



K. N. Toosi University of Technology

**Faculty of Physics
Educational Group of
Atomic-Molecular and Astronomy**

Machine Learning Projects (Project 2)

by
Ali Bagheri

Teacher
Dr. Mohammad Hossein Zhoolideh

**Academic Year 1401-1402
(First Semester)**

Diameter of Asteroids

In this project, we ask you to use the data in one dataset to build a model to predict the diameter of asteroids using the other data in the dataset. You can download the dataset needed to answer this question from this [link](#).¹ A table of information provided to us is on the next page.

Note: The given data is raw. To answer this question, you must first preprocess the data using the pandas package.

Important Points

Be sure to

- Leave appropriate comments for different parts of your code.
- Completely explain about the algorithm(s) you use to answer this question.
- Measure your model performance using model evaluation metrics and interpret the obtained result(s).

A part of your score will be allocated to these items.

* You should write all the steps of your project in the **Jupyter notebook** and upload it as a file with the **.ipynb** extension on the vc site.

¹To save the dataset, you need to press Ctrl+S on the opened page and save the .csv file

Columns	Description
Name	object full name
a	semi-major axis (AU)
e	eccentricity
i	inclination with respect to x-y ecliptic plane (deg)
om	longitude of the ascending node
w	argument of perihelion
q	perihelion distance (AU)
ad	aphelion distance (AU)
per_y	orbital period (years)
data_arc	data arc-span (d)
condition_code	orbit condition code
n_obs_used	number of observation used
H	absolute magnitude parameter
neo	Near Earth Object
pha	Physically Hazardous Asteroid
diameter	diameter of asteroid (km)
extent	object bi/tri axial ellipsoid dimensions (km)
albedo	geometric albedo
rot_per	rotation period (h)
GM	product of mass and gravitational constant
BV	Color index B-V magnitude difference
UB	Color index U-B magnitude difference
IR	Color index I-R magnitude difference
spec_B	Spectral taxonomic type (SMASSII)
spec_T	Spectral taxonomic type (Tholen)
G	magnitude slope parameter
moid	Earth Minimum orbit Intersection Distance (AU)
class	asteroid orbit class
n	mean motion (deg/d)
per	orbital period (d)
ma	mean anomaly (deg)