Predicting Pulsar Stars

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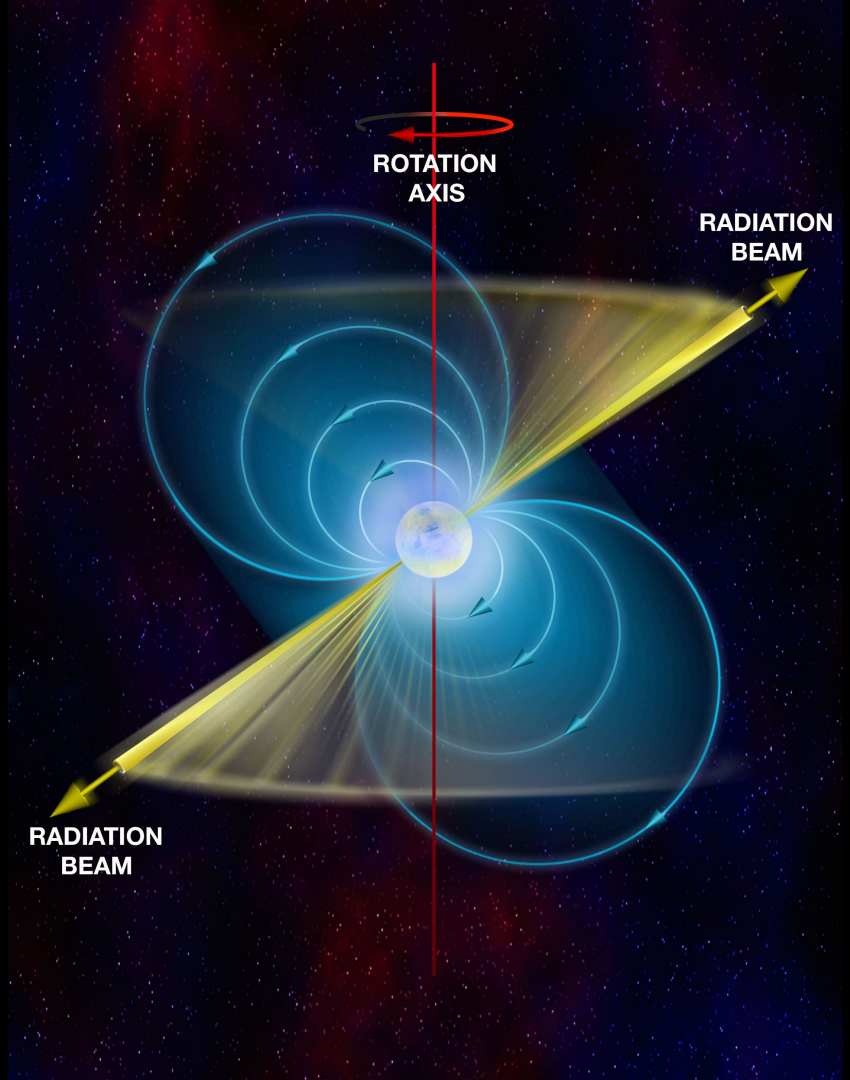
Pulsar Signal Detection

