



TRANSPORTATION ENGG LAB

DBSCAN ALGORITHM

GROUP - 7



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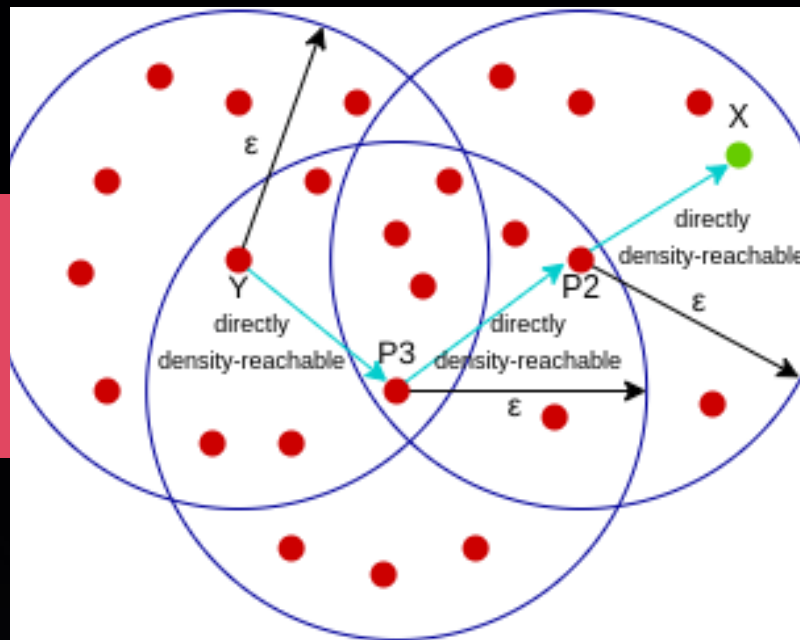
WHAT IS DBSCAN?



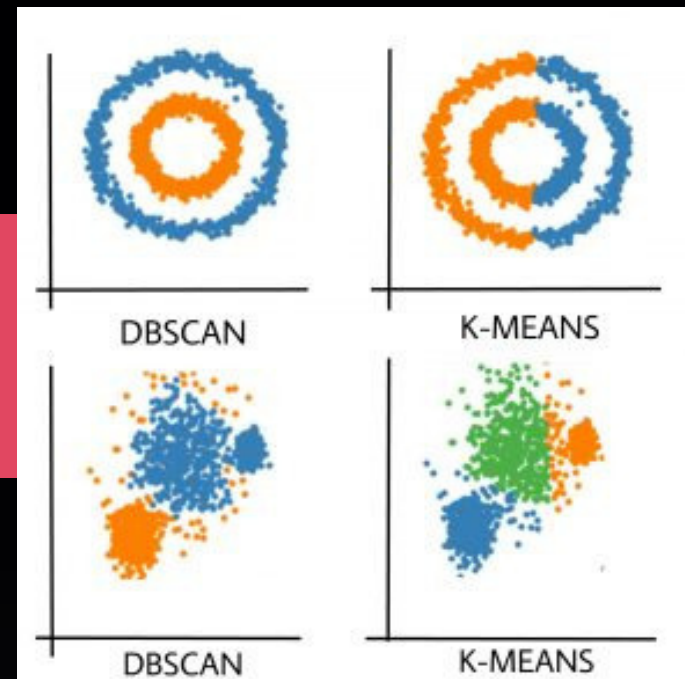
Density-based spatial clustering of application with noise (DBSCAN)

- is a type of density based clustering techniques.
- data is grouped by areas of high concentration of data points.
- it basically finds places which are dense with data points and call those clusters.

