Predicting Pulsar Stars

Emma-Claire McCarthy
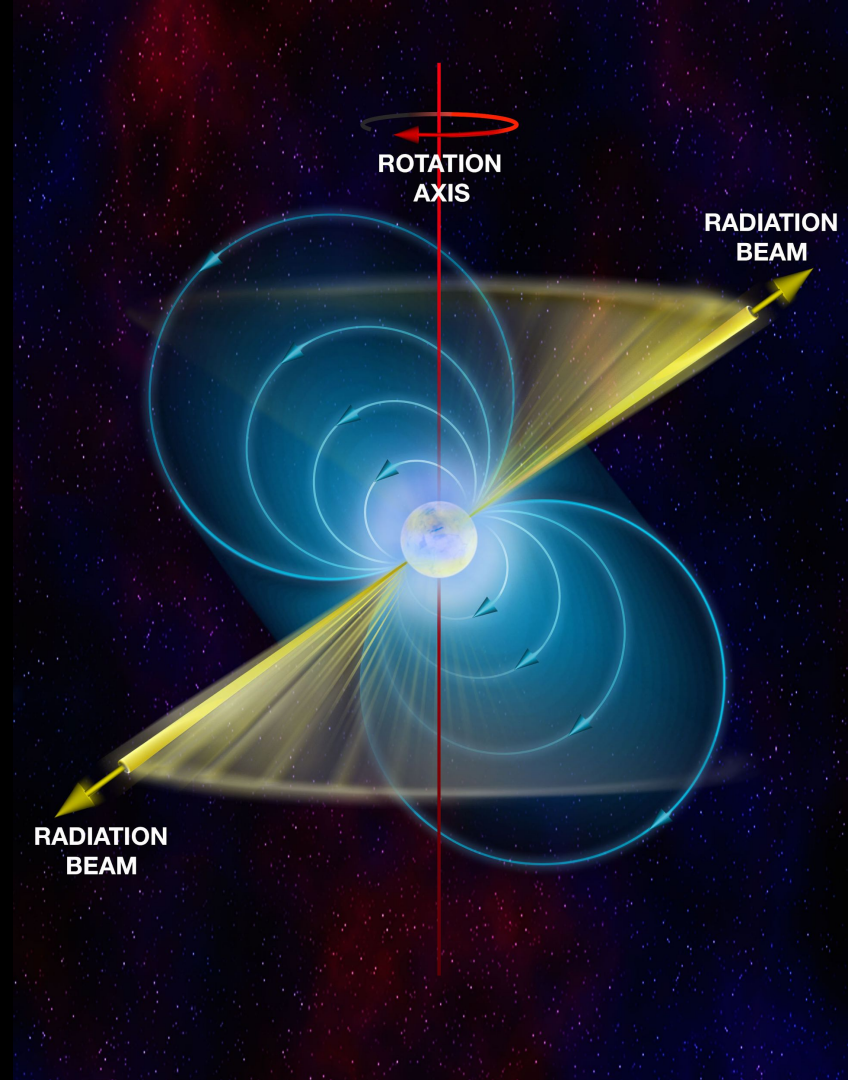
Pulsar Signal Detection

