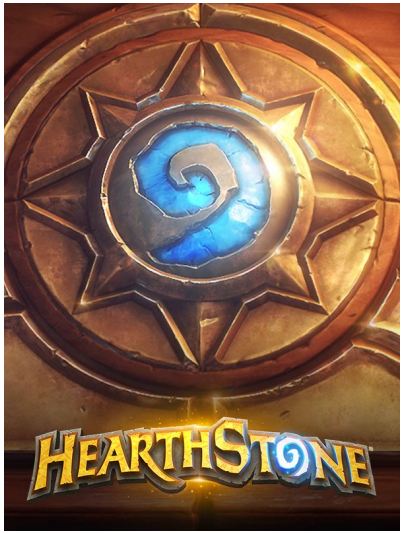

**Data Analysis**


**Visualization**

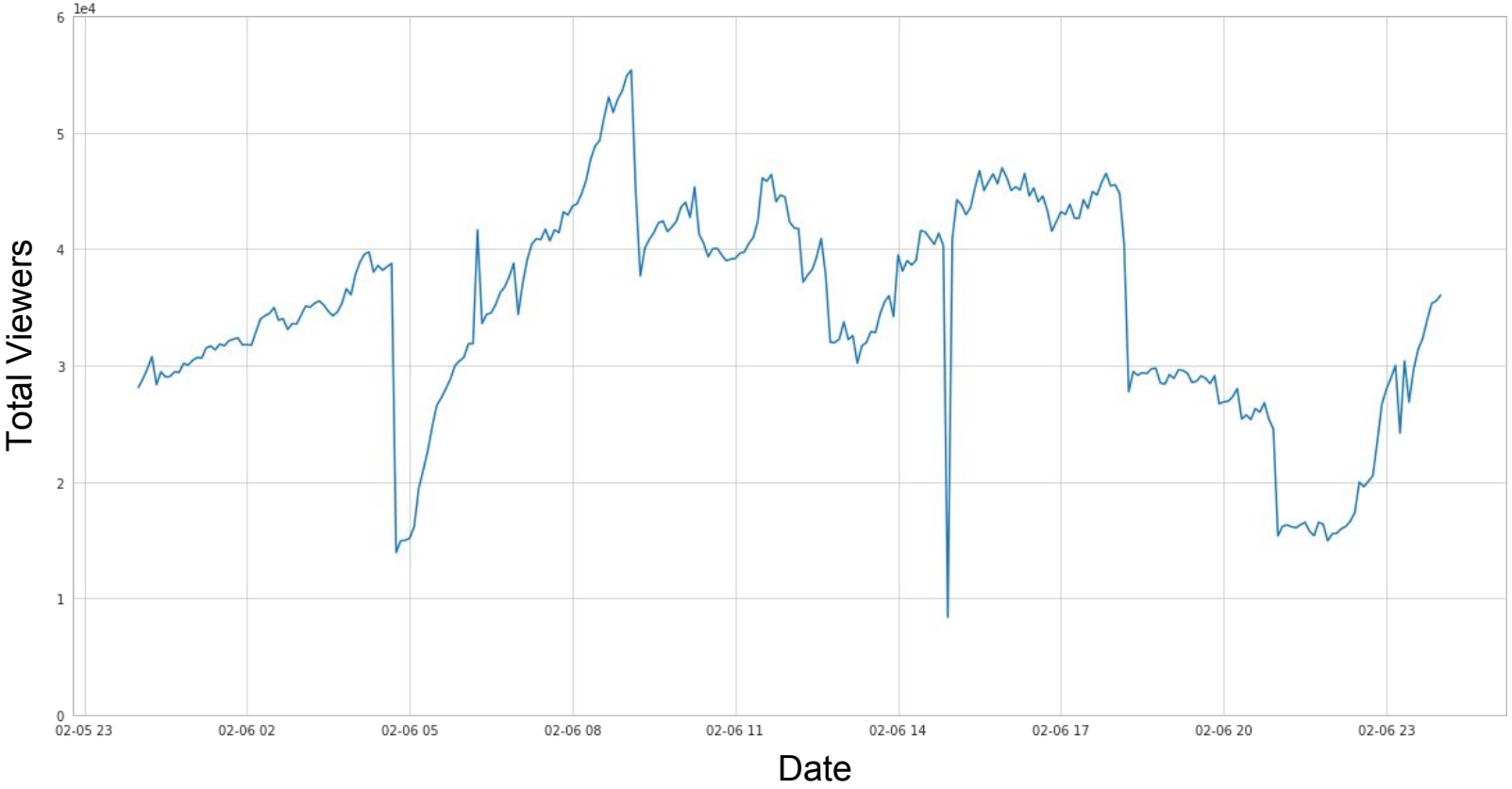