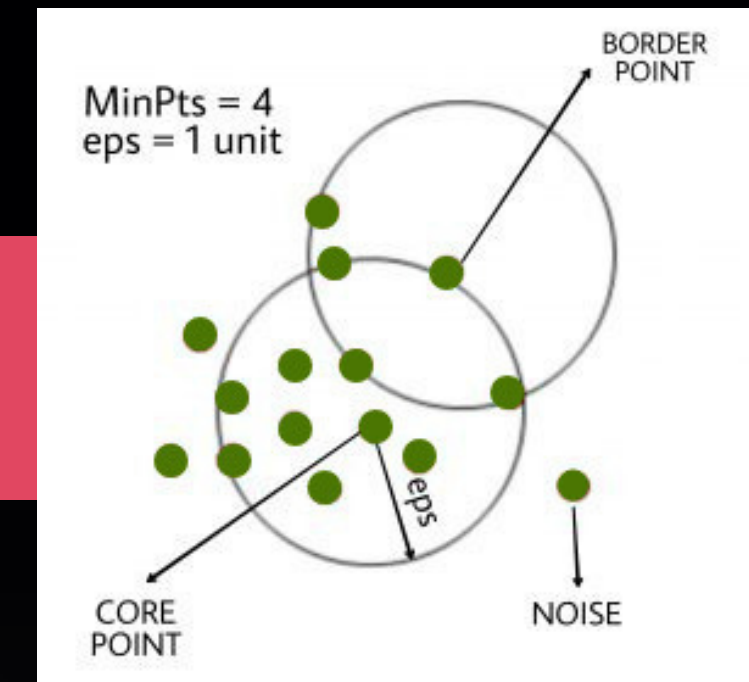
WHAT IT DOES?



It Groups 'densely grouped' data points into a single cluster.



Unlike K-Means, specifying the number of centroids beforehand is not required.