- Mean
- Standard Deviation
- Excess Kurtosis
- Skewness

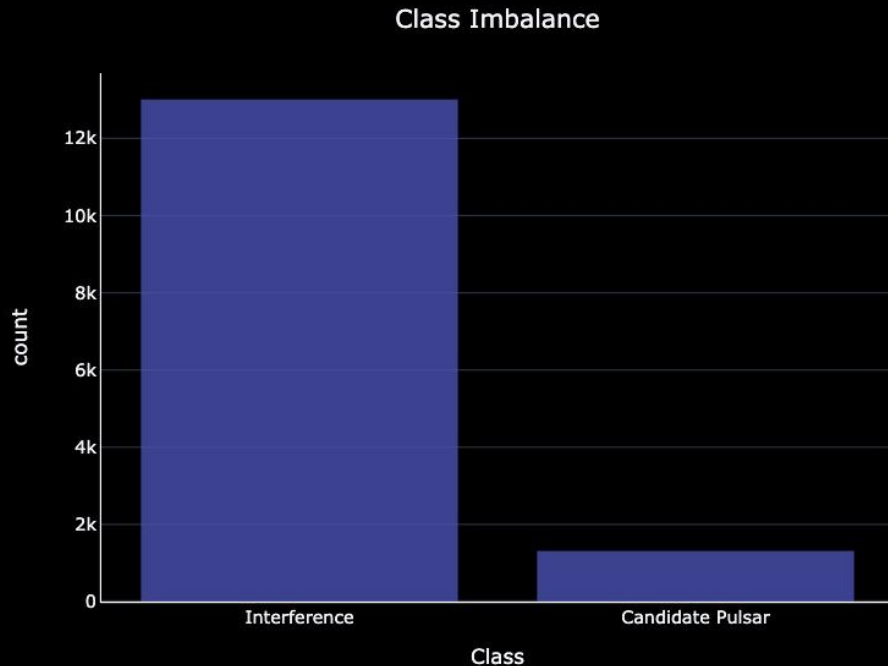**Integrated Pulse Profile**

- Mean
- Standard Deviation
- Excess Kurtosis
- Skewness

ROTATION AXIS

RADIATION BEAM

RADIATION BEAM

The Data

1,639 candidate pulsar signals
16,259 radio interference signals
17,898 total signals

Class Imbalance

Metrics and Model Selection