DM-SNR Curve

- Mean
- Standard Deviation
- Excess Kurtosis
- Skewness

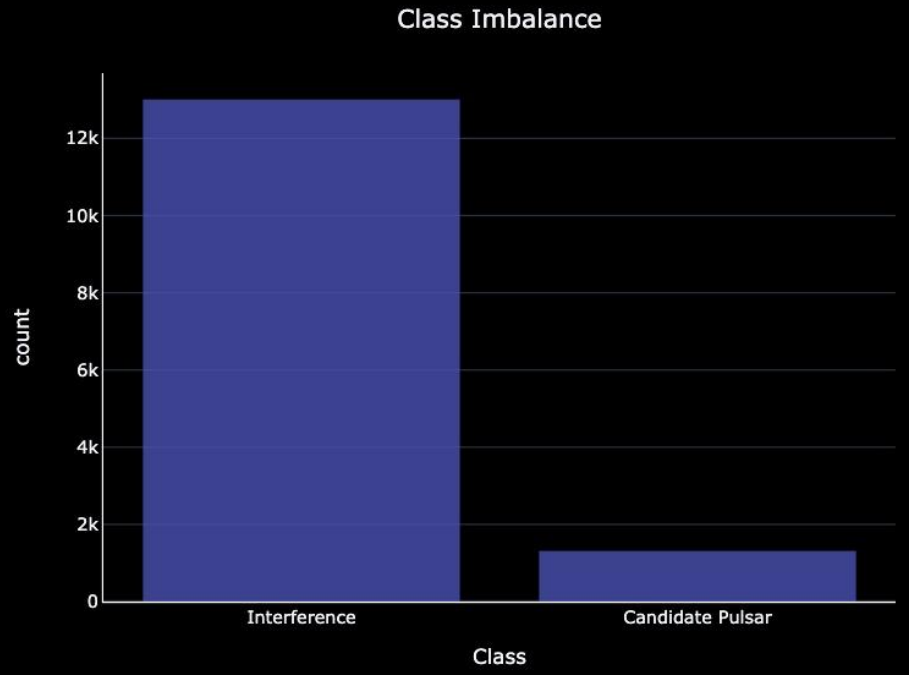
Integrated Pulse Profile

- Mean
- Standard Deviation
- Excess Kurtosis
- Skewness



The Data

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



Metrics and Model Selection

Primary Goal
Capture all candidate Pulsars