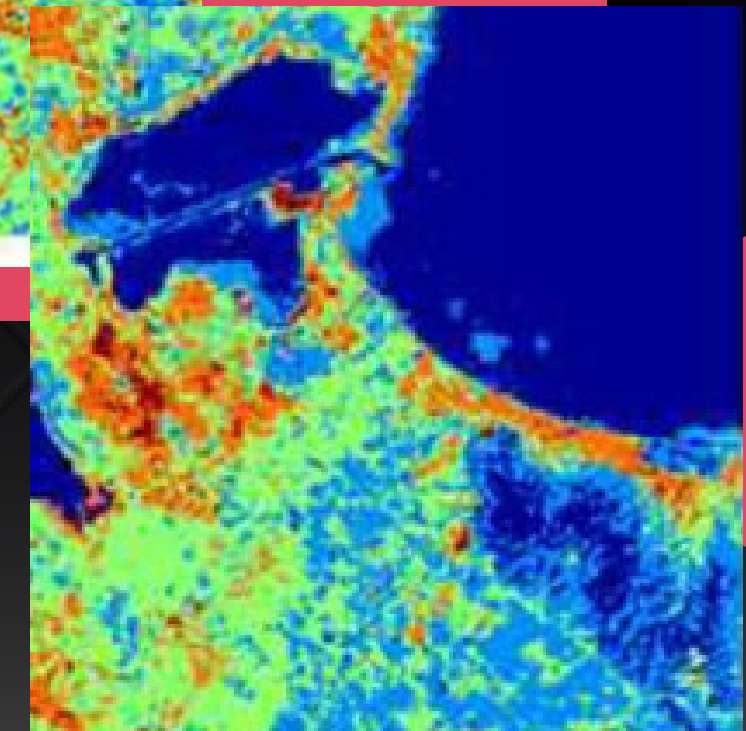
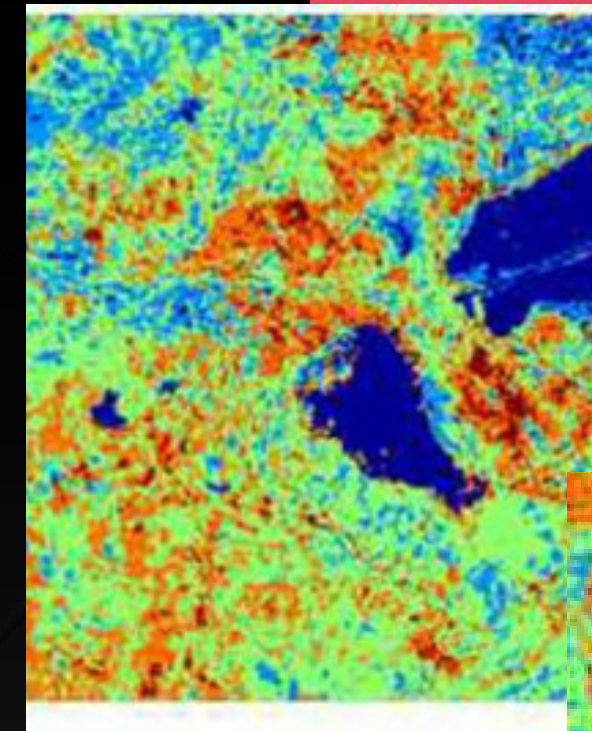
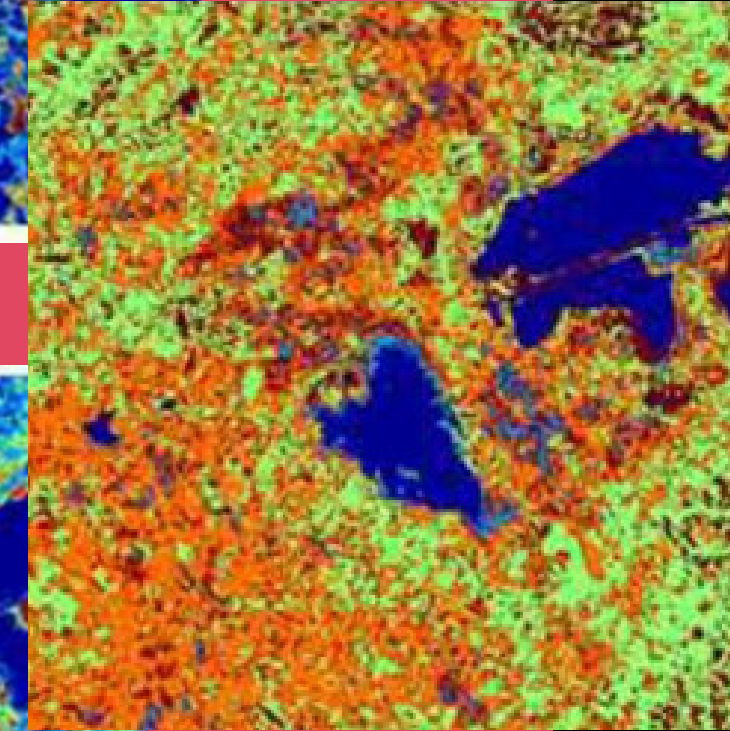
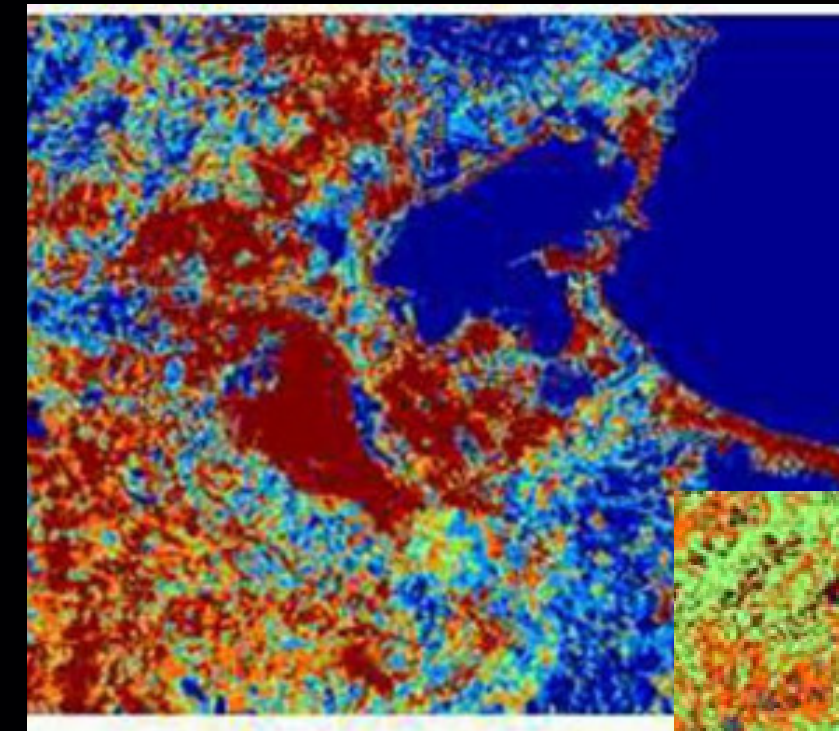
It identifies clusters in large spatial datasets by looking at the local density of datapoints

