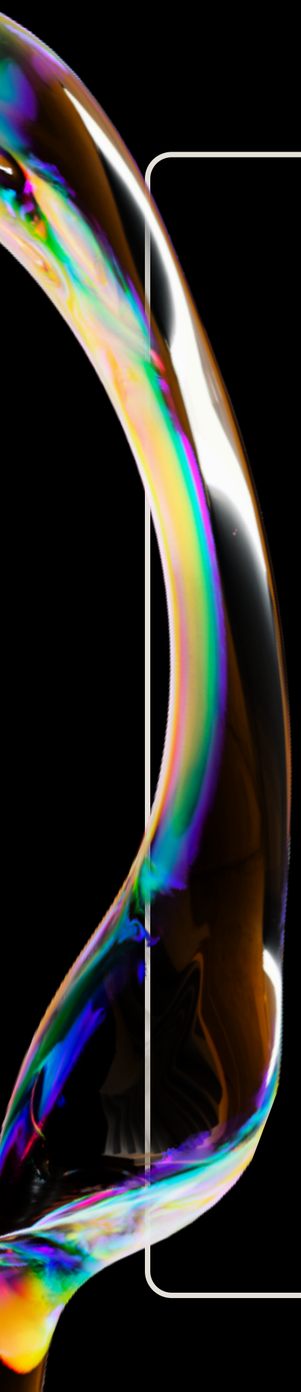
Team: Kepler-22 b

A WORLD AWAY: HUNTING FOR EXOPLANETS WITH AI

feliny155@gmail.com
kirillov.inwork@gmail.com
annagaaraeva@gmail.com
sgumenuk405@gmail.com

Igor Sikorsky Kyiv Polytechnic Institute



MAIN IDEA

Automatically identify planets beyond our Solar System.

The goal is to develop a machine learning model capable of accurately recognizing signs of exoplanets using open NASA missions data. This approach speeds up the analysis of space observations and helps reveal new worlds that might have been overlooked through manual processing.

PROBLEM

TESS and Kepler telescopes discover thousands of potential exoplanets. But only a fraction of them are real. Astronomers spend months of time conducting additional checks.

