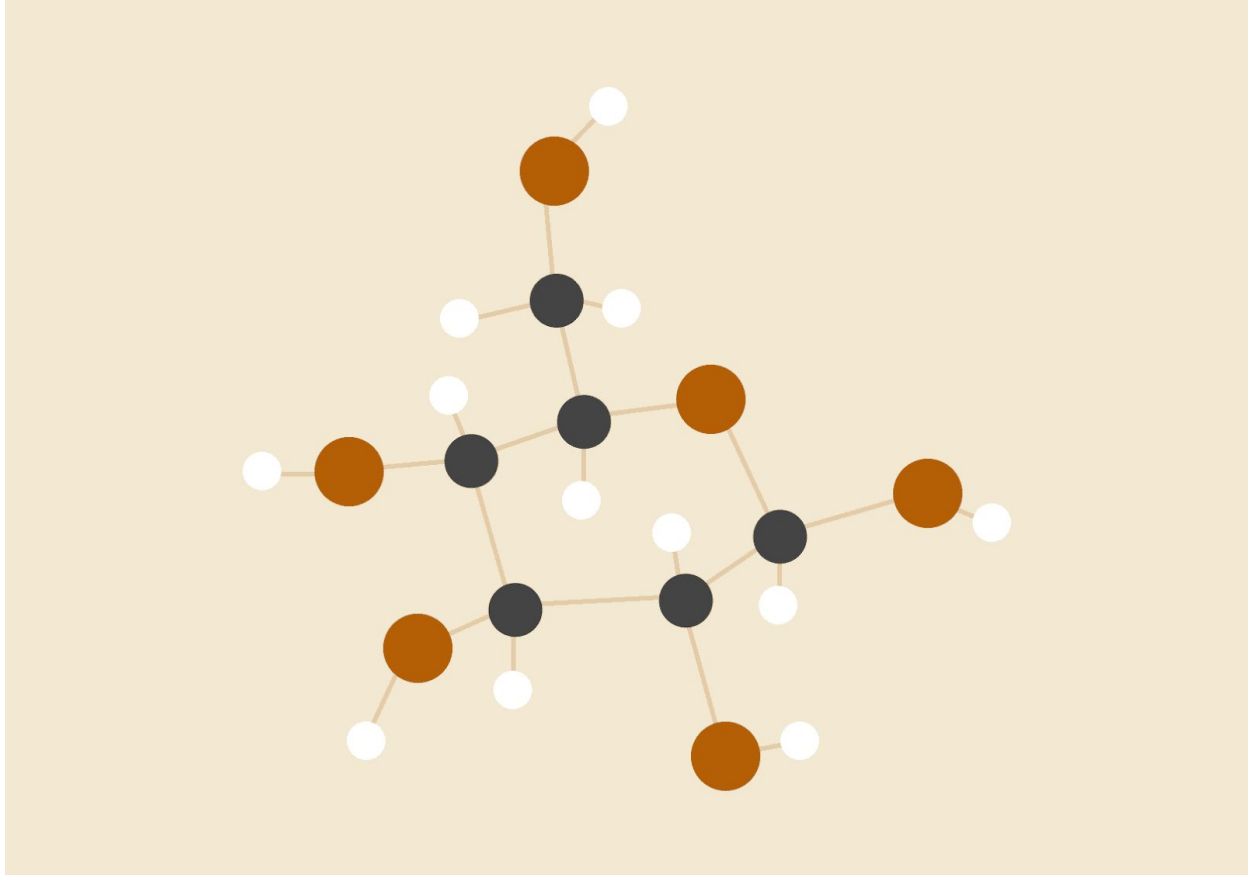


# Fuzzy C-mean Clustering

*Unsupervised learning algorithm*



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## INTRODUCTION

Fuzzy clustering (also referred to as soft clustering) is a form of clustering in which each data point can belong to more than one cluster.

Clustering or cluster analysis involves assigning data points to clusters such that items in the same cluster are as similar as possible, while items belonging to different clusters are as dissimilar as possible. Clusters are identified via similarity measures. These similarity measures include distance, connectivity, and intensity. Different similarity measures may be chosen based on the data or the application.

## COMPARISON TO HARD CLUSTERING

In non-fuzzy clustering (also known as hard clustering), data is divided into distinct clusters, where each data point can only belong to exactly one cluster. In fuzzy clustering, data points can potentially belong to multiple clusters.

## APPLICATIONS

Clustering problems have applications in biology, medicine, psychology, economics, and many other disciplines.

## BIOINFORMATICS

In the field of bioinformatics, clustering is used for a number of applications. One use is as a pattern recognition technique to analyze gene expression data from microarrays or other technology.[6] In this case, genes with similar expression patterns are grouped into the same cluster, and different clusters display distinct, well-separated patterns of expression. Use of clustering can provide insight into gene function and regulation. Because fuzzy clustering allows genes to belong to more than one cluster, it allows for the identification of genes that are conditionally co-regulated or co-expressed. For example, one gene may be acted on by more than one Transcription factor, and one gene may encode a protein that has more than one function. Thus, fuzzy clustering is more appropriate than hard clustering.

## IMAGE ANALYSIS

Fuzzy c-means has been a very important tool for image processing in clustering objects in an image. In the 70's, mathematicians introduced the spatial term into the FCM algorithm to improve the accuracy of clustering under noise. Furthermore, FCM algorithms have been used to distinguish between different activities using image-based features such as the Hu and the Zernike Moments. Alternatively, A fuzzy logic model can be described on fuzzy sets that are defined on three components of the HSL color space HSL and HSV; The membership functions aim to describe colors follow the human intuition of color identification.

## MARKETING

In marketing, customers can be grouped into fuzzy clusters based on their needs, brand choices, psychographic profiles, or other marketing related partitions.

## CONCLUSION

Because of this project, we had a great insight about the clustering techniques and their great use in the real world.

## REFERENCES

1. [www.geeksforgeeks.com](http://www.geeksforgeeks.com)
2. Wikipedia