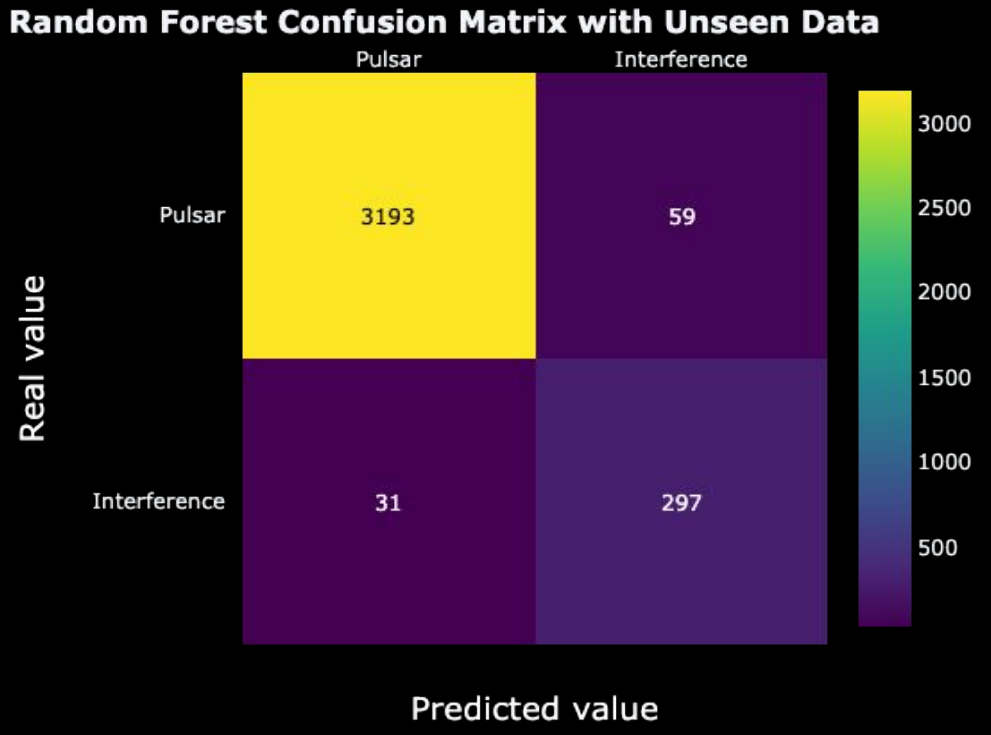
Maximize **Recall**

Secondary Goal
Ensure reasonable false positive rate

Keep an eye on **Precision**

Selected Model: Random Forest

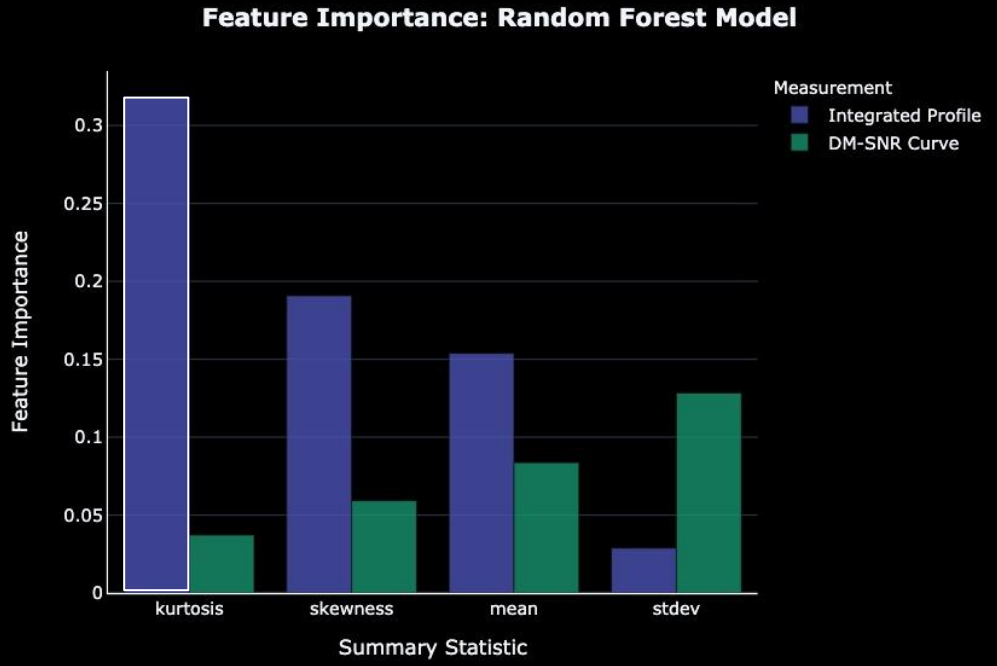
Results

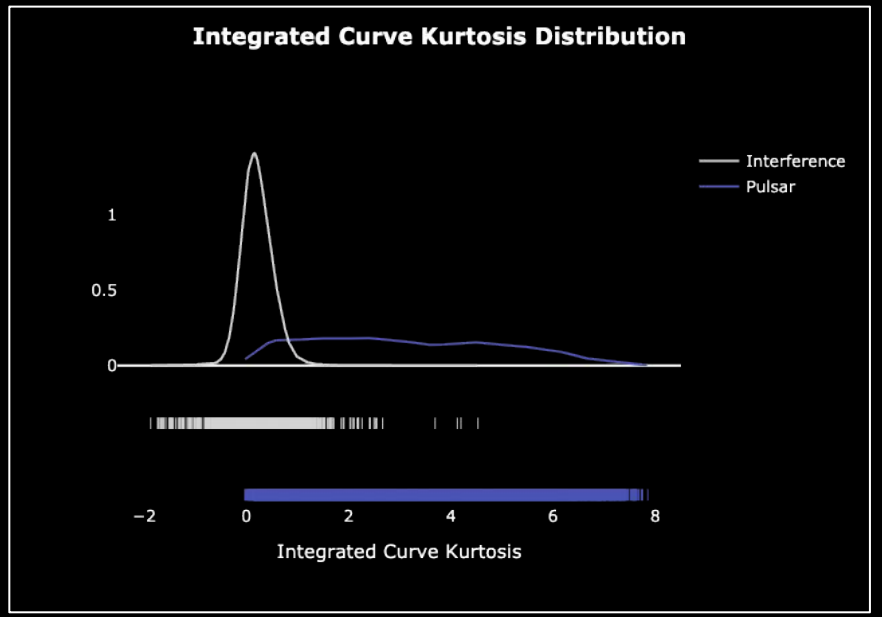


Precision = 91%

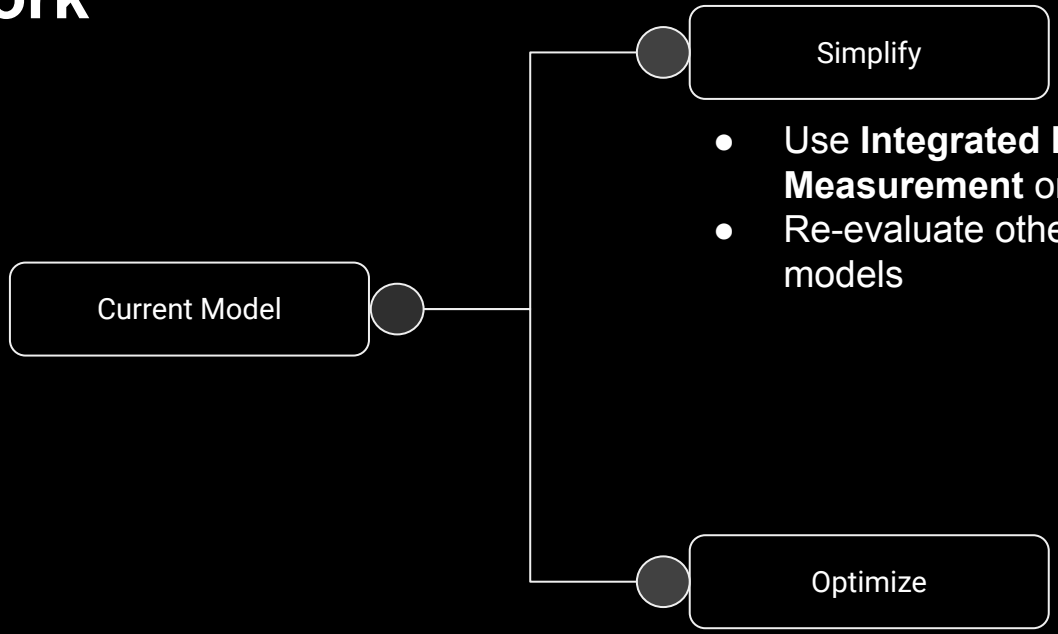
Recall = 83%

