

# Celestia Ai

Interactive Exoplanet Discovery with AI, 3D Exploration, and Gamified Learning



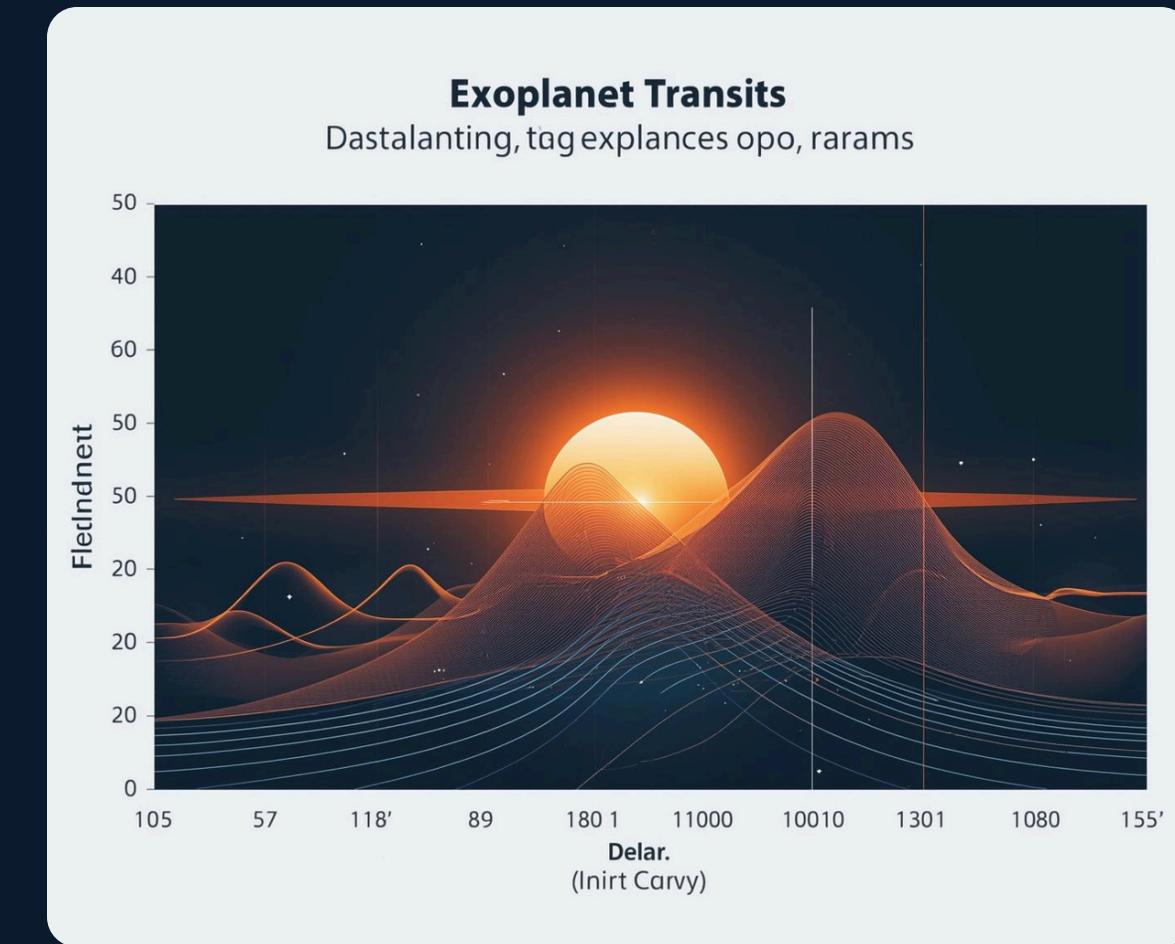
ExoplanetDetectors

**PRESENTED TO**  
NASA Space Apps Challenge

**PRESENTED BY**  
Omar & Abdel Rahman Abdel Motalb, Mohamed Samir, Mohand Fouda



# Identifying the Challenge: A World Away: Hunting for Exoplanets with AI

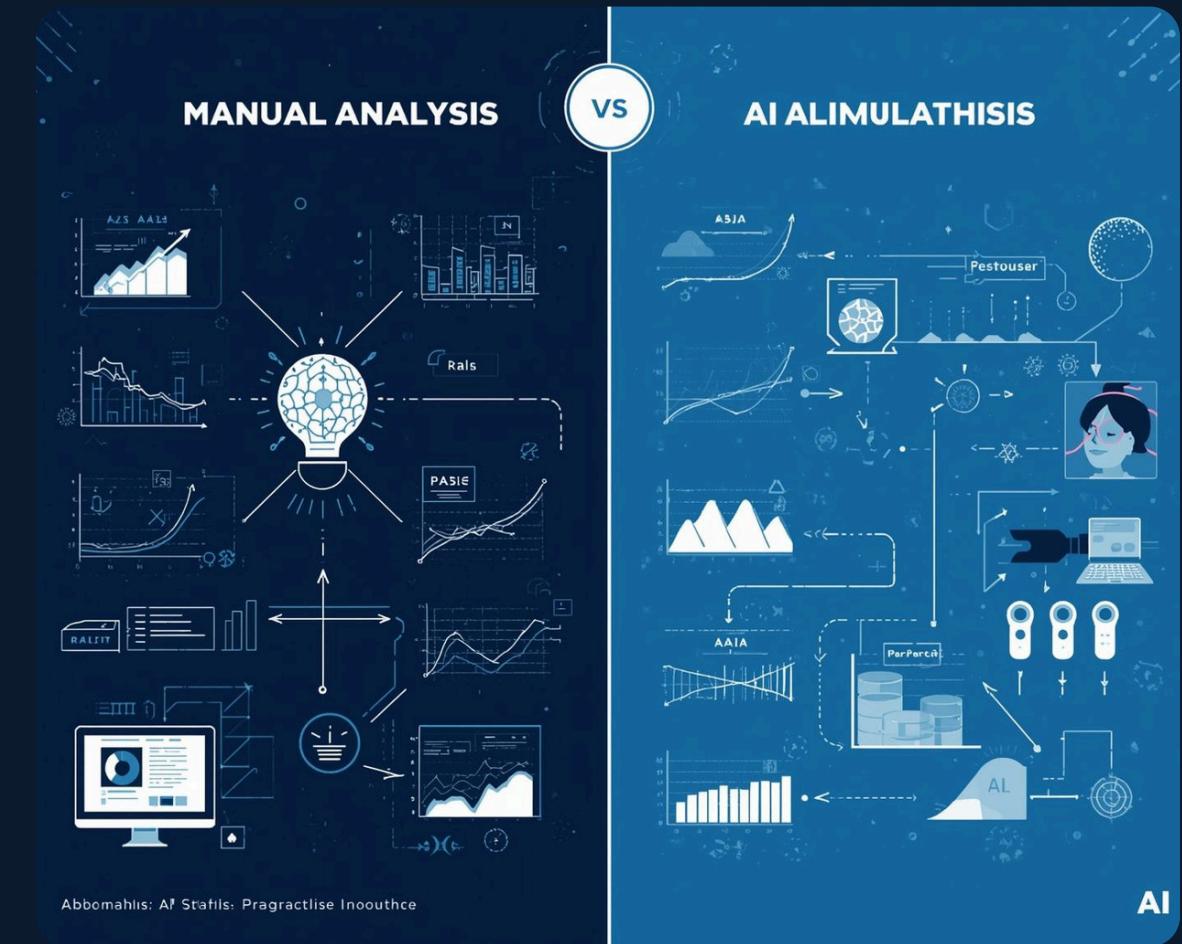


## MANUAL CLASSIFICATION OF EXOPLANETS

Thousands of Kepler and TESS candidates lack efficient classification methods.

## TIME-INTENSIVE IDENTIFICATION PROCESS

Analyzing light-curve data requires considerable human resources and time.



## CHALLENGES IN MANUAL ANALYSIS

Manual processes are often slow and **inefficient**, limiting discovery potential.

# Understanding Exoplanets: The Key to Our Future and Inspiration



## EXPANDING OUR UNDERSTANDING OF THE UNIVERSE

Discovering new exoplanets enhances our **knowledge** of cosmic phenomena.



## AUTOMATING DISCOVERY FOR ALL

Our goal is to make exploration interactive and fun.



## PROVIDING AN ACCESSIBLE PLATFORM

Our goal is also to provide an **accessible** platform for everyone to explore data.