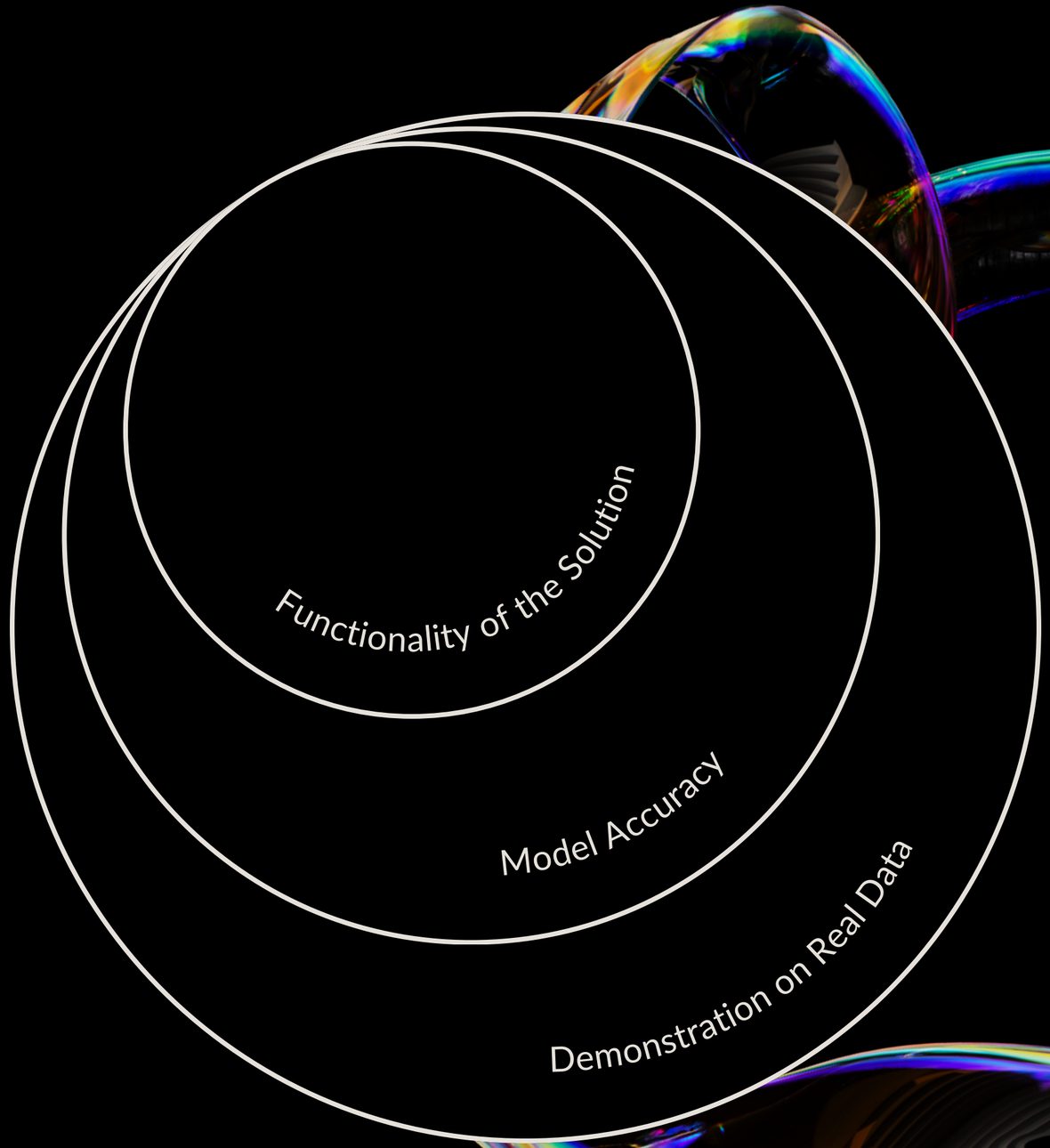
- **Noised data**
- **Much of false positive recognitions**
- **Slow manual work**

SOLUTION

Impact: We've used modern solutions on NASA data which gave us real and useful predictions

Creativity: We've merged TESS and Kepler data (for training/to train) CNN with LSTM and modern ML algorithms

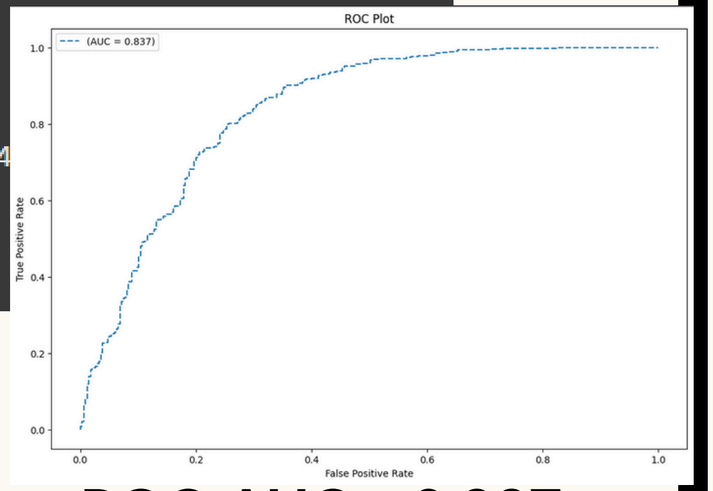
Validity: We got >80% of the F1 score in the result. It shows how well a model performs on a dataset when classes are imbalanced, like in TESS and Kepler



