



2025 NASA SPACE APPS CHALLENGE



HUNTING FOR EXOPLANETS WITH AI

EXPLORE

INTRO

KEPLER EXOPLANET AI CLASSIFIER
EXPLORING WORLDS BEYOND OUR OWN

EVENT:
NASA SPACE APPS
CHALLENGE 2025

CHALLENGE:
A WORLD AWAY –
HUNTING FOR
EXOPLANETS WITH AI

TEAM HUNTERS:
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MISSION:
END

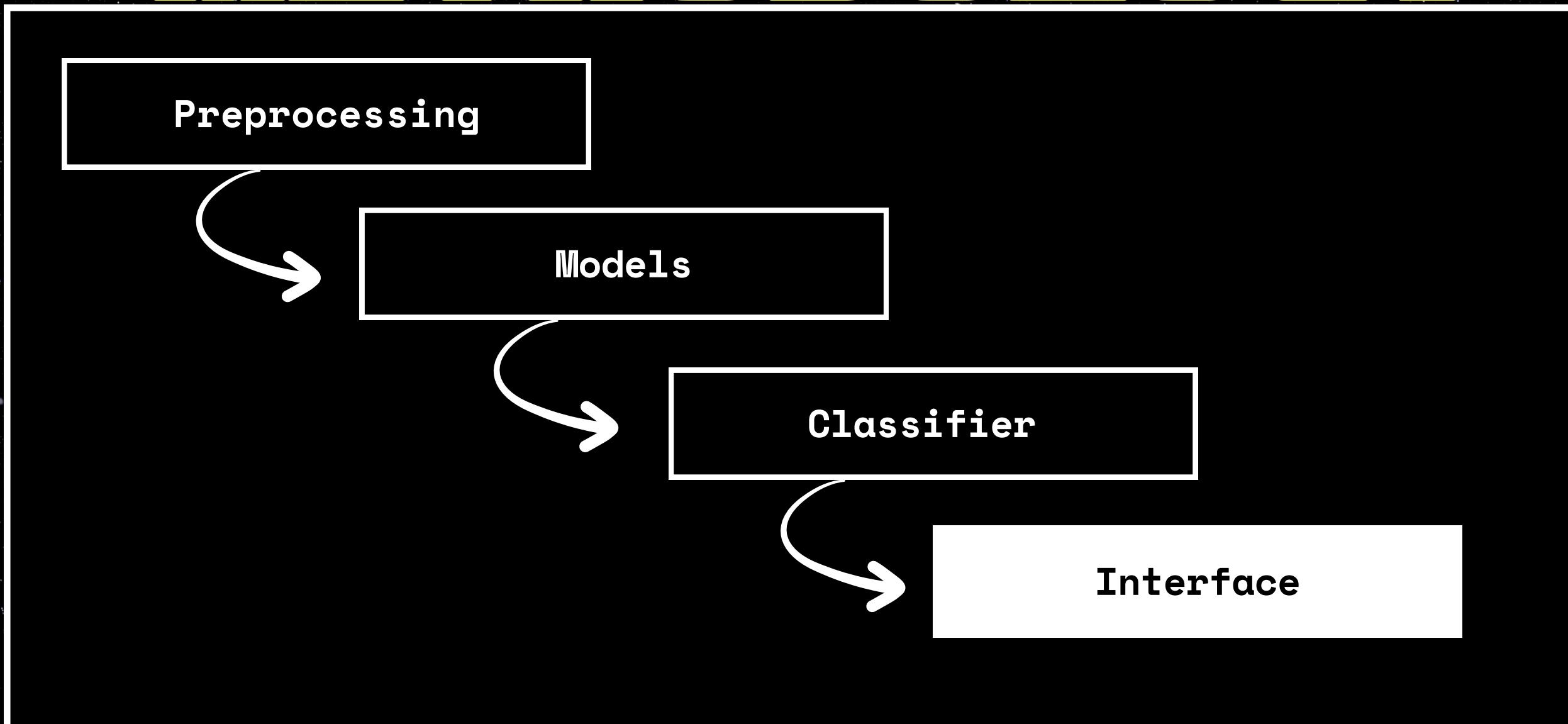
THE PROBLEM

- NASA MISSIONS LIKE KEPLER, K2, AND TESS HAVE COLLECTED VAST DATASETS OF STAR BRIGHTNESS.
- TRADITIONALLY, EXOPLANETS WERE IDENTIFIED MANUALLY BY ASTRONOMERS – SLOW AND ERROR-PRONE.
- THOUSANDS OF CANDIDATES STILL NEED CLASSIFICATION.

THE GOAL

- DEVELOP AN AI/ML MODEL TO CLASSIFY KEPLER'S OBJECTS OF INTEREST AS:
- ✓ CONFIRMED EXOPLANETS
- ● CANDIDATES
- ✗ FALSE POSITIVES
- BUILD AN INTERACTIVE WEB TOOL FOR SCIENTISTS AND STUDENTS.

METHOD-ODOLOGY



- Data preprocessing
- Feature selection & normalization
- Model comparison (Logistic Regression, Random Forest, Neural Network, XGBoost)
- Deployment using Gradio + Plotly

MODEL COMPARISON

| Model | Accuracy | F1-Score |
|---------------------|----------|----------|
| LOGISTIC REGRESSION | 74.9% | 74.8% |
| NEURAL NETWORK | 88.7% | 88.8% |
| RANDOM FOREST | 91.6% | 91.5% |
| XGBOOST | 91.7% | 91.6% |

DEMO

The screenshot shows a web-based application titled "KEPLER EXOPLANET AI CLASSIFIER" set against a dark background with a starry field. At the top center is the NASA logo. Below it, the title "KEPLER EXOPLANET AI CLASSIFIER" is displayed in a teal font, followed by the subtitle "Exploring worlds beyond our own" and a small Earth icon.

The interface includes a navigation bar with "Model Insights" and "About" buttons. The main content area is divided into two sections: "Parameters" on the left and "Flags & Ratios" on the right.

Parameters:

- Orbital period (days): A slider with a value of 1.
- (Transit duration (hours)): A slider with a value of 0.
- Planet radius (Earth radii): A slider with a value of 1.

Flags & Ratios:

- koi_max_single_ev (Max single event SNR): A slider with a value of 1.
- koi_fpflag_nt (Not transit-like flag (0/1)): A slider with a value of 0.
- koi_fpflag_ss (Stellar eclipse flag (0/1)): A slider with a value of 0.



KEPLER EXOPLANET AI CLASSIFIER

Exploring worlds beyond our own

Prediction

Model Insights

About

* Input Parameters

Star & Planet Parameters

koi_period (Orbital period (days))

10

koi_duration (Transit duration (hours))

10

koi_prad (Planet radius (Earth radii))

1

koi_depth (Transit depth (ppm))

1

koi_steff (Star effective temperature (Kelvin))

Flags & Ratios

koi_max_sngle_ev (Max single event SNR)

1

koi_fpflag_nt (Not transit-like flag (0/1))

0

koi_fpflag_ss (Stellar eclipse flag (0/1))

0

koi_fpflag_co (Centroid offset flag (0/1))

0

koi_fpflag_ec (Ephemeris match flag (0/1))

0

**THANKS
TOU**

