



Department of Artificial Intelligence & Machine Learning

Academic Year 2023-2024

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Experiment No. 7

Aim: Image Segmentation

Objective: Develop a program to Segment Image using K Means Algorithm

Theory:

Image segmentation is the task of partitioning an image into multiple segments. In semantic segmentation, all pixels that are part of the same object type get assigned to the same segment.

Image segmentation is the process of partitioning a digital image into multiple distinct regions containing each pixel (sets of pixels, also known as superpixels) with similar attributes.

The goal of Image segmentation is to change the representation of an image into something that is more meaningful and easier to analyze.

Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, Image Segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics.

K Means is a clustering algorithm. Clustering algorithms are unsupervised algorithms which means that there is no labelled data available. It is used to identify different classes or clusters in the given data based on how similar the data is. Data points in the same group are more similar to other data points in that same group than those in other groups.

1. Choose the number of clusters you want to find which is k.
2. Randomly assign the data points to any of the k clusters.
3. Then calculate the centre of the clusters.
4. Calculate the distance of the data points from the centres of each of the clusters.
5. Depending on the distance of each data point from the cluster, reassign the data points to the nearest clusters.
6. Again calculate the new cluster centre.
7. Repeat steps 4,5 and 6 till data points don't change the clusters, or till we reach the assigned number of iterations.

Observations



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<u>CV Experiment 7</u>	
2. <u>Aim: Develop a program to segment image using K-means algorithm</u>	
<u>Observation:-</u> K-means is a clustering algorithm unsupervised meaning that there is no labeled data available. K-means clustering is one of the most commonly used clustering algorithms where k represents the no. of clusters.	
With the use of python, numpy, opencv, matplotlib we implemented K-means clustering through the following steps:	
→ We choose the no. of clusters you want to find which is ' k '.	
→ Then we randomly assigned the data points to any of k clusters.	
→ Then we calculated centre of clusters.	
→ Followed by calculating the distance of each point from the cluster and then reassigning the data points to the nearest cluster.	
→ Then again calculating the new cluster centres.	
→ Repeating the steps till the data points do not change the cluster or we reach the assigned number of iterations.	
Hence we segment into k clusters after all iterations.	



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Though K-means clustering works well when we have small dataset. It can segment objects in images also gives better results. But when applied on larger datasets (ie. more number of images) it looks at all the samples in one iteration, which leads to a lot of time being taken up.

Conclusion: We This technique can be used in all ~~parts~~ ^{fields} that require image segmentation like in self-driving cars & healthcare industry.