# Hearthstone

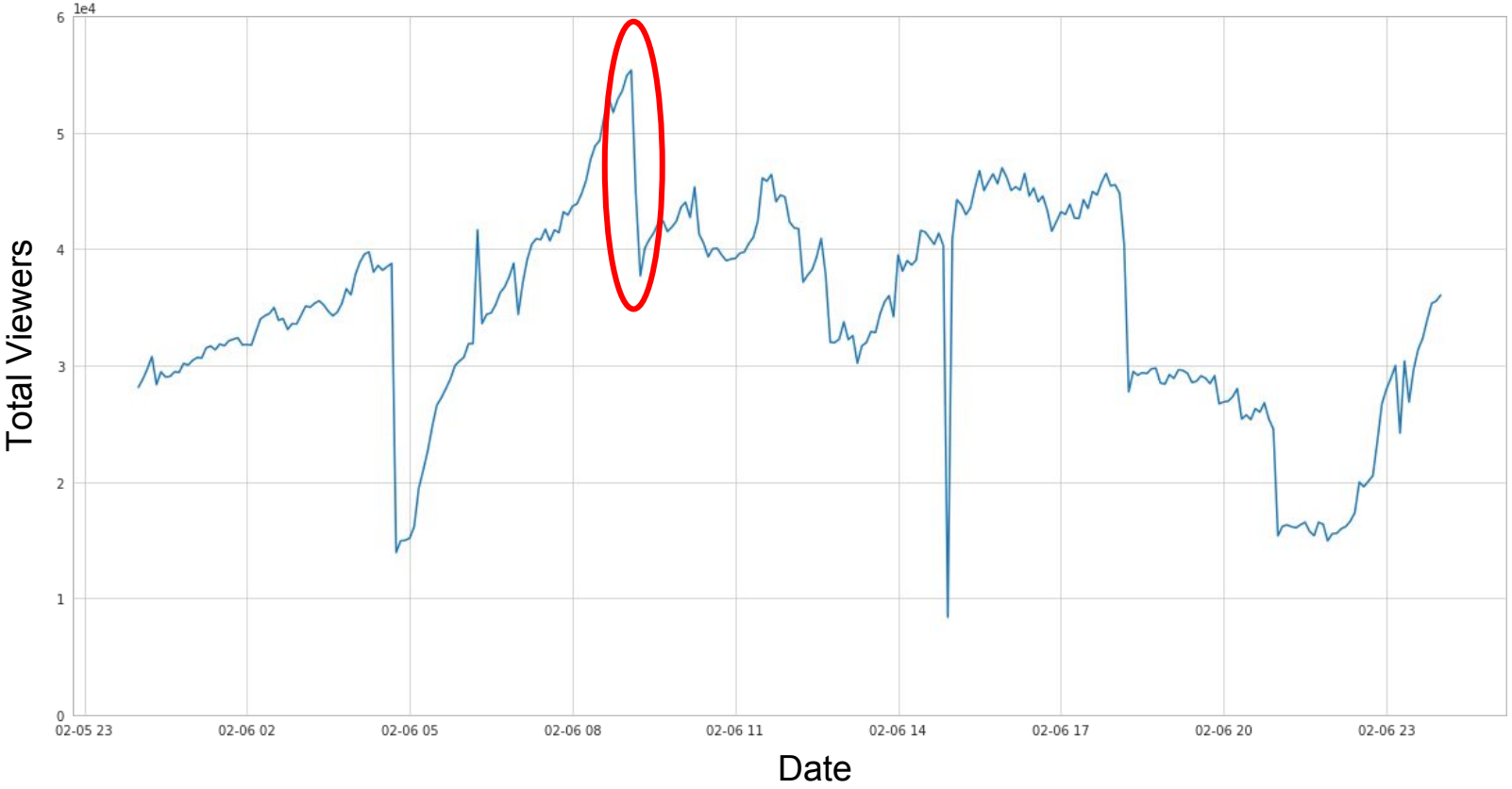
➢ Card game that can be played on mobile or PC, oriented towards **casual players**

