Asteroid Orbital Path

Asteroids, sometimes called minor planets, are rocky remnants left over from the early formation of our solar system about 4.6 billion years ago.

Most asteroids are irregularly shaped, though a few are nearly spherical, and they are often pitted or cratered. As they revolve around the Sun in elliptical orbits, the asteroids also rotate, sometimes quite erratically, tumbling as they go.

The orbits of asteroids can be changed by Jupiter's massive gravity – and by occasional close encounters with Mars or other objects.These encounters can knock asteroids out of the main belt, and hurl them into space in all directions across the orbits of the other planets. Stray asteroids and asteroid fragments have slammed into Earth and the other planets in the past, playing a major role in altering the geological history of the planets and in the evolution of life on Earth.

Your Task is to build a Machine Learning model that identifies the orbital path of an Asteroid.

**Dataset Description**

The dataset presents a basic Multi Class Classification problem. One has to classify the orbit of the Asteroid into one of the following types:-

• Atira

• Aten

• Apollo

• Amor

• Object with perihelion distance < 1.665 AU

• Hungaria

• MBA

• Phocaea

• Hilda

• Jupiter Trojan

• Distant Object

Name - name of the asteroid.

Number - Permanent designation of the asteroid

Principal\_desig - Principal provisional designation (if it exists)

Other\_desigs - Other provisional designations (if they exist)

H - Absolute magnitude

G - Slope parameter

Epoch - Epoch of the orbit (Julian Date)

a - Semimajor axis, a (AU)

e - Orbital eccentricity, e

i - Inclination to the ecliptic, J2000.0 (degrees)

Node - Longitude of the ascending node, ☊, J2000.0 (degrees)

Peri - Argument of perihelion, ω, J2000.0 (degrees)

M - Mean anomaly, M, at the epoch (degrees)

n -----float----- Mean daily motion, n (degrees/day)

U -----string -----Uncertainty parameter, U

Ref -----string -----Reference

Num\_obs----- integer -----Number of observations

Num\_opps -----integer -----Number of oppositions

Arc\_years -----string----- Only present for multi-opposition orbits (year of first observation – year of last observation)

Arc\_length----- integer----- Only present for 1-opposition orbits (days)

rms -----float----- r.m.s. residual

Perturbers -----string----- Coarse indicator of perturbers used in orbit computation

Perturbers\_2 -----string -----Precise indicator of perturbers used in orbit computation

Last\_obs -----string----- Date of last observation included in orbit solution (YYYY-MM-DD format)

Hex\_flags----- string -----4-hexdigit flags

Computer----- string----- Name of orbit computer (be it a person or machine)

NEO\_flag------ integer -----Value = 1 if flag raised, otherwise keyword is absent

One\_km\_NEO\_flag------ integer----- Value = 1 if flag raised, otherwise keyword is absent

PHA\_flag----- integer -----Value = 1 if flag raised, otherwise keyword is absent

One opposition

*object*

flag----- integer----- Value = 1 if flag raised, otherwise keyword is absent

Critical list numbered object\_flag -----integer -----Value = 1 if flag raised, otherwise keyword is absent

Perihelion\_dist----- float----- Perihelion distance (AU)

Aphelion\_dist----- float---- Aphelion distance (AU)

Semilatus\_rectum -----float -----Semilatus rectum distance (AU)

Orbital\_period---- float----- Orbital period (years)

Synodic\_period----- float----- Synodic period (years)