APPLICATIONS OF DBSCAN

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01 Satellite Images:

- DBSCAN algorithm is helpful in translating the images received from satellites into readable information.
- The geographical information like location of mountains, rivers, etc thus obtained, can be utilized in planning of roads and other modes of transport.

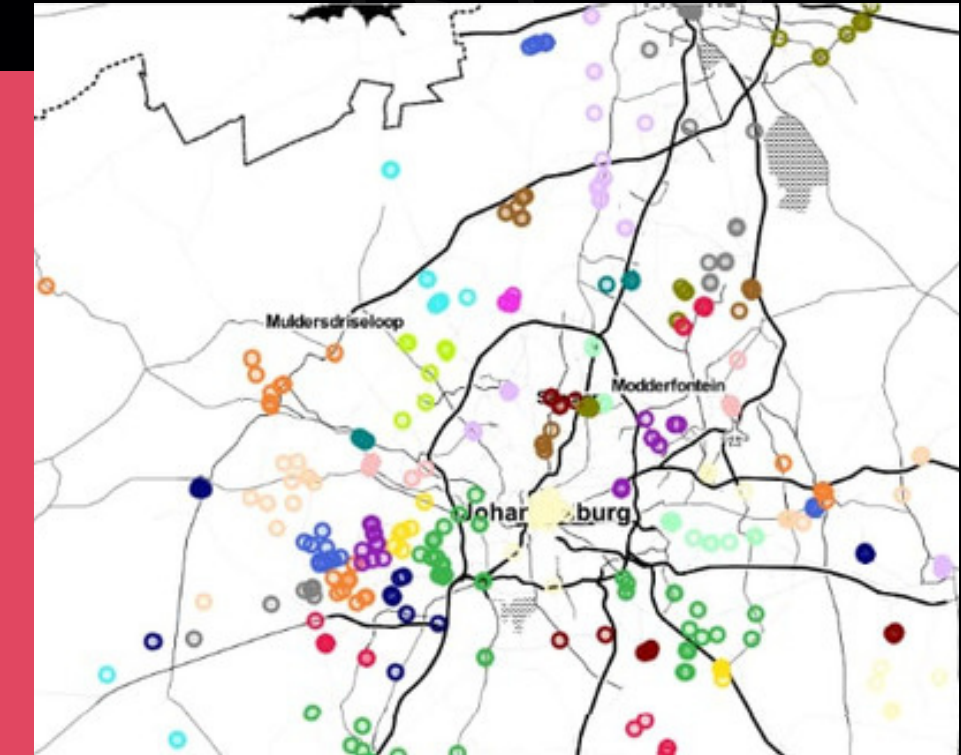


APPLICATIONS OF DBSCAN

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02 DETECTING LOCATIONS FOR BUS STOPS:

- Previously, only factors like population density and traffic conditions were considered while selecting bus stop locations. Seldom, travel patterns of people were considered which is utterly important.
- DBSCAN algorithm can be used to identify hot pick up and drop-off locations using taxi gps data which can prove to be potential bus stop locations.

