

HW3 Q4 Written Responses

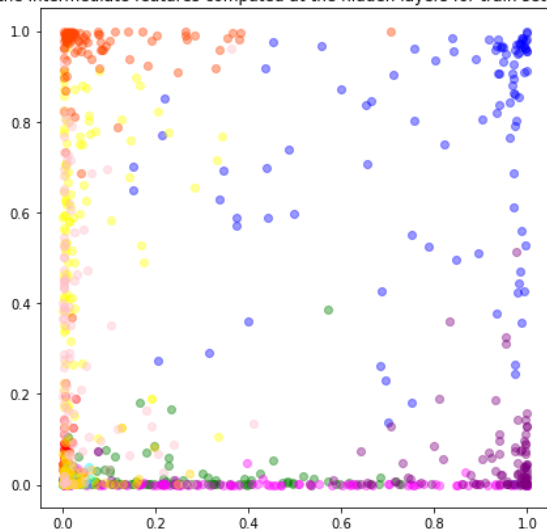
A. The validation accuracy by the number of hidden units:

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In [140]: runfile('/Users/kiavang/CSCI5521/hw3_programming/hw3.py', wdir='/Users/kiavang/CSCI5521/hw3_programming')
Reloaded modules: MyMLP, visualization
Validation accuracy for 4 hidden units is 0.869
Validation accuracy for 8 hidden units is 0.876
Validation accuracy for 12 hidden units is 0.877
Validation accuracy for 16 hidden units is 0.883
Validation accuracy for 20 hidden units is 0.899
Validation accuracy for 24 hidden units is 0.904
Test accuracy with 24 hidden units is 0.884
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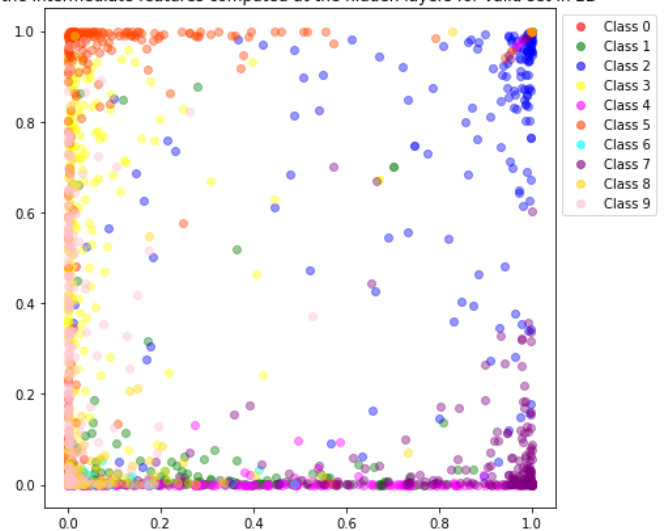
For this trial, the number of hidden units that we should use is 24. It has a test accuracy of 0.884.

B. Training with 2 hidden units + Visualization plots for Train, Valid, and Test sets:

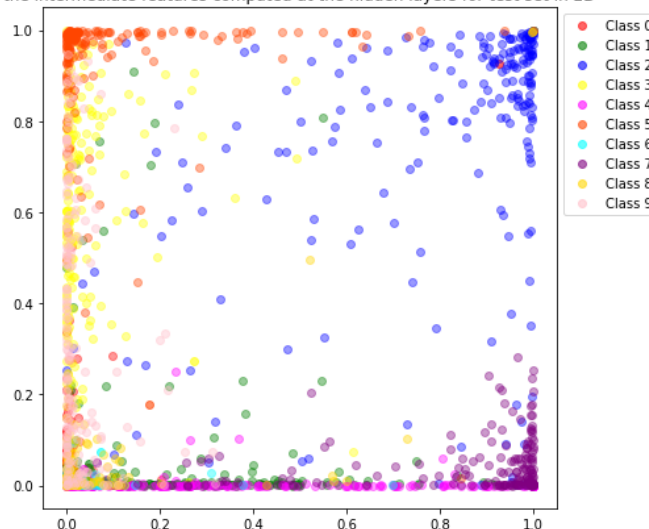
the intermediate features computed at the hidden layers for train set in 2D



