**Abstract**

**Cosmic Classifier: XGBoost Solution for Planetary Classification**

This project presents a machine learning approach to classify planets based on their physical and atmospheric characteristics. Using a dataset containing attributes such as **Atmospheric Density, Surface Temperature, Gravity, and Radiation Levels**, we built a classification model to predict the type of a planet.

To address data inconsistencies due to transmission interference, we applied **data preprocessing techniques**, including handling missing values and noise. Feature engineering was performed to enhance the predictive power of the model by identifying key relationships between planetary attributes.

We implemented **XGBoost**, a gradient boosting framework, as our primary model and optimized its hyperparameters using **grid search cross-validation** to improve performance. The model was evaluated using **accuracy**, achieving strong predictive performance on the validation set. Additionally, we trained and tested our model on a separate test dataset to generate predictions. The final output was formatted into a submission.csv file containing **Planet\_ID and Predicted\_Class**, ready for evaluation.

Our approach provides a **reliable and efficient solution** for planetary classification, offering insights into which features contribute most to distinguishing different planet types. Future work could explore **alternative models such as CatBoost**, ensemble methods, and deep learning techniques to further enhance classification accuracy.

[Code](https://colab.research.google.com/drive/1KFSHAWCD5pwHvxngoDZQl46v54UFNKWm?usp=sharing)

[Submission.csv](../Downloads/submission.csv)