Software Assignment 3

Kazi Ashraf Moinuddin

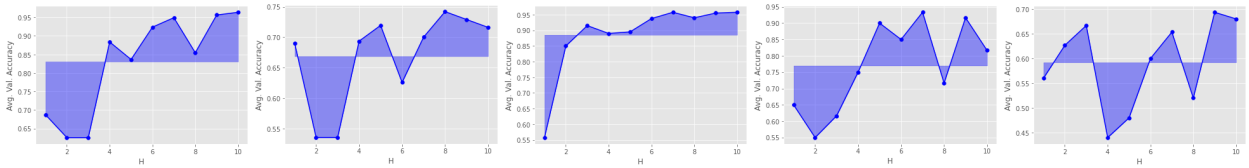
October 13, 2020

1 Results from Bi-Class Classification using NN

The result of hyper-parameter tuning of a single layer network using variable number of hidden units are illustrated in table 1. The learning rate and number of epochs is constant during the tuning ($lr = 0.001, epochs = 150$), so the only parameter tuned here is the number of units in the hidden layer. The tuning is automated and the training utilizes the GPU (GTX - 1080). Figure 1 shows the cross-validation accuracy for each datasets using different H and figure 2 shows the confusion matrices using the best H for individual datasets.

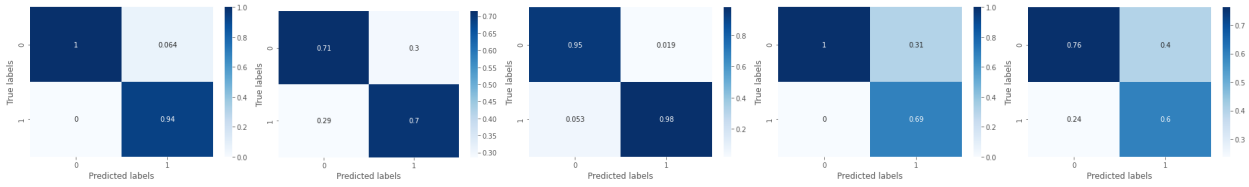
	Dataset	Best H	Val. acc	Test acc
1	Breast Cancer	10	96.3	96.0
2	Diabetes	8	74.2	71.0
3	Digit	7	95.7	96.0
4	Iris	7	93.3	70.0
5	Wine	9	69.3	69.0

Table 1: Results from hyperparameter optimization



(a) Breast Cancer (b) Diabetes (c) Digit (d) Iris (e) Wine

Figure 1: Avg. Cross Val Accuracy using different H



(a) Breast Cancer (b) Diabetes (c) Digit (d) Iris (e) Wine

Figure 2: Confusion Matrix for each Dataset using best H

2 Results from Multi-Class Classification using NN

I also automated the tuning process here. The learning rate and epochs are also constant here ($lr = 0.0001, epochs = 1000$), so the only parameters tuned here are H1 and H2 (number of units in the consecutive hidden layers). The hyperparameter tuning result suggest $H1 = 50\, and\, H2 = 10$ are the best number of units for the hidden layers respectively. Figure 4 shows the avg. cross val accuracy for differnt $H \in (H1, H2)$, figure 4 and table 2 shows the confusion matrix and classification report respectively using the best model.

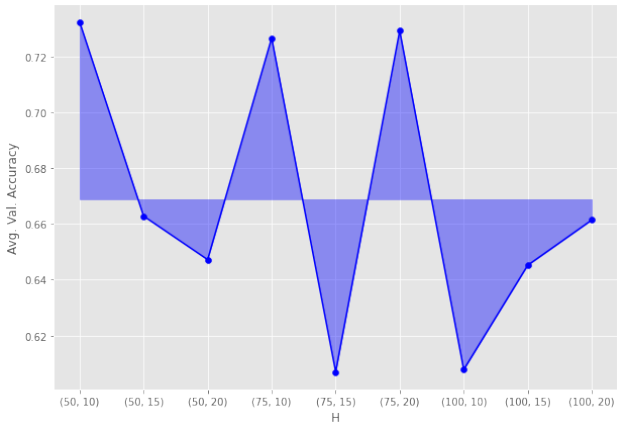


Figure 3: Avg Cross Val. Accuracy during hyperparameter tuning

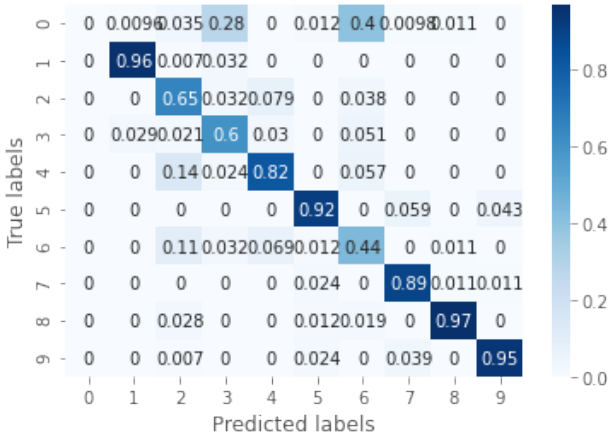


Figure 4: Confusion Matrix for the best model

	Precision	Recall	F1	Accuracy
macro avg	0.72	0.77	0.74	0.76
weighted avg	0.71	0.76	0.73	0.76

Table 2: Classification report of Multi-Class Modeling