the intermediate features computed at the hidden layers for valid set in 2D

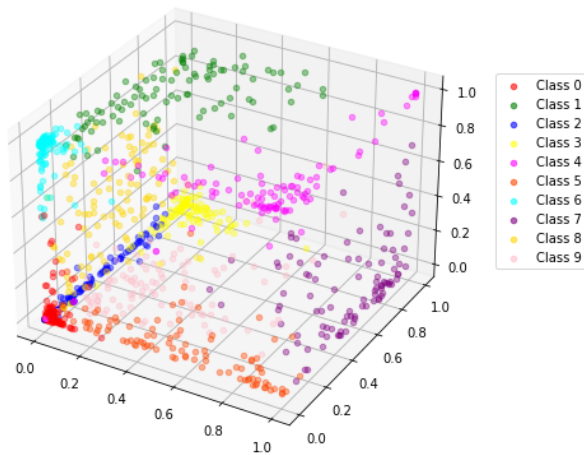


the intermediate features computed at the hidden layers for test set in 2D

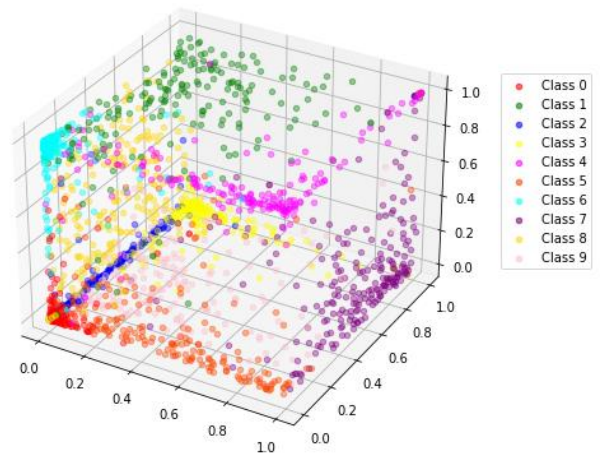


C. Training with 3 hidden units + Visualization plots for Train, Valid, and Test sets:

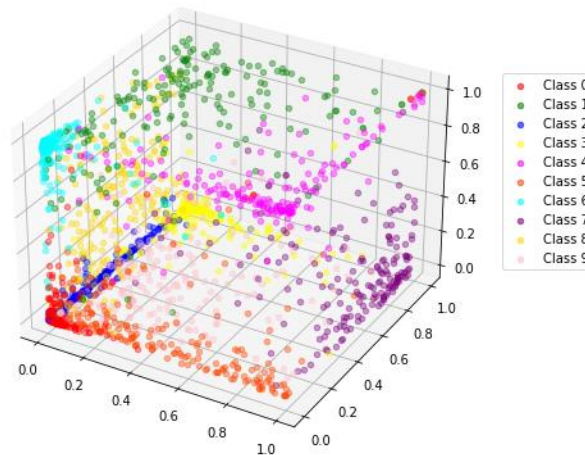
the intermediate features computed at the hidden layers for train set in 3D



the intermediate features computed at the hidden layers for valid set in 3D



the intermediate features computed at the hidden layers for test set in 3D



Comparing the visualization of 2 hidden units to 3 hidden units, the 3 hidden unit plots in 3D provide a better and more accurate representation of the extracted intermediate features overall. In the 2D plots, it's hard to distinguish the orange-red (Class 5), red (Class 0), yellow (Class 3), gold (Class 8) apart. Their features are stacked on top of each other on side of the graph. By adding a third hidden unit, the classes' features are more distinguishable from each other in the 3D plots.