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Assignment #5 Report

- The dataset you used, its source and characteristics.

Data source:
https://archive.ics.uci.edu/ml/datasets/banknote+authentication

We use the follow as features:
1. variance of Wavelet Transformed image (continuous)
2. skewness of Wavelet Transformed image (continuous)
3. curtosis of Wavelet Transformed image (continuous)
4. entropy of image (continuous)

To predict:
banknote is genuine or forged

- Iterations to Convergence and Relevant evaluation metrics for the dataset

```
hidden_layer_size=100,

activation='relu',

learning_rate='constant'
```

Iterations to Convergence = 195
Training Accuracy = 100%
Test Accuracy = 100%

```
hidden_layer_size=300,

activation='relu',

learning_rate='constant'
```

Iterations to Convergence = 122

Training Accuracy = 100%
Test Accuracy = 100%

```
hidden_layer_size=300,

activation='relu',

learning_rate='adaptive'
```

Iterations to Convergence = 112
Training Accuracy = 100%
Test Accuracy = 100%

- Comparison of performance metrics

For our dataset, it looks like MLP classifier returns a better accuracy than logistic regression with gradient descent.

- Additional Information

- ‘relu’, the rectified linear unit function, returns f(x) = max(0, x).
- ‘constant’ is a constant learning rate given by ‘learning_rate_init’.
- ‘adaptive’ keeps the learning rate constant to ‘learning_rate_init’ as long as training loss keeps decreasing. Each time two consecutive epochs fail to decrease training loss by at least tol, or fail to increase validation score by at least tol if ‘early_stopping’ is on, the current learning rate is divided by 5.