# Celestial Ai: Revolutionizing Exoplanet Discovery with Advanced AI Technology



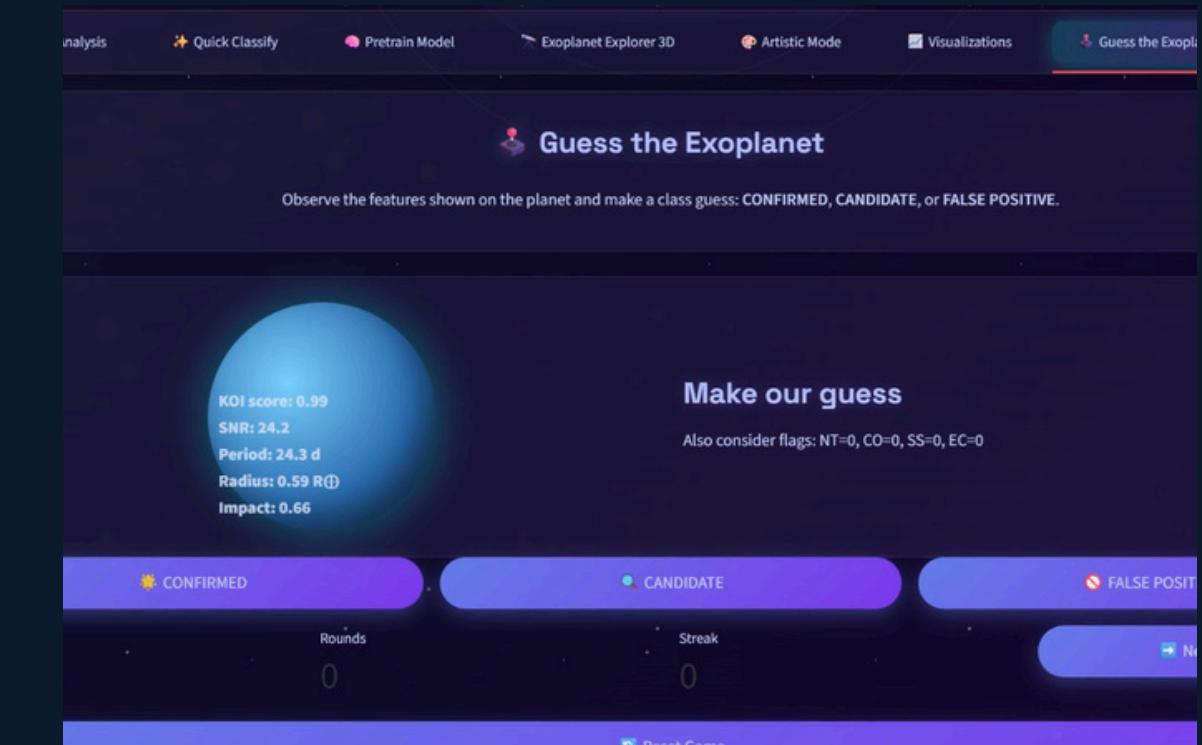
## AI MODEL TRAINED ON KEPLER DATASET

Our advanced model leverages NASA's open-source Kepler dataset for **accurate classifications**.



## CLASSIFIES PLANETS EFFICIENTLY AND INTELLIGENTLY

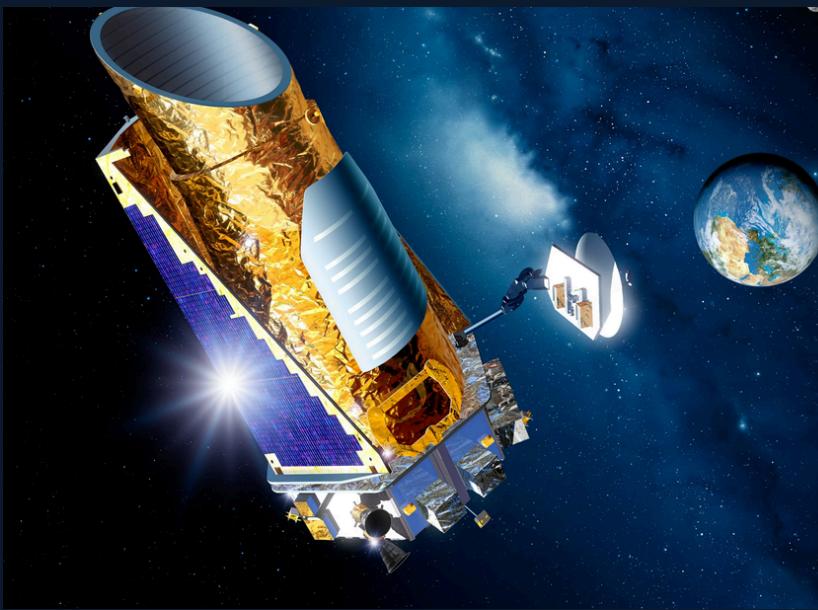
Planets are classified as Confirmed, Candidate, or False Positive, enhancing discovery.