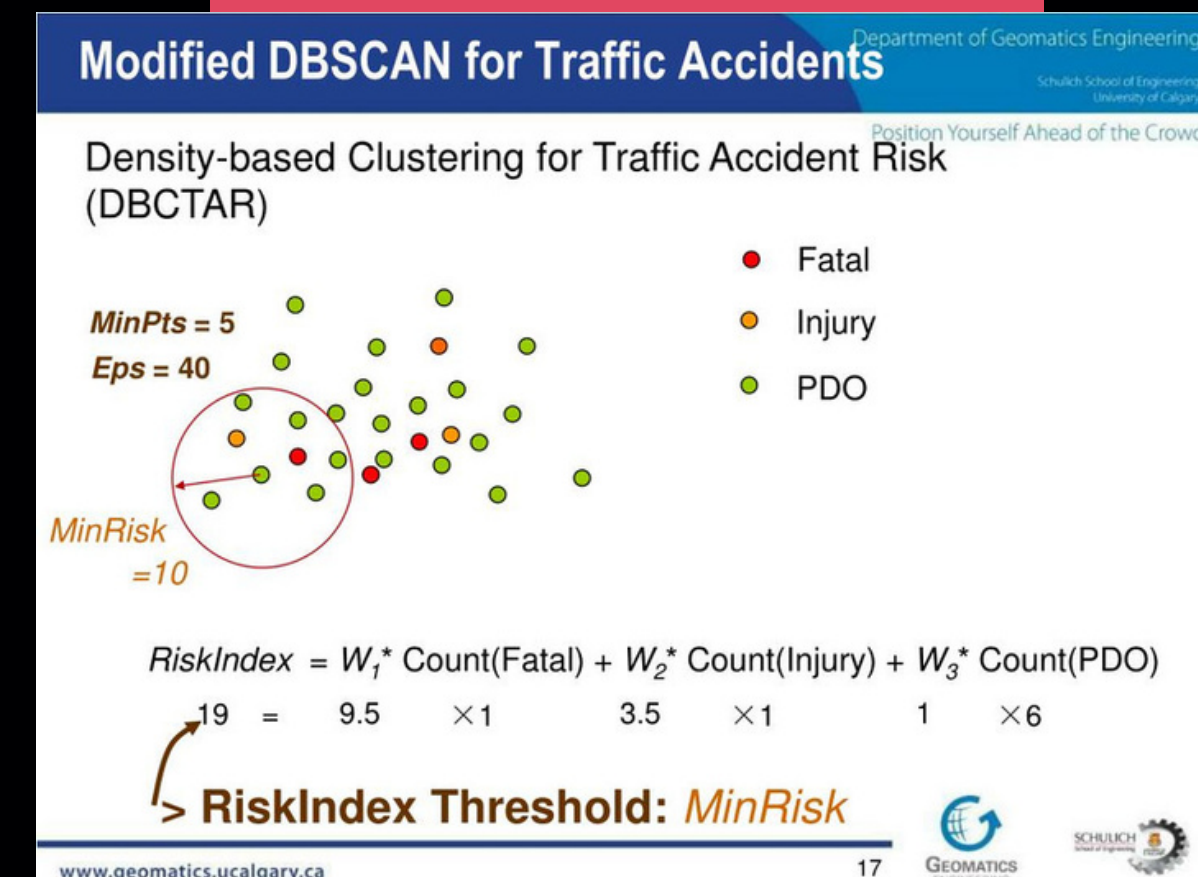
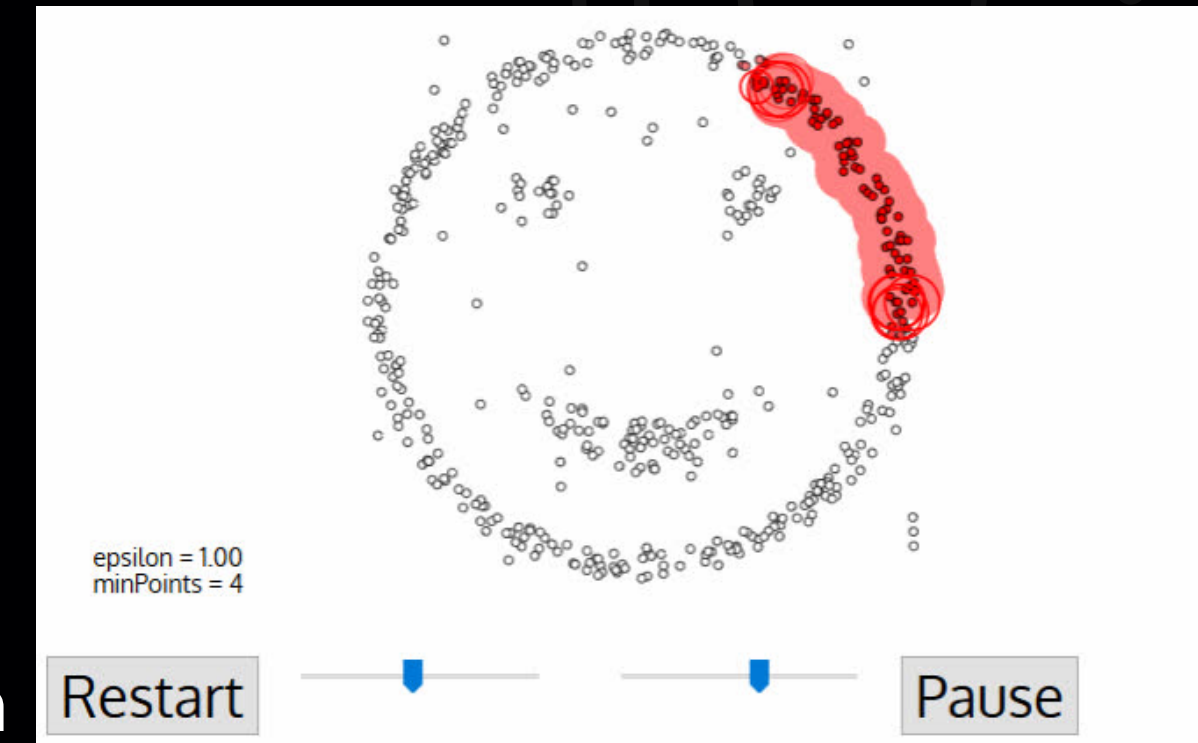