# Hearthstone Viewership 2/6/15



# Hearthstone Viewership 2/6/15



# Facebook Prophet

$$y(t) = g(t) + s(t) + h(t) + \varepsilon_t$$

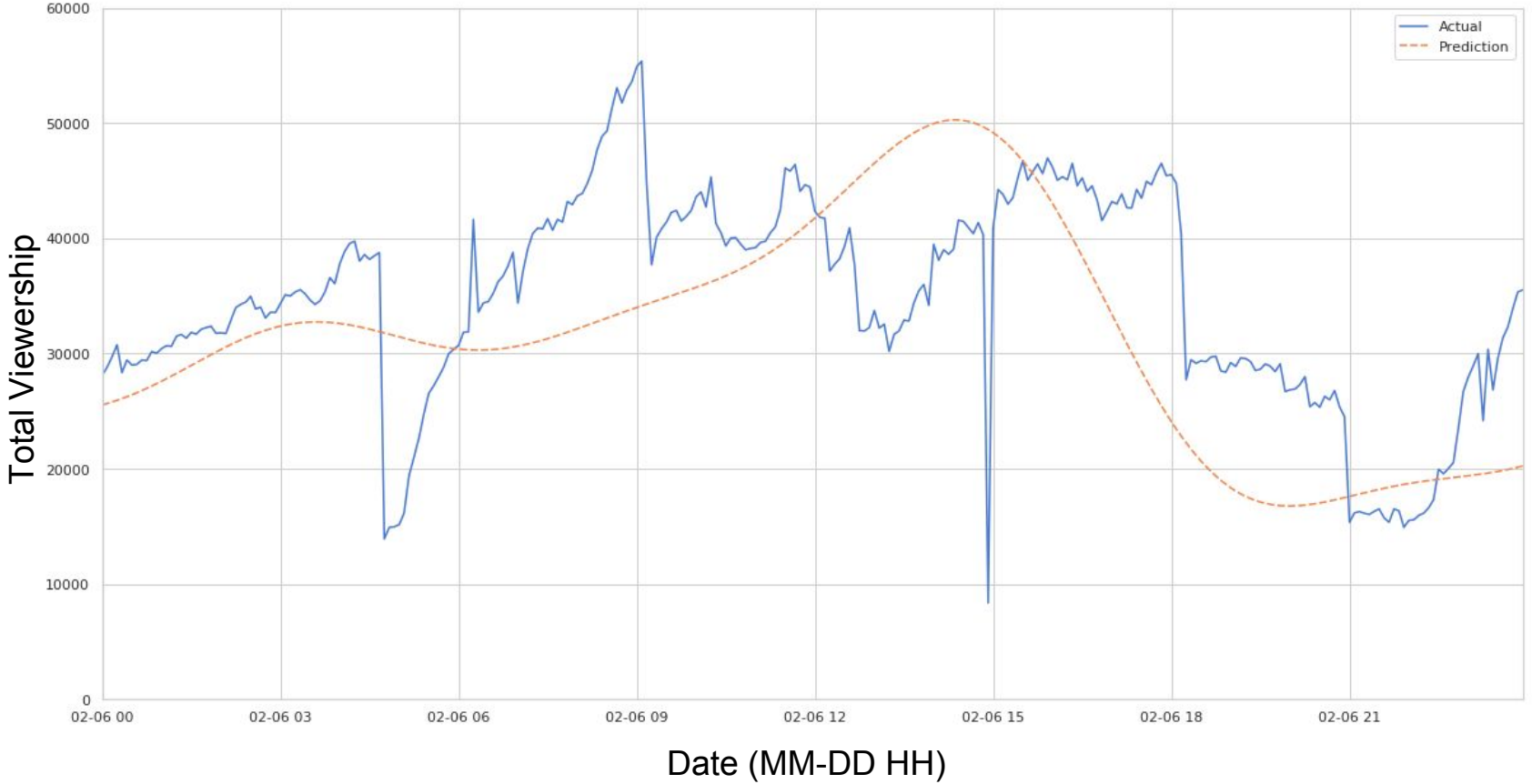
g(t) : trend

s(t) : seasonality

h(t) : special events

ε : noise

# Facebook Prophet Prediction (MAE = 6500)



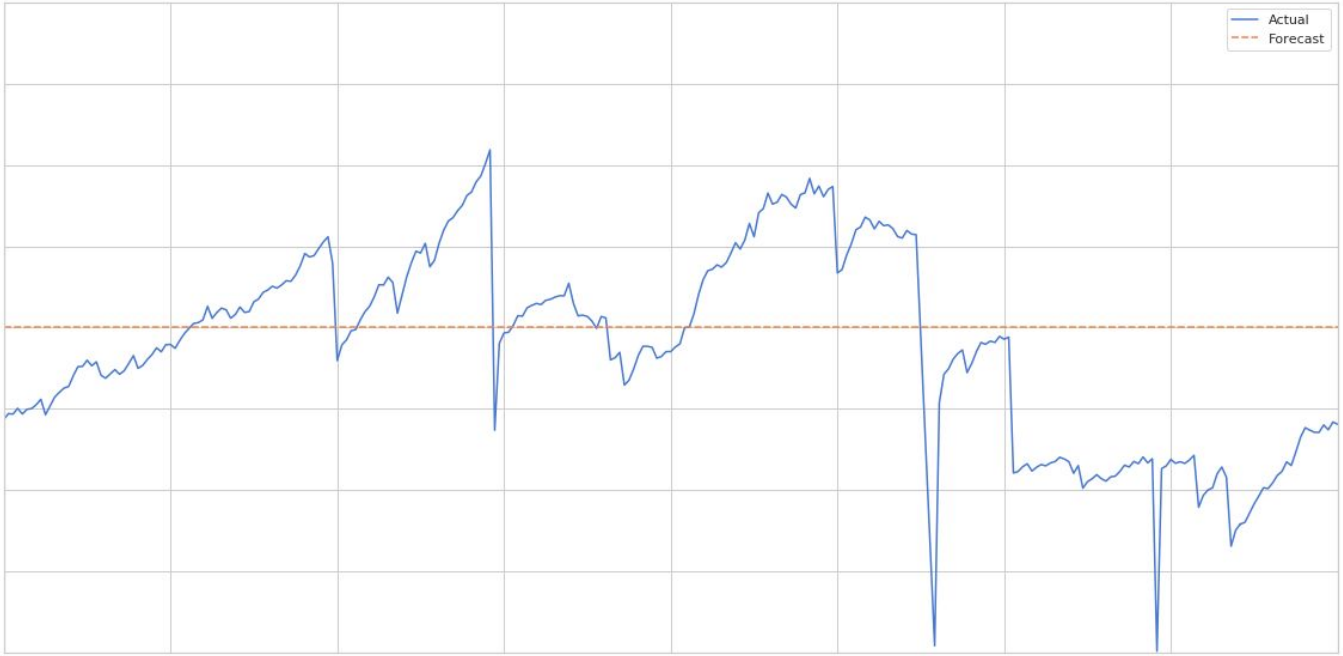
# SARIMA Model

Me: SARIMA, predict viewership!

