

# OPTIMIZATION

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**Algorithm** used in writing the code is **K** -means Clustering:

**K** -means Clustering aims to partition  $n$  observations into  $K$  clusters in which each observation belongs to the cluster with the nearest mean, serving as prototype of the cluster.

## Code:

- ❶ In the **code** 4 Centroids has been chosen randomly. Distance of each point in data set is calculated with each centroid and the whole data set has been clustered into 4 Clusters based on the distance of particular point to the centroid.
- ❷ A Point is classified to a particular cluster if it is more near to the centroid of cluster.
- ❸ After partitioning of whole dataset into 4 clusters, centroid each cluster is updated by mean of the dataset and the whole process is repeated till difference between centroid and updated centroid is nullified.
- ❹ The number of clusters can be increased as per requirement.

# OUTPUT

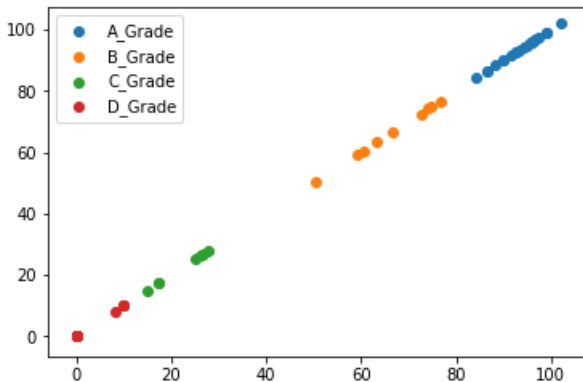


Figure: Clusters

# CONCLUSIONS

- A Grade

[95.0, 99.2, 99.2, 96.4, 88.4, 86.7, 84.2, 91.7, 95.7, 94.2

96.7, 93.2, 90.1, 92.5, 102.0, 90.0, 92.5, 97.5, 96.0, 86.5]

- B Grade

[76.7, 66.7, 74.2, 74.7, 59.2, 50.4, 72.6, 60.4, 63.4]

- C Grade

[17.2, 26.1, 15.0, 27.7, 26.9, 17.2, 25.2]

- D Grade

[0.0, 0.0, 10.0, 10.0, 0.0, 0.0, 0.0, 0.0, 10.0, 0.0, 0.0, 8.0]