APPLICATIONS OF DBSCAN

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03 LOCATING ACCIDENT HOTSPOTS:

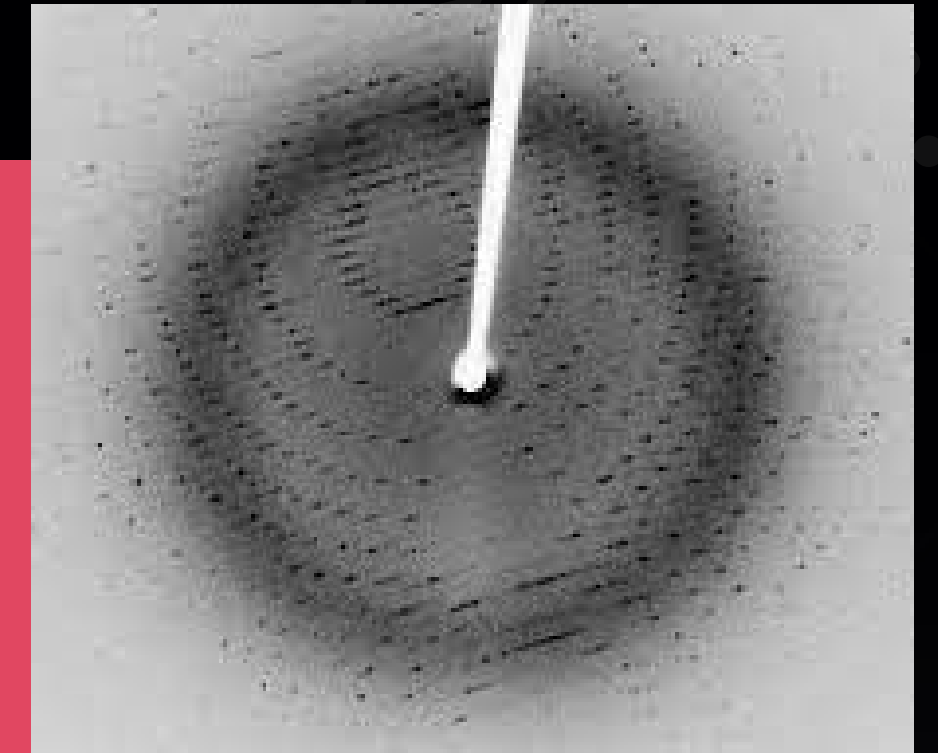
- Road accidents constitute a significant proportion of the number of serious injuries reported every year. Yet, it is often challenging to determine which specific conditions lead to such events, making it more difficult for local law enforcement to address the number and severity of road accidents.
- DBSCAN groups points that are closely packed together and marks points outside of these groups as noise. Therefore, using this algorithm, locations in which a high density of accidents take place will be highlighted as clusters. We can then plot the location of these clusters using folium.