# SARIMA Model

Me: SARIMA, predict viewership!

Model: No



# SARIMA Model

Me: SARIMA, predict viewership!

Model: No

Me:

# SARIMA

Seasonal

Auto

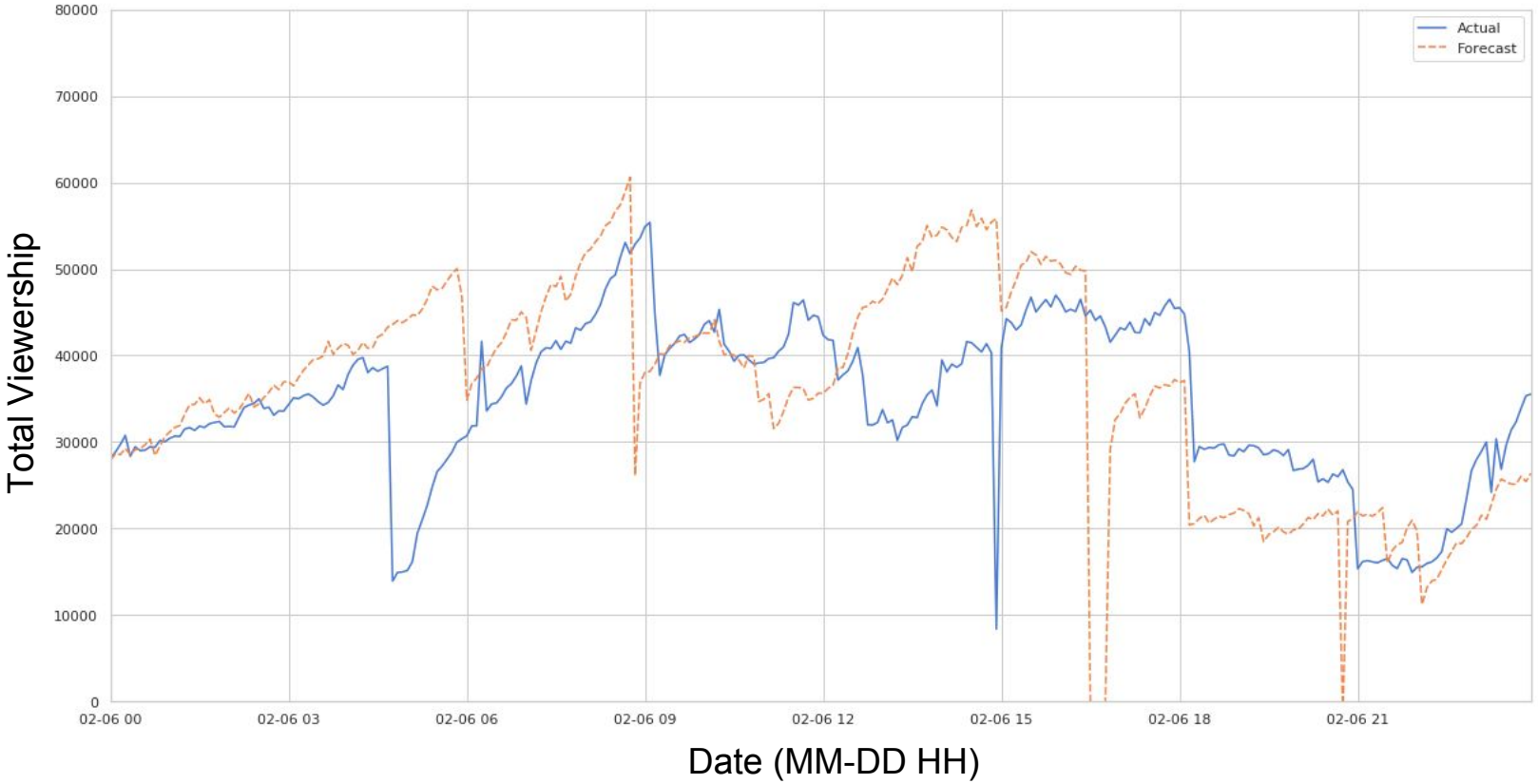