## INTEGRATES DATA VISUALIZATION AND GAMIFIED LEARNING

Users experience real-time **data interaction** and engaging educational tools.

# Harnessing Tech and Data for Scientific Advancement



**KEPLER OPEN EXOPLANET DATASET (TOP 10 FEATURES)**  
Orbital Period, Planet Radius, Transit Duration, SNR, Impact Parameter, and Flags

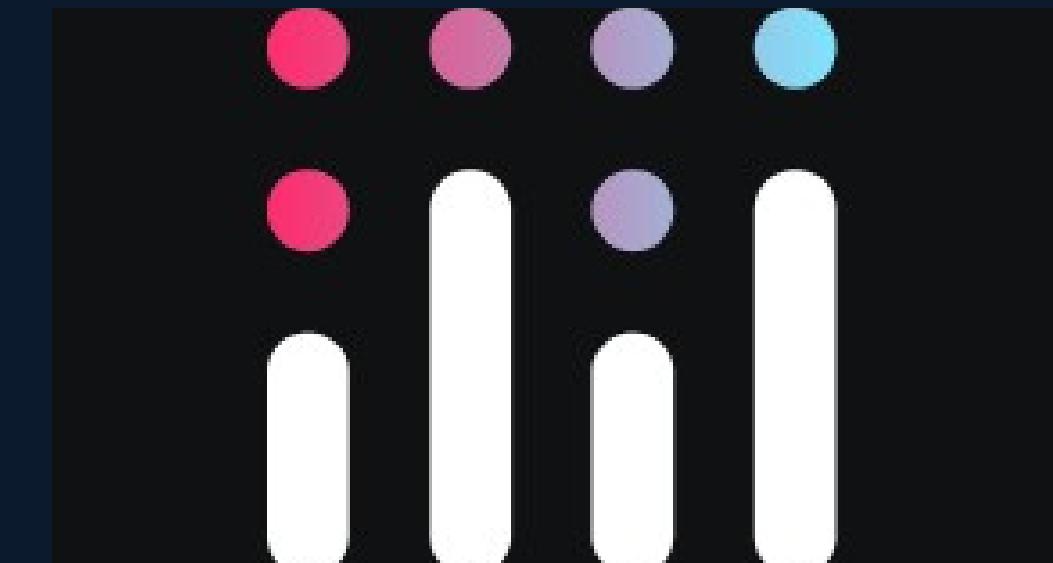


**STREAMLIT**  
Framework for building the interactive web app interface



**SCIKIT-LEARN**

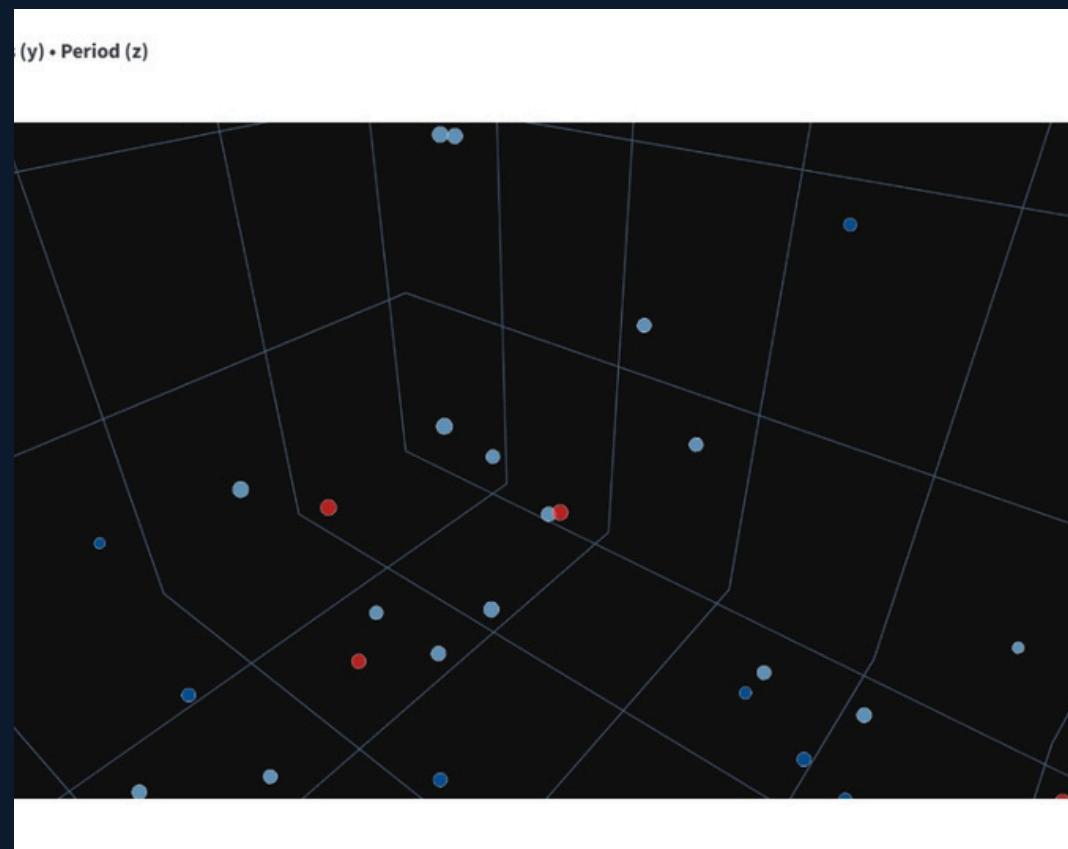
Machine-learning library used for the HistGradientBoosting Classifier and preprocessing



