

In the Name of God



Machine Learning and Vision Lab

Lab 5th

Pre report

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Nov 22th 2023

1)

Because each keypoint is assigned one or more orientations based on local image gradient directions.

2.1)

First of all, it partitions the data into  $K$  clusters by iteratively assigning data points to the cluster whose mean (centroid) is closest to them and updating the centroids based on the newly assigned points. This process continues until convergence, minimizing the sum of squared distances between data points and their assigned centroids.

2.2)

Yes, K-means is dependent and sensitive to initial centroid placement.

2.3)

For this we can do several things like:

We can perform the algorithm multiple times with different initial centroid placements and choose the result with the lowest loss (sum of squared distances).

Also increasing the value of  $K$  can make the algorithm less sensitive to initial centroids. After running K-means with a larger  $K$ , we can then merge clusters if necessary.