Regressive

Integrated

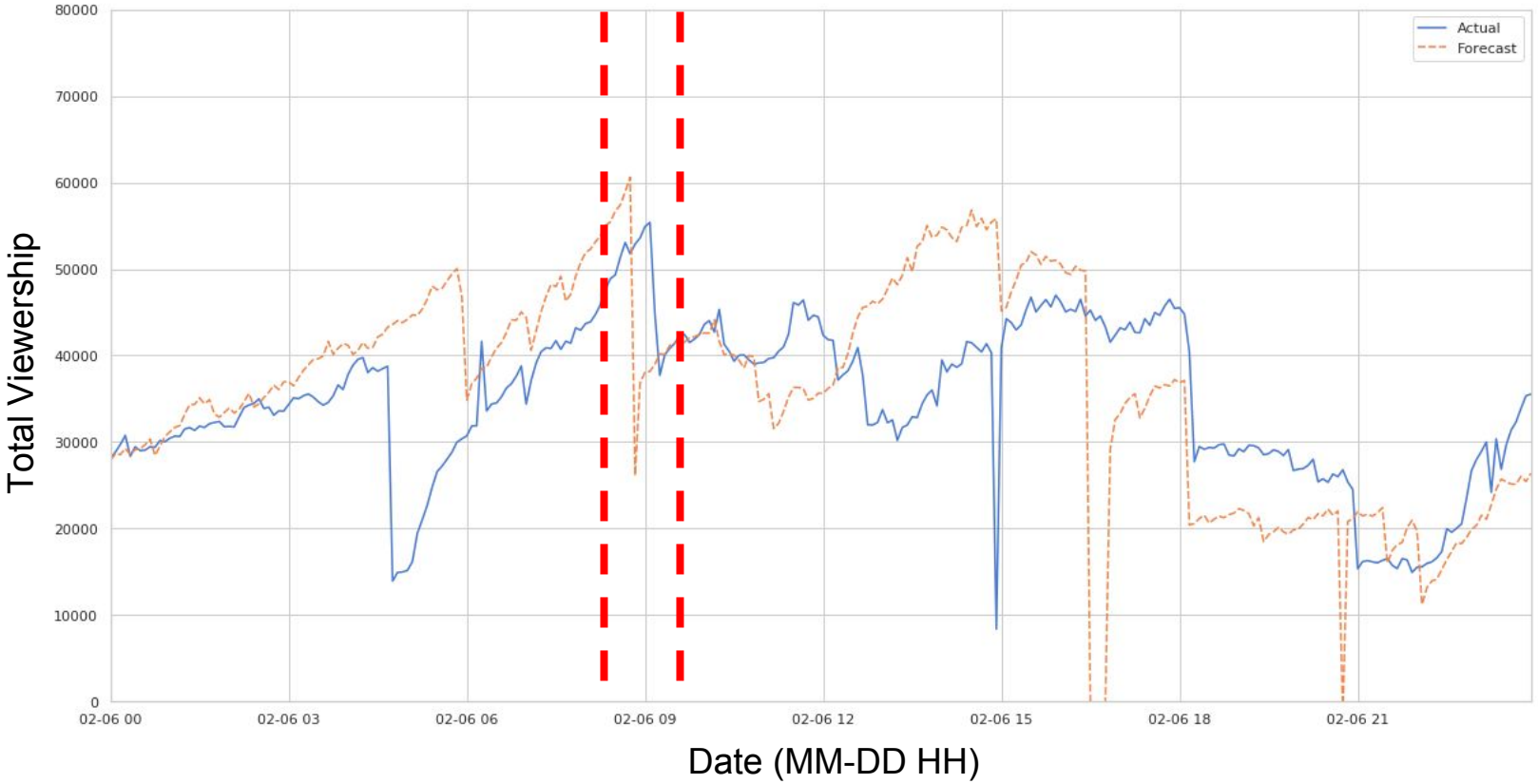
Moving

Average

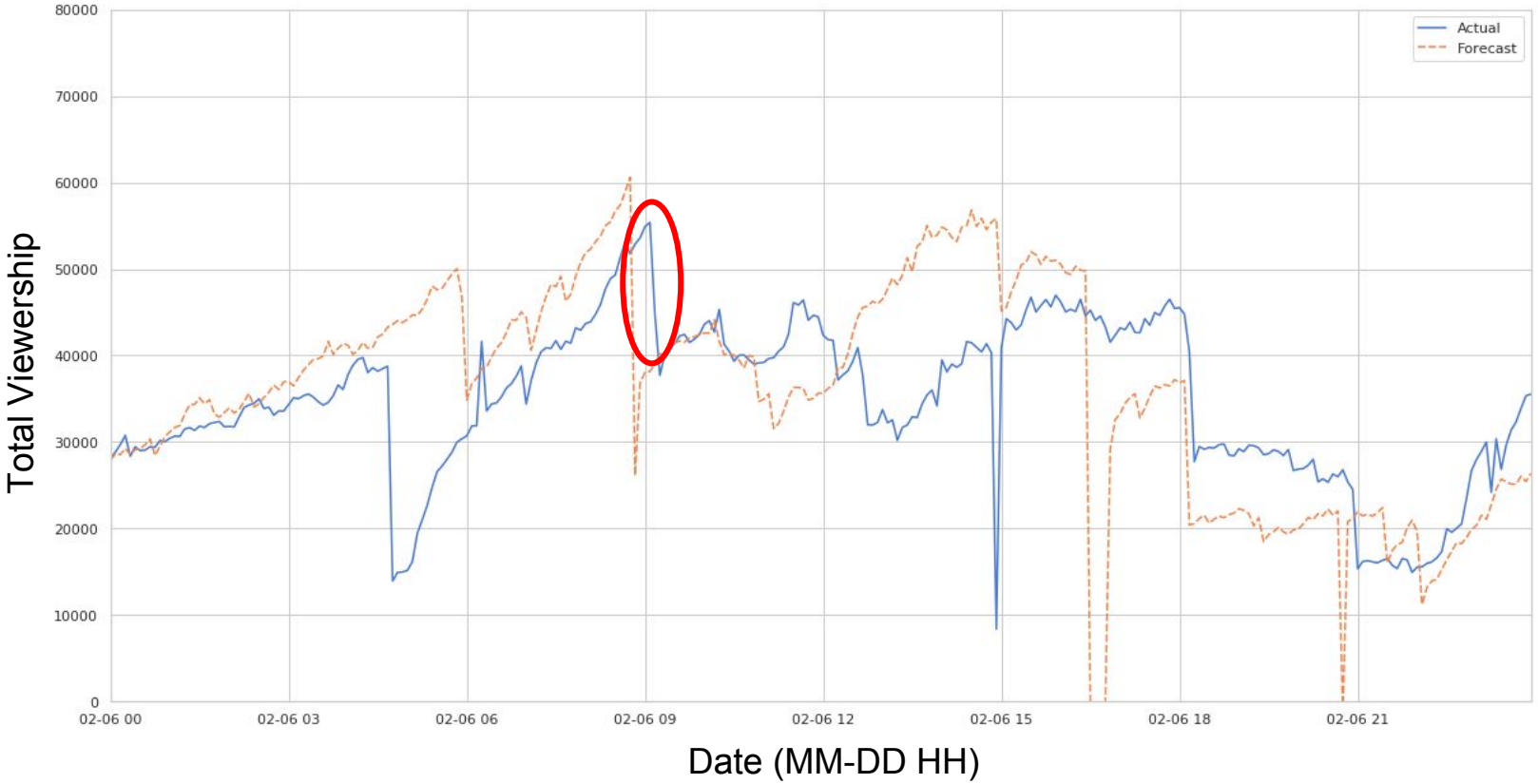
# SARIMA Prediction (MAE = 7100)



