RESULT & ANALYSIS

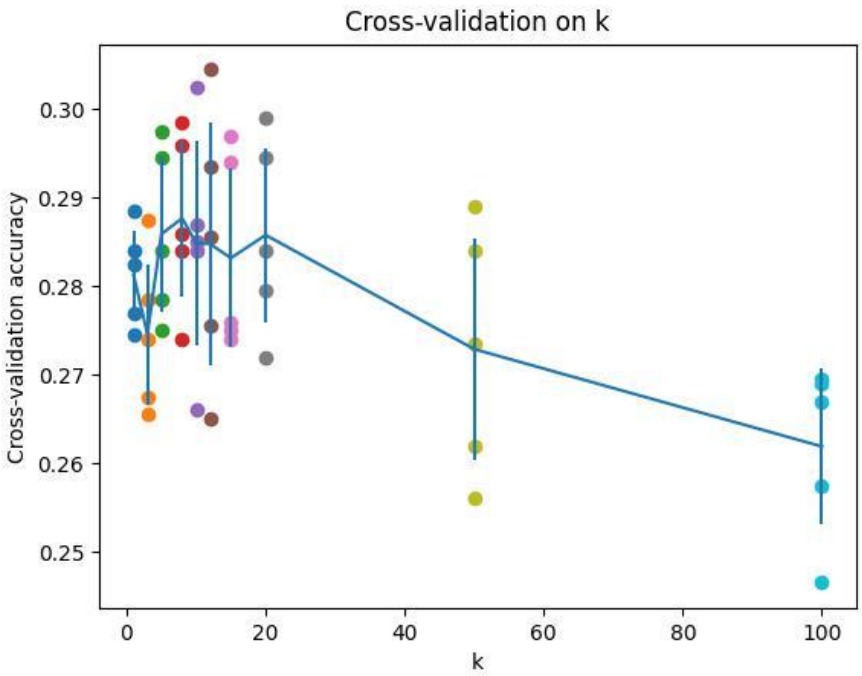

fig 1. Cross validation result for 100 epochs

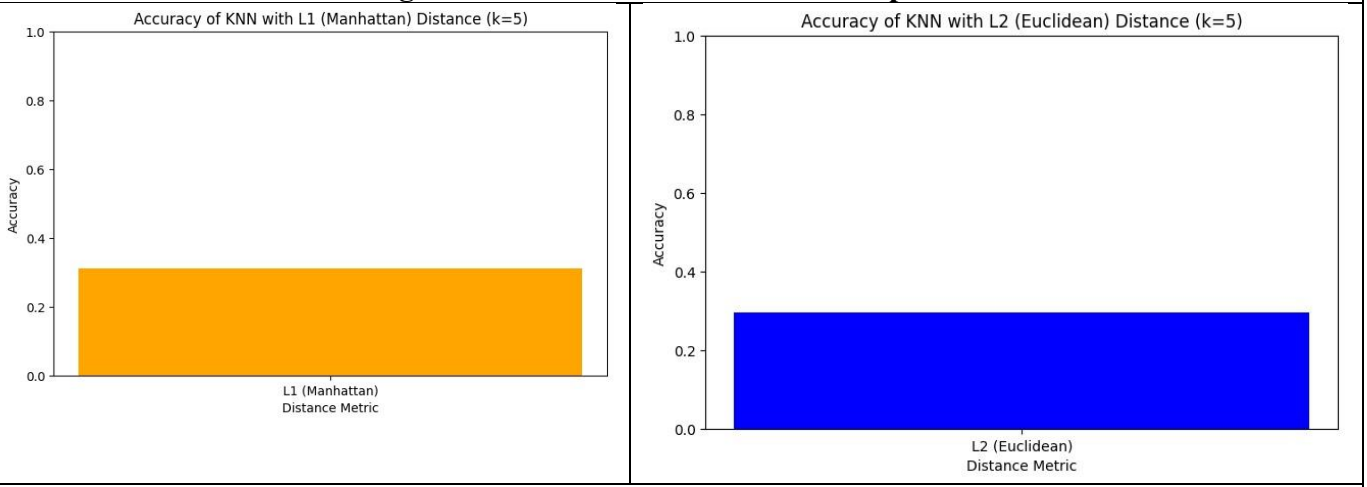

fig 2. Comparison between L1 & L2 values for k=5 (Bonus part)