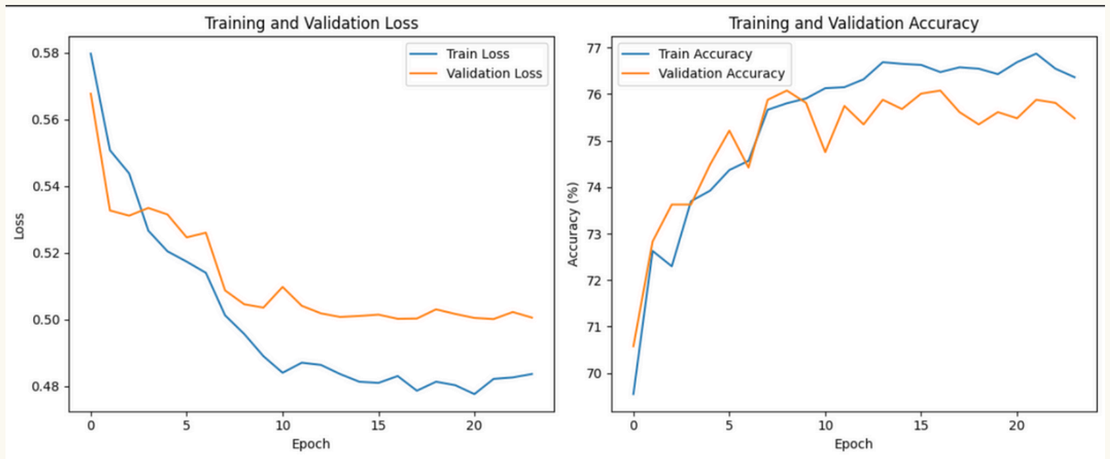
DEMO

```
--------------------------------------------------
Information:
ra            118.881765
dec            54.596601
orbper          5.803220
duration        1.569000
depth        1710.000000
rad             6.374400
steff        5846.000000
logg            4.110000
srad            1.500000
Name: 862, dtype: float64

This is exoplanet
Class: 1
```



ROC-AUC = 0.837



Kepler-22 b

FUNCTIONALITY

Upload datasets (CSV/JSON), preview, visualize, and send to the model (via API).

1) Upload Data

Drag & Drop CSV or JSON here, or

Choose a File

Supported formats: CSV (recommended), JSON.

Load Sample | Clear

2) Preview

ra	dec	orbper	duration	depth	rad	steff	logg	srad
112.357708	-12.69596	2.1713484	2.0172196	656.8860989	5.8181633	10249.0	4.19	2.16986
122.580465	-5.513852	1.9316462	3.166	1286.0	11.2154	7070.0	4.03	2.01
104.726966	-10.580455	1.8675574	1.408	1500.0	23.7529	8924.0		5.73
110.559945	-25.207017	2.74323	3.167	383.41		5388.5	4.15	
122.178195	-48.802811	3.5730141	3.37	755.0	11.3113	9219.0	4.14	2.15
120.704811	-11.101521	4.5505945	2.654	3731.0	7.10841	5613.0		1.09
124.359239	-27.273521	2.5047918	4.3797563	2270.5402194	8.6950898	6616.0		1.53429

3) Send for Analysis

Send to Model

Visualizations & Results

Identification Results

```
----------------------------------------------------
Information:
ra          130.155224
dec         -57.223839
orbper      3.0327366
duration    2.548
depth       12000
rad         19.6858
steff       7124
logg        4.13
srad        1.79

This is not an exoplanet
Class: 0
----------------------------------------------------
Information:
ra          129.778031
dec         -56.261649
orbper      11.2645152
duration    5.778
depth       10110
rad         0
steff       5869.8
logg        0
srad        0
```

Team: Kepler-22 b

THANK YOU

for your time and attention

feliny155@gmail.com
kirillov.inwork@gmail.com
annagaaraeva@gmail.com
sgumenuk405@gmail.com

Igor Sikorsky Kyiv Polytechnic Institute