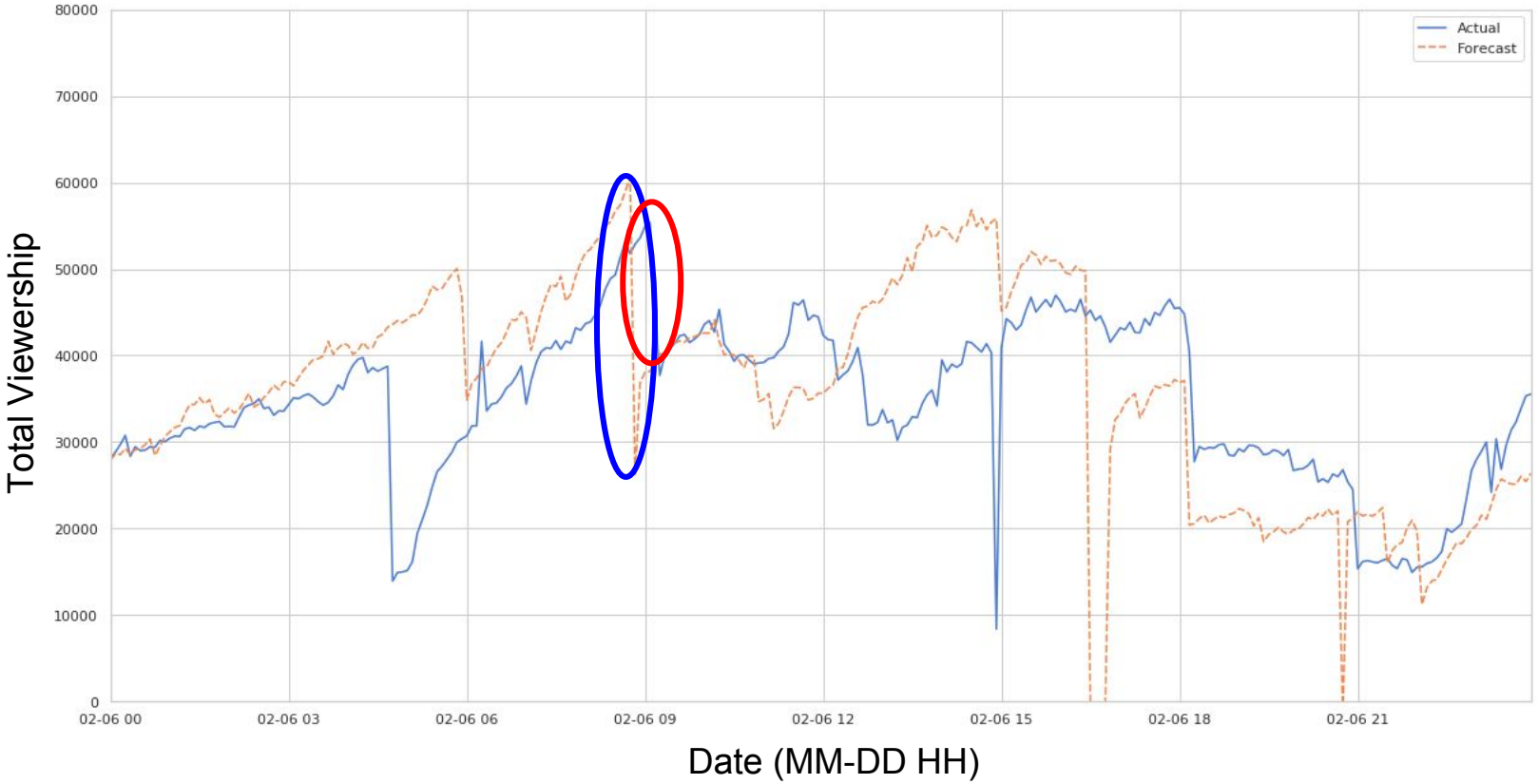
# SARIMA Prediction (MAE = 7100)



