

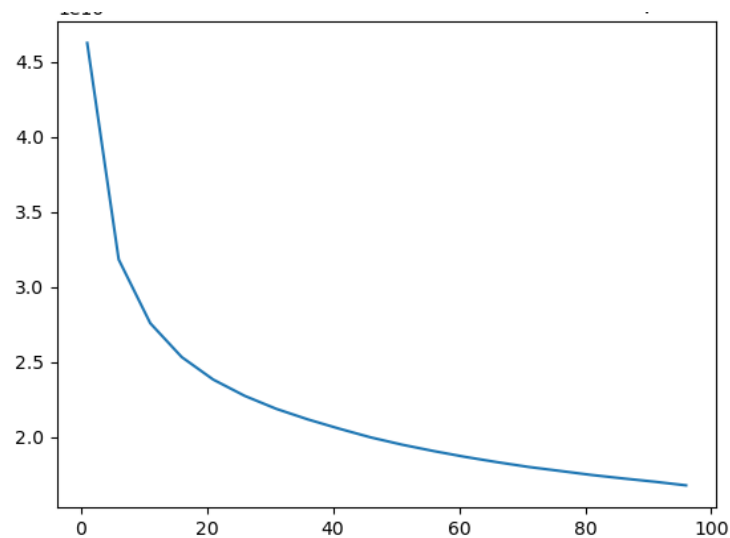
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Computer Vision Assignment 2

How did you choose the optimum value of the number of clusters?

-> To arrive at an optimum value of the number of clusters, I used the **elbow method**. I plotted the **WSS** of all the k-means by varying the number of clusters from 1 to 100. Also I decided the optimal number of clusters by checking the accuracy I got on the test set. After both these steps and careful thought, found the **optimal number of clusters at 57**



Number of clusters vs WSS from 1 to 100

```
Classification report after using SVM (Support Vector Machines)
      precision    recall  f1-score   support

0         0.58      0.57      0.57        971
1         0.78      0.82      0.80        963
2         0.48      0.46      0.47        986
3         0.47      0.51      0.49        973
4         0.41      0.50      0.45        991
5         0.66      0.75      0.70        979
6         0.37      0.18      0.24        971
7         0.71      0.77      0.74        996
8         0.66      0.65      0.66        986
9         0.85      0.82      0.84       1000

 accuracy          0.60        9816
 macro avg         0.60        0.60        0.60        9816
weighted avg         0.60        0.60        0.60        9816

Prediction using both classifiers has been printed
```

```

Iteration 99 completed
Visual Dictionary is created
The Closet Visual Word has been stored in the directory closetVisualWords
Clusters-no: 57
Classification report after doing k-NN (k=25)

```

	precision	recall	f1-score	support
0	0.53	0.57	0.55	971
1	0.70	0.86	0.77	963
2	0.42	0.48	0.45	986
3	0.49	0.44	0.46	973
4	0.46	0.41	0.43	991
5	0.61	0.73	0.66	979
6	0.33	0.19	0.24	971
7	0.70	0.76	0.73	996
8	0.66	0.60	0.63	986
9	0.84	0.83	0.83	1000
accuracy			0.59	9816
macro avg	0.57	0.59	0.58	9816
weighted avg	0.57	0.59	0.58	9816

Accuracy using both the classifiers (K-NN and SVM)

In the project,

- Used the fashion_mnist dataset from the tensorflow
- Used the skimage SIFT for extraction of features
- Wrote the k-means clustering code for generating codebook
- Used k-NN and SVM classifier for predicting labels
- Used elbow method to find the optimum cluster number
- **Stored the closet visual words in the closetVisualWords directory**
- Got **60-65% accuracy** on multiple runs (Variation due to randomness in k-means)

Functions created:-

1. K Means class
2. CreateVisualDictionary()
3. ClosetVisualWord()
4. getOptimumK() to get the optimum K
5. ComputeHistogram()
6. MatchHistogram()
7. PredImage() to get the label for one image
8. Predict_test() to test the BOVW on the test images