

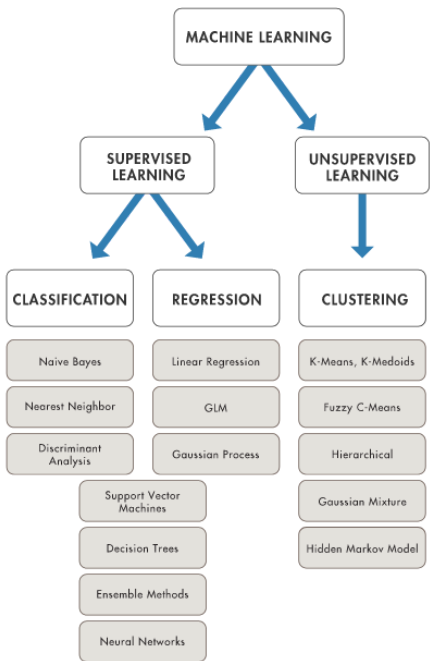
Potentially Hazardous Asteroids Detection



Objective & Background

The impact of a collision could have serious consequences, so it is necessary to detect and track potentially hazardous asteroids. This paper proposes the use of machine learning algorithms to detect potentially hazardous asteroids. It uses supervised learning models such as logistic regression, k-nearest neighbour classifier, decision tree, and random forest to categorize asteroids as hazardous or non-hazardous.

Dataset Link:
<https://www.kaggle.com/datasets/sakhawat18/asteroid-dataset>



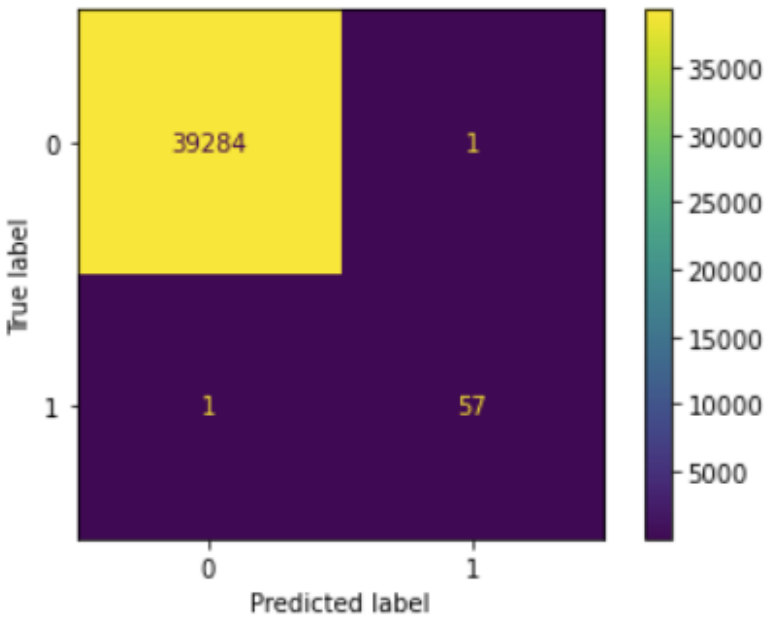
Methodology

We collected data about asteroids from various sources to make models as accurate as possible. We visualized the data with maps provided by modules such as Matplotlib and Seaborn, removed unnecessary features, and split the dataset into training and testing datasets. Various models are then trained with this dataset, so their performances can be compared.

Result

After implementing various machine learning models we found out that gradient boosting and decision tree had the highest accuracy.

	Model	Accuracy	Precision	Recall	f1
	AdaBoost	0.999497	0.873469	0.977778	0.895698
	Logistic-Regression	0.999263	0.945628	0.784432	0.847184
	KNN	0.998246	0.639351	0.560116	0.583898
	Decision-Tree	0.999949	0.991367	0.991367	0.991367
	Random-Forest	0.999822	0.973633	0.965479	0.969521
	SVC	0.998526	0.499263	0.500000	0.499631
	Gradient-Boosting	0.999949	0.991367	0.991367	0.991367



Conclusion & Future scope

Algorithms such as XGClassifier, Adaboost, Logistic Regression, and Decision Tree have been used to accurately identify the threat an asteroid poses. This has implications for providing Earth with a sanctuary from dangerous wandering bodies and further research of PHAs. A system of ML models and devices such as telescopes, radars, and satellites can be made to further strengthen planetary defenses. Additional data and features can be studied to further strengthen the model.

PC01 Garvit Akar
PC02 Arnav Deshpande
PC07 Avi Jain
PC08 Aditya Renukdas
PC09 Ronit Chougule
Guide:
Prof Shilpa Sonawani