**PLOTLY**

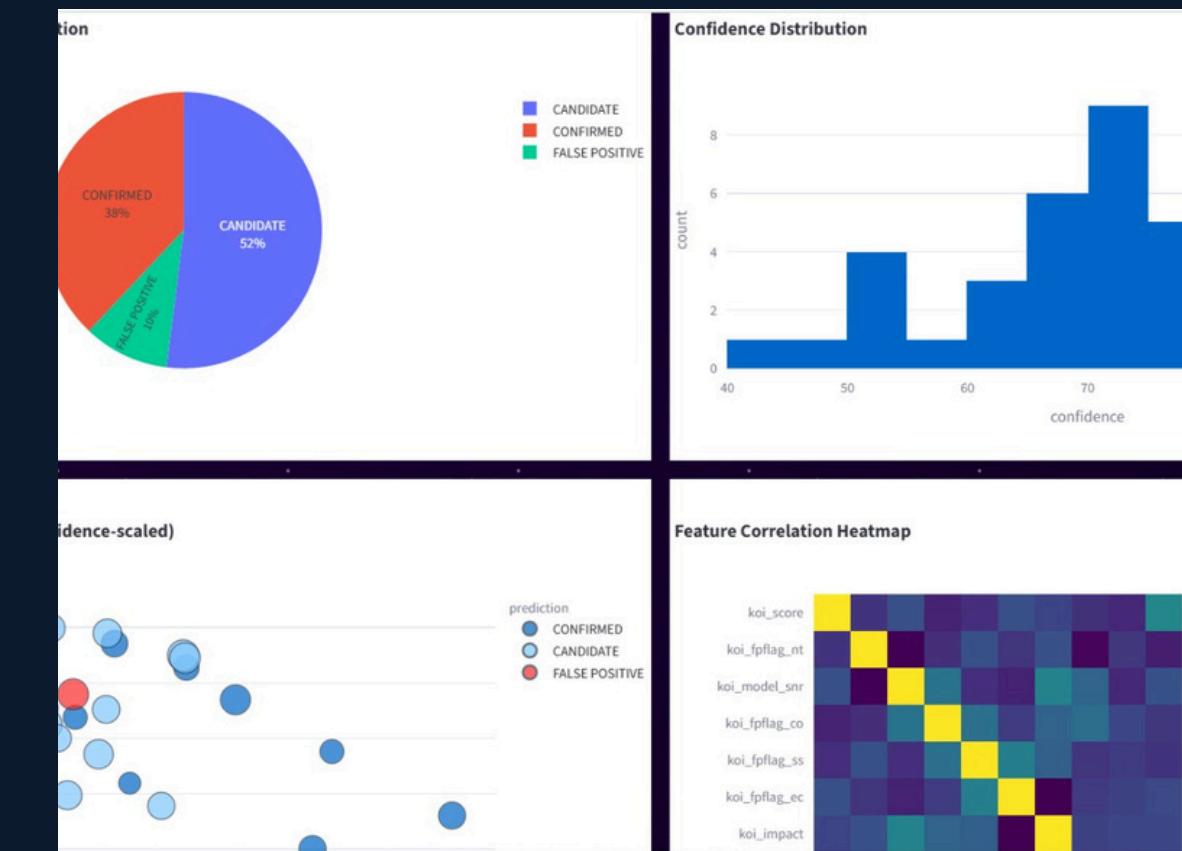
Library for interactive 2D and 3D visualizations (Explorer & Artistic Mode)

