

Seismic Detection Across the
Solar System:

WAVERSE

By Code of Duty





TABLE OF CONTENTS

01

Objective

What should we do?

02

Approach

How we are going to do it?

03

Solution

How we solved it?

04

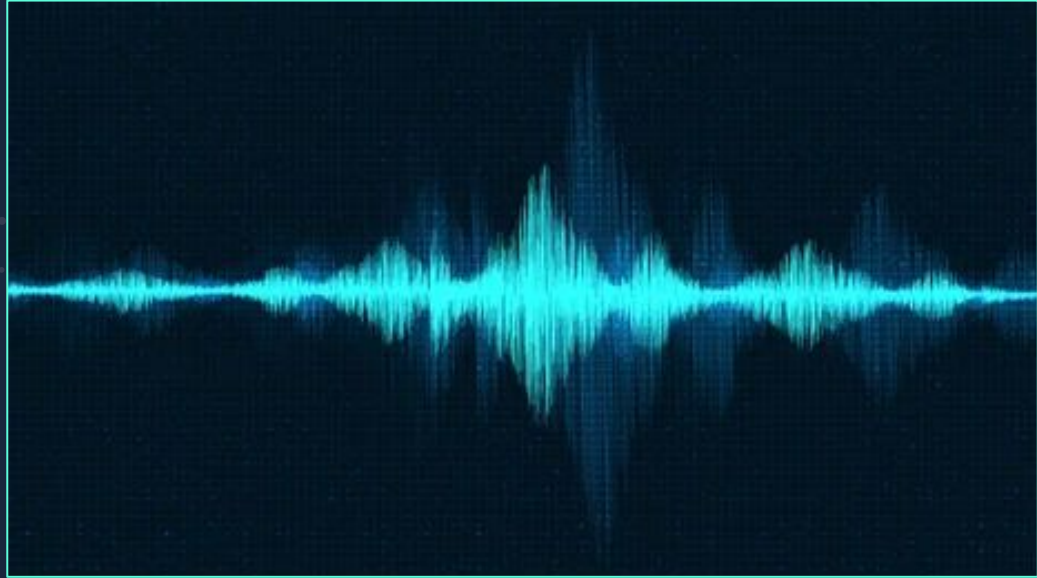
Results

Improvements and next steps

Objective

● Moon & Mars

Identify which type of signals correspond to a quake and which do not for the Moon and Mars, through an artificial intelligence model, using publicly available information.



The data comes from the Apollo missions and the Mars Interior Exploration.





Our Approach

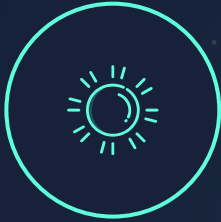


An algorithm of (STA/LTA) was applied to identify those that are quakes, then by processing the information and generating new variables, we trained an AI model that predicts which signals are from an quake and which are not to finally deploy the results through web app site.

Steps:

1. Gather information
2. Process information
3. Apply STA/LTA Algorithm
4. Generate new features
5. Develop AI classification model
6. Gather results
7. Site Deployment

Solution



Develop

1. First, the system identifies possible seismic events from seismic data stored in .mseed files.
2. A HighPass filter + Bayesian Optimization + STA/LTA algorithm pipeline is used to detect these seismic events. (1)
3. Additional features are extracted from the same seismic data for further analysis.



Training

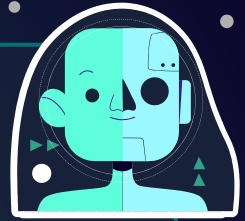
1. The dataset, consisting of extracted features and detected events, is fed into two machine learning models: XGBoost and Recurrent Neural Network (RNN).
2. The best-performing model is selected using the Recall metric, applied during training by taking the target variable from (1).
3. Once the best model is selected, it is used to make the classification on the test dataset.



Results

We got the next results for the classification model:

- **Recall on the testing set:** 92.85%
- **Precision on the testing set:** 86.67%
- **F1-score on the testing set:** 89.66%
- **Accuracy on the testing set:** 88.46%



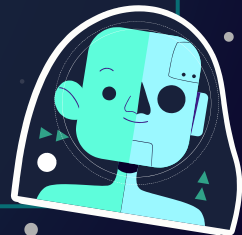


Results



WAVERSE

A web app that allows a better understanding of earthquakes on Mars and the moon, using AI models capable of predicting which signals are actually from an earthquake and which are not.





Business Plan



PYG (Pay as you go)

\$\$\$\$\$

Thanks!

Code of Duty Members:

- Aaron Castillo
- Gilberto Subias
- Javier Sánchez