OTHER APPLICATIONS OF DBSCAN

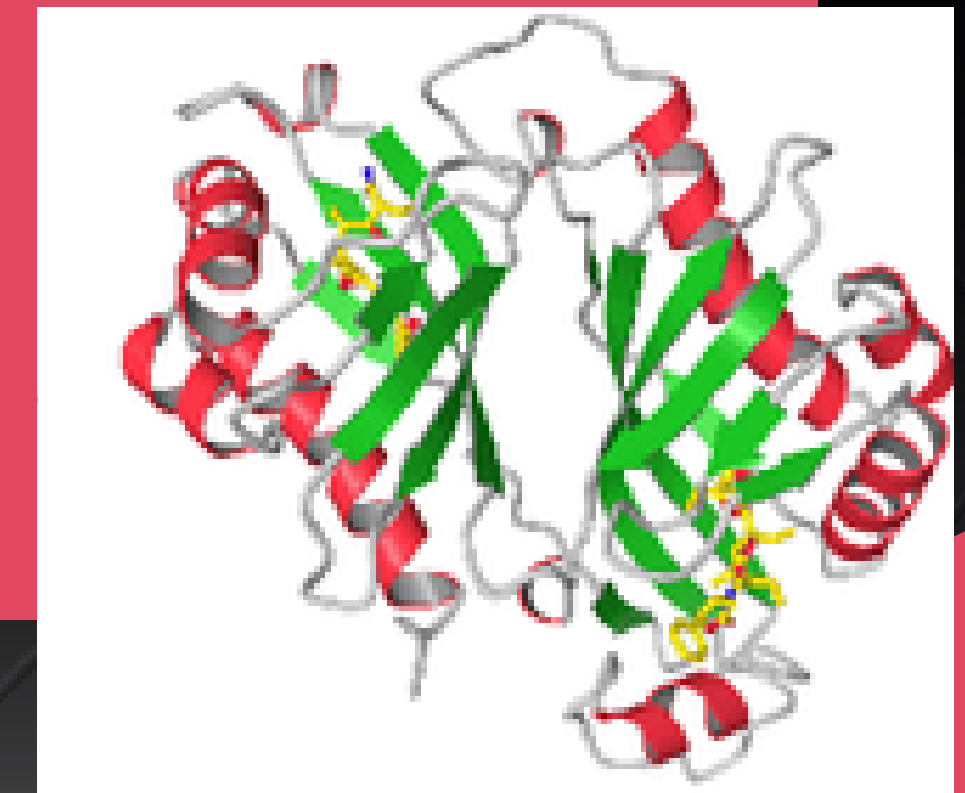
01 Study of Galaxies

- Study of galaxy is significant for understanding the evolution of universe.
- DBSCAN method is used to understand the clustered nature of galaxies and classify the data correctly.



02

- X-ray crystallography is another practical application that locates all the atoms in a crystal, which causes a large amount of data.
- The DBSCAN algorithm can be used to find and classify the atoms in the data.



PARAMETERS

1

EPSILLON

Distance measured that will be used to locate the points and check the density in the neighbourhood of any point.

2

MINPOINTS

Minimum number of points (a threshold) clustered together for a region to be considered as dense.

HOW THE ALGORITHM WORKS

Again, a point is considered core if it contains at least minpoints, a minimum number of points in its epsilon neighborhood.

Assign each non-core point to the nearest cluster if the cluster is its epsilon neighbor. Such a point is called the border point

Initially, the algorithm starts by randomly and uniformly selecting a point from the set of data points. Checks if the selected point is the core point.

Next, search for the connected components of all the core points, ignoring the noise point

If not, assign it as noise. The algorithm stops when it explores all the points one by one and classifies them as either core, border or noise point.



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THANK YOU