Primary Goal
Capture all candidate
Pulsars

→ Maximize **Recall**

Secondary Goal
Ensure reasonable false
positive rate

→ Keep an eye on
Precision

Selected Model: Random Forest

Results

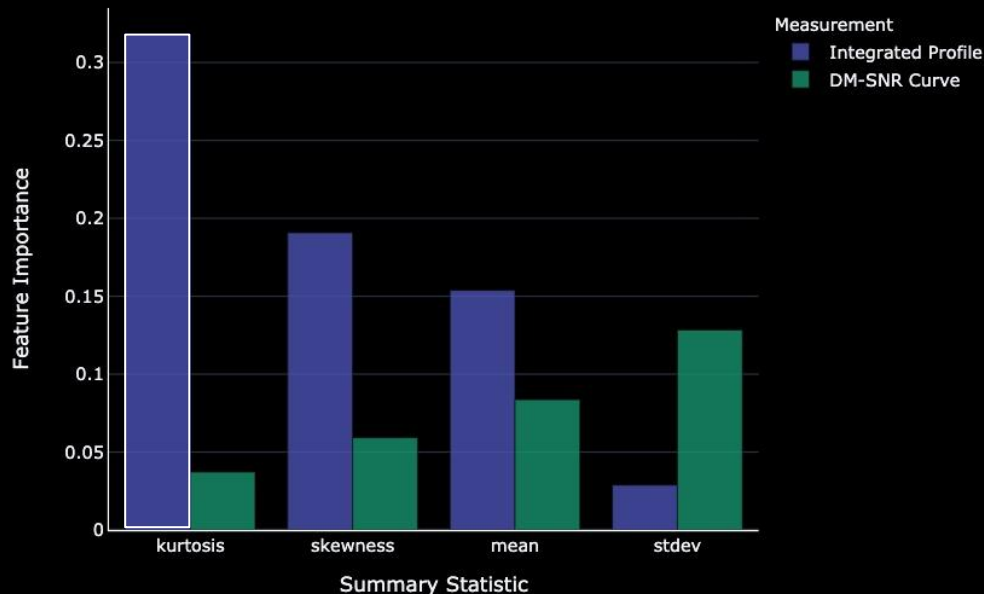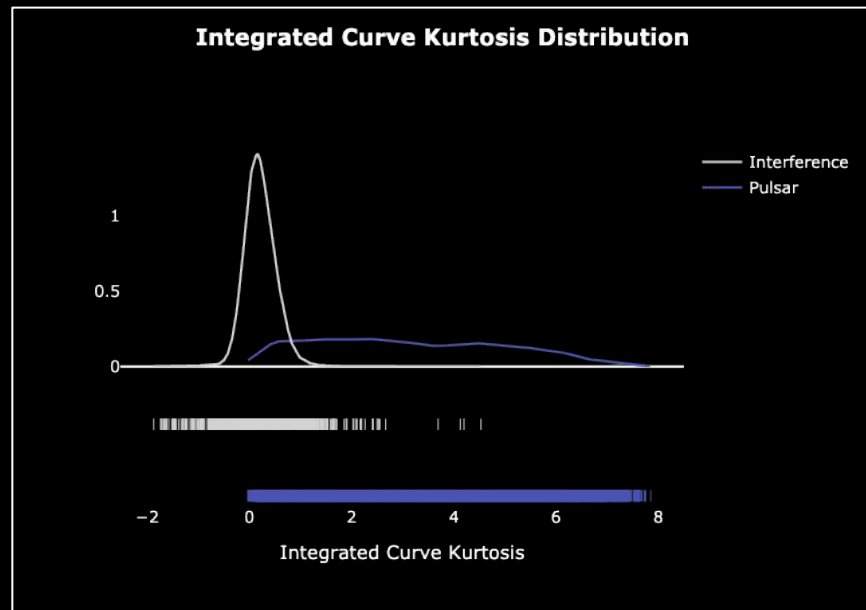Random Forest Confusion Matrix with Unseen Data
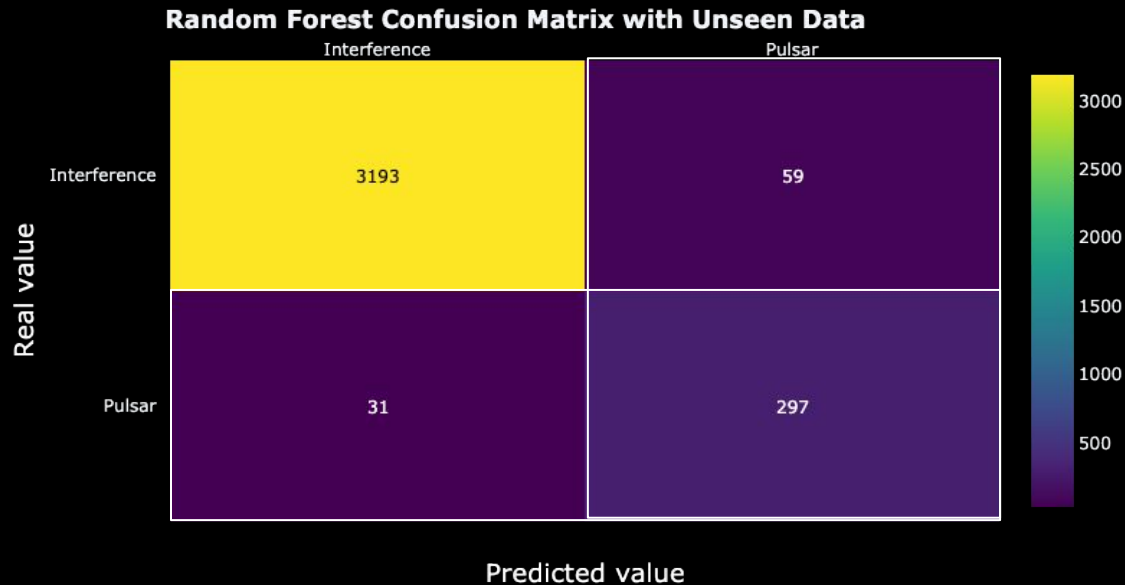
Precision = 83%

