

The background of the image is a photograph of Earth as seen from space. The planet's curvature is visible, and the horizon shows a mix of white clouds and brown landmasses. The lighting suggests the sun is low on the horizon, creating a warm glow.

**NATIONAL  
SPACE DAY**

# ANTARIKSH 2024



COSMOSOC-  
Space and Data  
Science Club,  
IIT Dh

Hosted by-  
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# INTRODUCTION

## Nature's Cosmic Wanderers and Potential Hazards

- Asteroids are small, rocky objects that orbit the Sun, primarily found in the asteroid belt between Mars and Jupiter. They are remnants from the early solar system, offering valuable insights into its formation and evolution.
- Despite their small size compared to planets, asteroids can pose significant threats to Earth. If an asteroid were to collide with our planet, the impact could cause catastrophic damage, leading to natural disasters like tsunamis, wildfires, and global climate changes.
- Historical evidence, like the impact that contributed to the extinction of the dinosaurs 66 million years ago, highlights the potential danger of large asteroid collisions.
- Space agencies around the world actively monitor Near-Earth Objects (NEOs) to assess potential impact risks. Advances in technology have also led to the development of strategies for asteroid deflection and impact mitigation, aiming to protect Earth from future hazards.



# PROBLEM STATEMENT

Task:

- Your Aim is to develop a Machine Learning Model which can take the given features of the dataset to predict if an asteroid is hazardous or not.

Project Objective:

- You have to train your Machine Learning Model on Labelled Data.
- Use the ML model to predict the Unlabelled Data.



LINK TO FILES:

[https://drive.google.com/drive/folders/1l9TIs3OyWjxtNXtmxMFbC\\_PYDv8EXXgO  
?usp=drive\\_link](https://drive.google.com/drive/folders/1l9TIs3OyWjxtNXtmxMFbC_PYDv8EXXgO?usp=drive_link)

# SOME IMPORTANT TERMS

- **a**: Semi-major axis of an asteroid's orbit.
- **e**: Orbital eccentricity, indicating how elongated the orbit is.
- **G**: Geometric albedo, measuring the reflectivity of an asteroid.
- **i**: Orbital inclination, the tilt of the orbit relative to the ecliptic plane.
- **om**: Longitude of the ascending node, where the orbit crosses the ecliptic plane.
- **w**: Argument of periapsis, the angle from the ascending node to the asteroid's closest approach to the Sun.
- **q**: Perihelion distance, the closest distance of the asteroid to the Sun.
- **ad**: Aphelion distance, the farthest distance of the asteroid from the Sun.
- **albedo**: Reflectivity of the asteroid's surface.
- **mois**: Not a standard term in asteroid science; potentially refers to 'moons' or 'moisture' depending on context.
- **pha**: Potentially Hazardous Asteroid, a classification for asteroids with orbits that bring them close to Earth's orbit.
- **neo**: Near-Earth Object, any asteroid or comet whose orbit brings it close to Earth.
- **Rotation Period**: The time it takes for an asteroid to complete one full rotation on its axis.
- **Data Arc**: The time span between the first and last observations used to calculate an asteroid's orbit.
- **Condition Code**: A numerical scale (0-9) indicating the uncertainty of an asteroid's orbit, with 0 being highly accurate and 9 being highly uncertain.

# EVALUATION CRITERIA

THE MAIN EVALUATION CRITERIA IS GOING TO BE ON THE FOLLOWING BASIS:

- PRE-PROCESSING
- FEATURE ENGINEERING
- MODEL IMPLEMENTATION
- ACCURACY

Registration(google form in mail) opens from 23-08-24 and ends at EOD(25-08-24)

TEAM SIZE- 1-3 members(max)

# SUBMISSION

## Report/Documentation (PDF)

The teams must create a concise report that includes the workings and outcomes (model performance) as well as their thought process throughout the project

## Submission

The complete project must be submitted as a GitHub repository, which will include all the codes (preferably in Python notebooks), report, result file and any other required file. The result file should be submitted in CSV format , having two columns namely(Asteroid name,pha)



# CONTACT US



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# THANK YOU

WISH YOU BEST OF LUCK