# SARIMA Prediction (MAE = 7100)



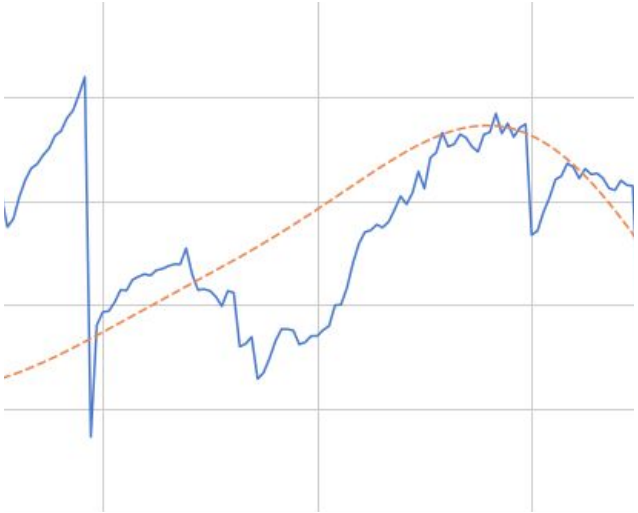
# SARIMA Prediction (MAE = 7100)



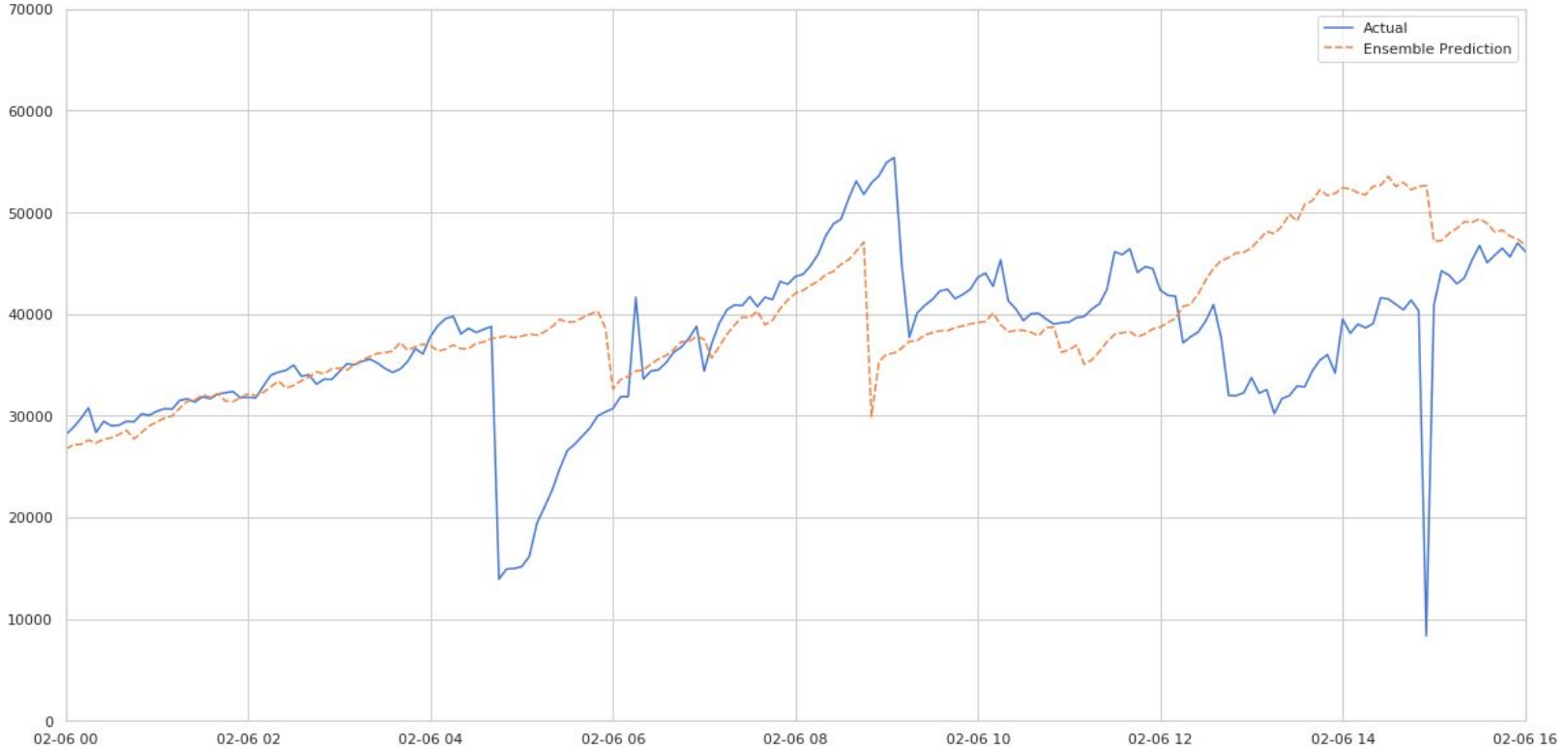
# Ensemble Model

- SARIMA
  - Captures patterns better
  - MAE = 7100

- Facebook Prophet
  - Better overall accuracy
  - MAE = 6500

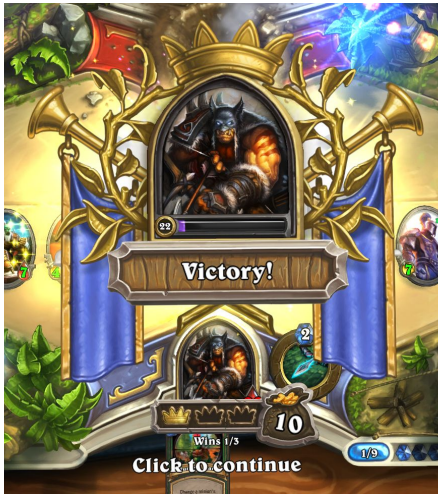


# Ensemble Prediction (MAE = 6500)

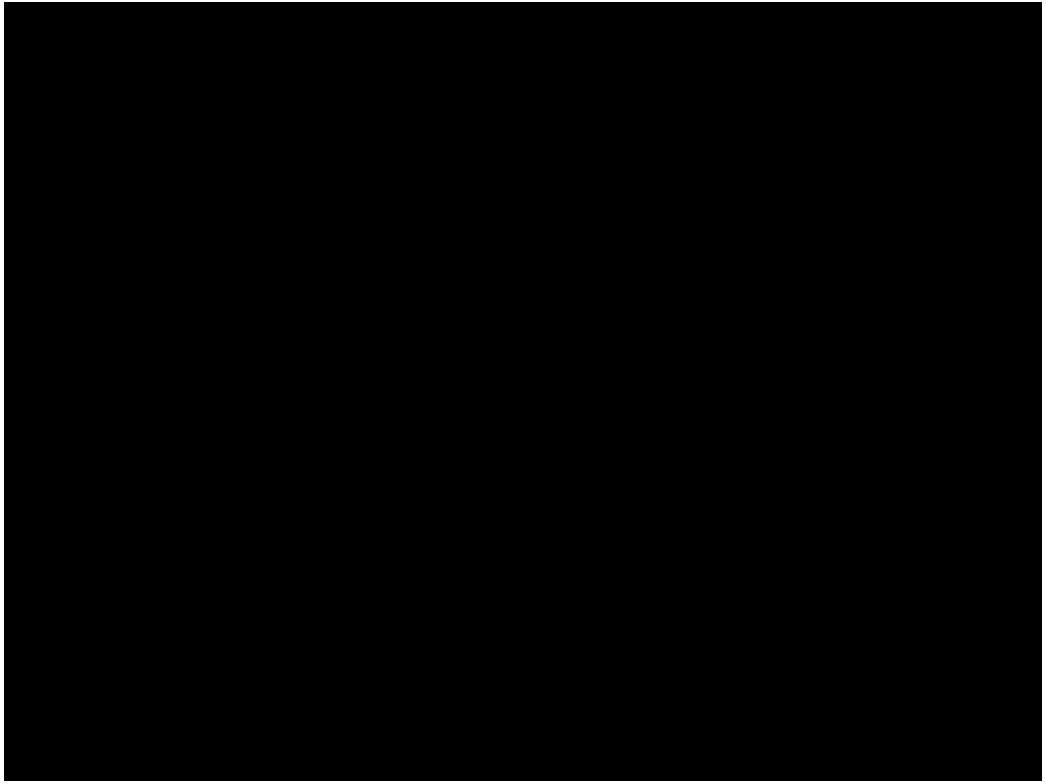


# Conclusion

| Model | Accuracy (MAE) | Patterns? |
|---|---|---|
| Facebook Prophet | 6500 | No |
| SARIMA | 7100 | Yes |
| **Ensemble** | **6500** | **Yes** |



# Ensemble Model



# Next Steps

- Optimize weights between Prophet and SARIMA models
- Predict other game viewerships and single channel viewership
- Deep learning  with more time series data

benjamin-leung-sw

dynogravelso

# Thank you!

# LSTM

test RMSE of 0.1276252341557857(scaled), 10674.064(non-scaled), 15 epochs and 4 batch size

# Tuning SARIMA Parameters

$$\underbrace{(p, d, q)} \qquad \underbrace{(P, D, Q)_m}$$

**Data Stationarity**

$$X_t = c + \sum_{i=1}^{p} \varphi_i X_{t-i} + \varepsilon_t \qquad X_t = \mu + \sum_{i=1}^{q} \theta_i \varepsilon_{t-i} + \varepsilon_t$$

# League of Legends

- Team game played on PC with a well established **competitive** scene