Recall = 91%

The integrated curve measurement is overall more predictive than the DM-SNR curve.

Feature Importance: Random Forest Model

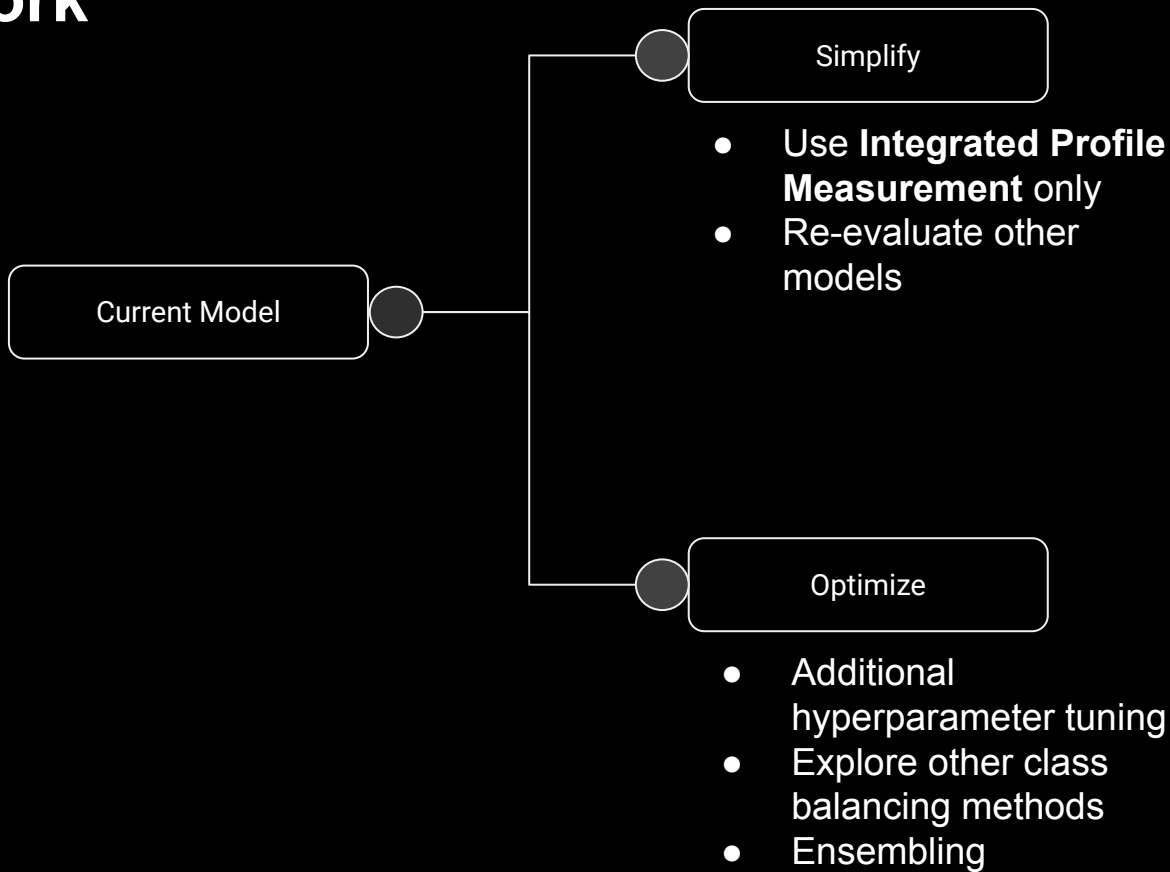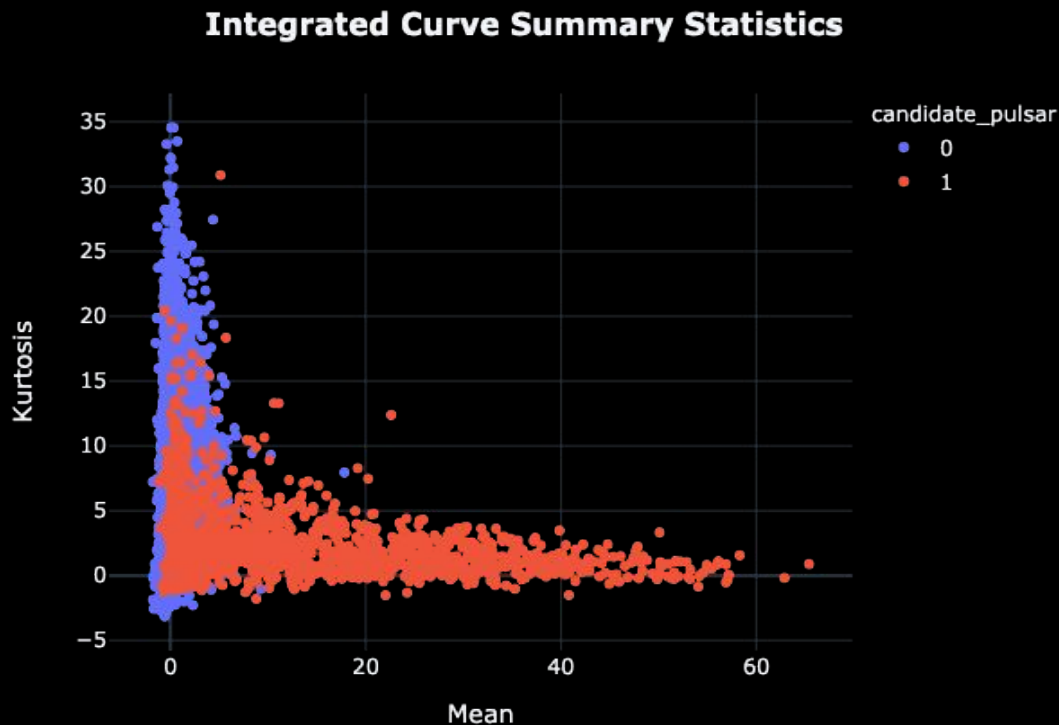**Integrated Curve Kurtosis Distribution**

Future Work

Thank You!

Appendix

Feature Interactions

Feature Interactions