# Explore, Learn, and Play: Engaging with Exoplanets in 3D



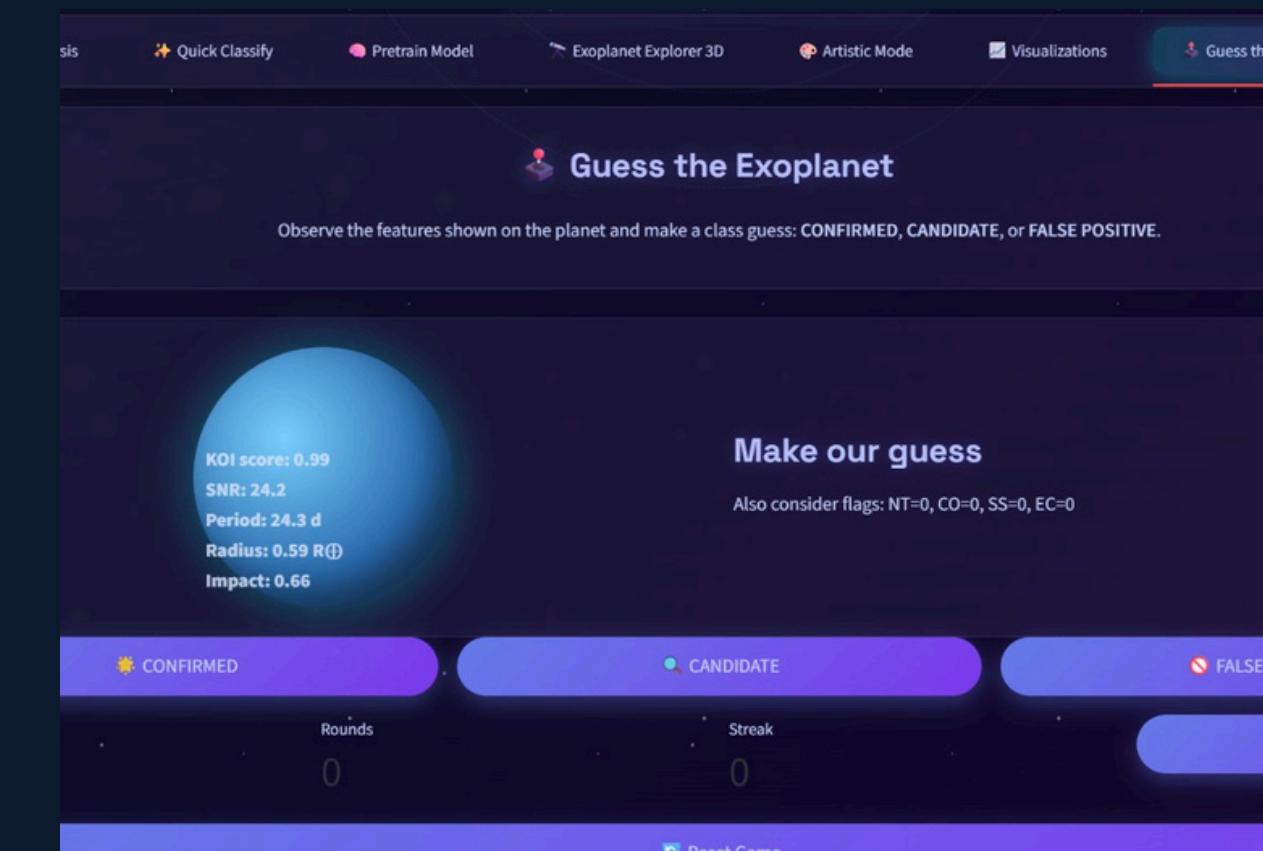
## 3D EXOPLANET EXPLORER

Navigate and visualize planetary systems through interactive 3D models.



## DATA VISUALIZATION

Turn data into a stunning galaxy of glowing exoplanets and statistics.



## GUESS THE EXOPLANET GAME

Learn classification through play, enhancing knowledge interactively.



# IMPACT AND FUTURE VISION

- **Scientific Impact:** Accelerates exoplanet validation and helps NASA researchers triage data faster.
- **Educational Impact:** Turns complex space data into an interactive learning experience for students and citizens.
- Expand the AI pipeline to include TESS and K2 missions.
- Integrate Explainable AI (SHAP visuals, feature importance).
- Develop cloud-based access for wider global use.
- Partner with educational platforms and citizen-science programs.