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





Future Work



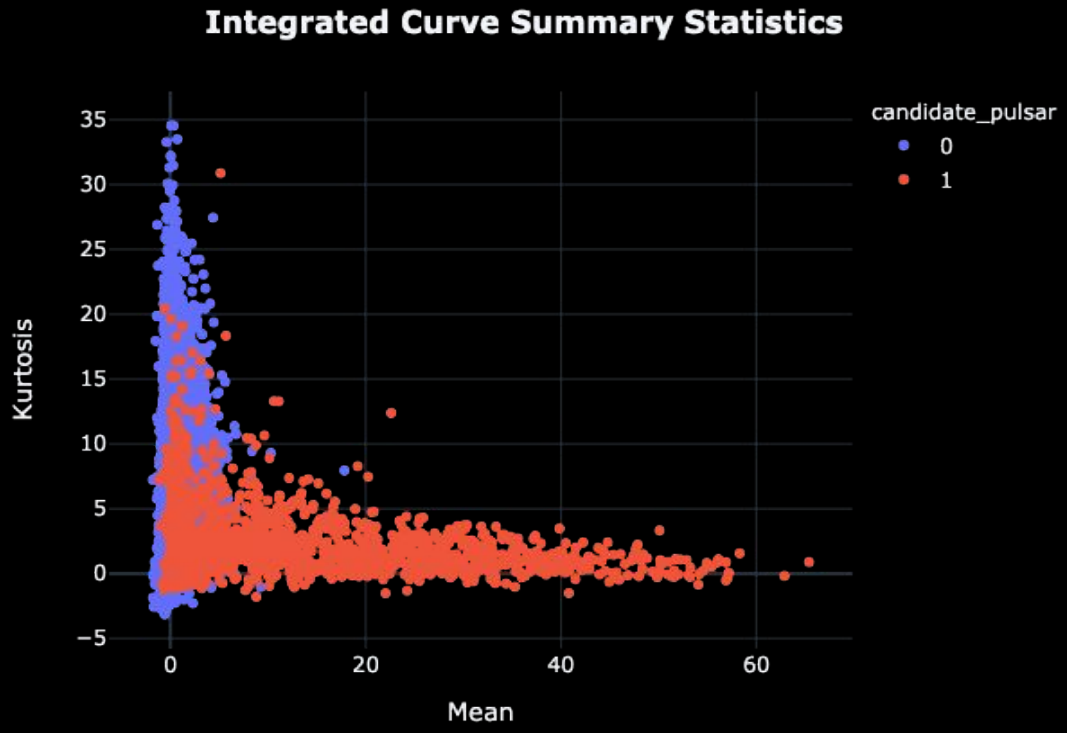
- Use **Integrated Profile Measurement** only
- Re-evaluate other models

- Improve Recall Through:
  - Additional hyperparameter tuning
  - Explore other class balancing methods
  - Ensembling

Thank You!

Appendix

Feature Interactions



Feature Interactions