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NetID(s): leihaoc2
Team name on Kaggle leaderboard: leihaoc2

For each of the sections below, your reported test accuracy should approximately match the accuracy reported on Kaggle.

Perceptron

Briefly describe the hyperparameter settings you tried. In particular, you should list the different values for learning rate and number of epochs you tried. You should also mention whether adding a learning rate decay helped and how you implemented this decay. Report the optimal hyperparameter setting you found in the table below. Report your training, validation, and testing accuracy with your optimal hyperparameter setting.

I used a search grid to tune the hyperparameter for both dataset:
lr = [.5, .05]
n_epochs = [10, 20]
decay_factor = [1, .5].
The decay is implemented: after each epoch, learning rate is multiplied with a constant decay factor.
Yes, adding this decay helped.

MUSHROOM DATASET

Optimal hyperparameters:	lr = 0.5 n_epochs = 10 lr decay by a factor of 0.5 for each epoch
Training accuracy:	95.527288%
Validation accuracy:	94.769231%
Test accuracy:	95.200000%

CIFAR DATASET

Optimal hyperparameters:	lr = 0.05 n_epochs = 20 lr decay by a factor of 0.5 for each epoch
Training accuracy:	40.797500%

Validation accuracy:	28.920000%
Test accuracy:	29.709999%

SVM

Describe the hyperparameter tuning you tried for learning rate, number of epochs, and regularization constant. Report the optimal hyperparameter setting you found in the table below. Also report your training, validation, and testing accuracy with your optimal hyperparameter setting.

I used a search grid to tune the hyperparameter for both dataset:
lr = [.5, .05, .005]
n_epochs = [10, 20]
batch_size = [100, 200]
reg_const = [.05, .025]

MUSHROOM DATASET

Optimal hyperparameters:	lr = 0.3 n_epochs = 10 reg_const = 0.05 batch_size = 100
Training accuracy:	89.208043 %
Validation accuracy:	88.984615 %
Test accuracy:	87.876923 %

CIFAR DATASET

Optimal hyperparameters:	lr = 0.5 n_epochs = 10 reg_const = 0.025 batch_size = 100
Training accuracy:	36.190000 %
Validation accuracy:	33.420000 %
Test accuracy:	33.790000 %

Softmax

Once again, describe the hyperparameter tuning you tried for learning rate, number of epochs, and regularization constant. Report the optimal hyperparameter setting you found in the table below. Also report your training, validation, and testing accuracy with your optimal hyperparameter setting.

I used a search grid to tune the hyperparameter for both dataset:
lr = [.5, .25]
n_epochs = [5, 7, 10]
batch_size = [100, 200]
reg_const = [.05, .03]

MUSHROOM DATASET

Optimal hyperparameters:	lr = 0.25 n_epochs = 7 reg_const = 0.03 batch_size = 100
Training accuracy:	91.280263 %
Validation accuracy:	90.215385 %
Test accuracy:	90.523077 %

CIFAR DATASET

Optimal hyperparameters:	lr = 0.3 n_epochs = 10 reg_const = 0.05 batch_size = 100
Training accuracy:	36.730000 %
Validation accuracy:	32.990000 %
Test accuracy:	32.880000 %

Logistic

Once again, describe the hyperparameter tuning you tried for learning rate, number of epochs, and regularization constant. Report the optimal hyperparameter setting you found in the table below. Also report your training, validation, and testing accuracy with your optimal hyperparameter setting.

I used a search grid to tune the hyperparameter for both dataset:
lr = [.5, .05, .005]
n_epochs = [10, 20]

MUSHROOM DATASET

Optimal hyperparameters:	learning_rate = 0.5 n_epochs = 20
Training accuracy:	92.654904 %
Validation accuracy:	92.000000 %
Test accuracy:	92.553846 %