**RESULT & ANALYSIS**

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| **fig 1. Cross validation result for 100 epochs** | |
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| **fig 2. Comparison between L1 & L2 values for k=5 (Bonus part)** | |
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**Data**

Question 1 output data

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| 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*](command:cellOutput.enableScrolling?cb388f0e-3b63-49ed-b6b3-6462e2b6eac9) *or open in a* [*text editor*](command:workbench.action.openLargeOutput?cb388f0e-3b63-49ed-b6b3-6462e2b6eac9)*. Adjust cell output* [*settings*](command:workbench.action.openSettings?%5B%22%40tag%3AnotebookOutputLayout%22%5D)*...* |

**Bonus part output data (WITHOUT USING K-FOLD)**

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| 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.