**ASTEROIDS DATASHEET PROJECT**

Basic Column Definition

* SPK-ID: Object primary SPK-ID (Spacecraft and plant Kemel Identifier)
* Object ID: Object internal database ID
* Object fullname: Object full name/designation
* pdes: Object primary designation
* name: Object IAU name
* NEO: Near-Earth Object (NEO) flag
* PHA: Potentially Hazardous Asteroid (PHA) flag
* H: Absolute magnitude parameter
* Diameter: object diameter (from equivalent sphere) km Unit
* Albedo: Geometric albedo
* Diameter\_sigma: 1-sigma uncertainty in object diameter km Unit
* Orbit\_id: Orbit solution ID
* Epoch: Epoch of osculation in modified Julian day form
* Equinox: Equinox of reference frame
* e: Eccentricity
* a: Semi-major axis au Unit
* q: perihelion distance au Unit
* i: inclination; angle with respect to x-y ecliptic plane
* tp: Time of perihelion passage TDB Unit
* moid\_ld: Earth Minimum Orbit Intersection Distance au Unit

DETAILS

1. Asteroid Classification:

* Goal: Classify asteroids based on their properties, such as whether they are potentially hazardous (PHA) or not.
* Approach: Use features like diameter, albedo, eccentricity, inclination, and other orbital elements as input to a classification model.
* Algorithms: You could start with supervised learning algorithms like Logistic Regression, Random Forest, or Support Vector Machines (SVM). For more advanced modeling, consider using Neural Networks.

2. Predicting Asteroid Impact Risk:

* Goal: Predict the likelihood of an asteroid being a Near-Earth Object (NEO) or even a Potentially Hazardous Asteroid (PHA).
* Approach: Use a regression model to estimate the risk based on the given features like eccentricity, semi-major axis, perihelion distance, inclination, etc.
* Algorithms: Linear Regression, Gradient Boosting, or Neural Networks.

3. Clustering Asteroids:

* Goal: Identify groups of similar asteroids in terms of their orbital and physical characteristics.
* Approach: Apply unsupervised learning techniques to discover clusters of asteroids that may share common properties.
* Algorithms: K-Means Clustering, DBSCAN, or Hierarchical Clustering.

4. Asteroid Orbit Prediction:

* Goal: Predict the future position of asteroids based on their current orbital parameters.
* Approach: Time series forecasting or sequence modeling using LSTM (Long Short-Term Memory) networks.
* Algorithms: ARIMA models for simpler cases or LSTM for more complex sequence predictions.

5. Anomaly Detection:

* Goal: Detect anomalies in asteroid behavior or properties, such as sudden changes in their orbits or unusual physical characteristics.
* Approach: Use statistical methods or machine learning models to identify outliers in the dataset.
* Algorithms: Isolation Forest, One-Class SVM, or Autoencoders for more advanced anomaly detection.