Data

Question 1 output data

```
Training data shape:  (50000, 32, 32, 3)
Training labels shape:  (50000,)
Test data shape:  (10000, 32, 32, 3)
Test labels shape:  (10000,)
(10000, 3072) (1000, 3072)
Got 296 / 1000 correct with k=5 => accuracy: 0.296000**[ACCURACY MET]
k = 1: 100%|██████████| 5/5 [18:27<00:00, 221.56s/it]
k = 3: 100%|██████████| 5/5 [17:40<00:00, 212.03s/it]
k = 5: 100%|██████████| 5/5 [16:40<00:00, 200.04s/it]
k = 8: 100%|██████████| 5/5 [18:35<00:00, 223.09s/it]
k = 10: 100%|██████████| 5/5 [17:43<00:00, 212.72s/it]
k = 12: 100%|██████████| 5/5 [16:38<00:00, 199.65s/it]
k = 15: 100%|██████████| 5/5 [16:41<00:00, 200.26s/it]
k = 20: 100%|██████████| 5/5 [16:49<00:00, 201.96s/it]
k = 50: 100%|██████████| 5/5 [17:38<00:00, 211.73s/it]
k = 100: 100%|██████████| 5/5 [16:46<00:00, 201.21s/it]
Printing our 5-fold accuracies for varying values of k:

k = 1, accuracy = 0.288500
k = 1, accuracy = 0.284000
k = 1, accuracy = 0.282500
k = 1, accuracy = 0.274500
k = 1, accuracy = 0.277000
k = 3, accuracy = 0.287500
k = 3, accuracy = 0.274000
k = 3, accuracy = 0.278500
k = 3, accuracy = 0.267500
k = 3, accuracy = 0.265500
k = 5, accuracy = 0.294500
k = 5, accuracy = 0.284000
k = 5, accuracy = 0.297500
k = 5, accuracy = 0.275000
k = 5, accuracy = 0.278500
k = 8, accuracy = 0.298500
k = 8, accuracy = 0.296000
k = 8, accuracy = 0.284000
k = 8, accuracy = 0.274000
k = 8, accuracy = 0.286000
k = 10, accuracy = 0.302500 ***[best]
k = 10, accuracy = 0.287000
k = 10, accuracy = 0.284000
...
k = 20, avg. accuracy = 0.285800
k = 50, avg. accuracy = 0.272900
k = 100, avg. accuracy = 0.261900 ***[accuracy didn't meet the predicted range]
Got 276 / 1000 correct on test data => accuracy: 0.276000
Output is truncated. View as a scrollable element or open in a text editor. Adjust cell output settings...
```

Bonus part output data (WITHOUT USING K-FOLD)

```
Training data shape:  (50000, 32, 32, 3)
Training labels shape:  (50000,)
Test data shape:  (10000, 32, 32, 3)
Test labels shape:  (10000,)
(10000, 3072) (1000, 3072)
Got 296 / 1000 correct with k=5 using L2 distance => accuracy: 0.296000
Got 310 / 1000 correct with k=5 using L1 distance => accuracy: 0.310000
```

Analysis

Although the accuracy initially met our expectations, hovering around 29-30% for k=5, later predictions didn't go as planned. Instead of reaching the anticipated 57-58% accuracy, the model fell short. This difference highlights the challenge of classification tasks and suggests that more work is needed to improve the model's performance.

Bonus part analysis

When comparing the performance of L1 and L2 distances for k=5, we found that the accuracy achieved with L1 distance was slightly higher at 31%, whereas L2 distance resulted in an accuracy of 29.6%. This indicates that L1 distance performed marginally better than L2 in this scenario.