Message Response Predictor Report

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November 10, 2023

1 Custom Linear Predictor Analysis

1.1 Learning Curve

The learning curve for the custom linear predictor indicates a decreasing trend in loss as the number of iterations increases. This behavior suggests that our model is learning from the training data.

1.2 Step Size Comparison

By experimenting with different step sizes, we observed that smaller step sizes result in a gradual decrease in loss, eventually stabilizing at a lower value. Larger step sizes might initially show a rapid decrease but tend to plateau at higher loss values, indicating potential overshooting during optimization.

2 Built-in Linear Predictor Analysis

2.1 Learning Curve

The learning curve for the scikit-learn Linear Regression model shows a stable mean squared error for both training and testing sets. This implies that the model performs consistently across different numbers of training examples.

2.2 Peak and Stability

In particular, the mean squared error for the testing set reaches a peak value and then stabilizes at 0. This indicates that the model generalizes well to unseen data, resulting in a constant and low error.

3 Comparison

3.1 Training Set Performance

Both the custom linear predictor and the scikit-learn Linear Regression model exhibit stable performance on the training set, as seen in their learning curves.

The mean squared error remains consistently low, suggesting a good fit to the training data.

3.2 Testing Set Generalization

The scikit-learn Linear Regression model demonstrates strong generalization to the testing set, with a stable and low mean squared error. The custom linear predictor might show variations in performance based on the chosen step size, with smaller step sizes leading to better generalization.

4 Conclusion

4.1 Model Comparison

The scikit-learn Linear Regression model showcases robust performance, maintaining a low mean squared error on both training and testing sets. Its ability to generalize well to new data is a notable strength.

4.2 Custom Model Insights

The custom linear predictor, while effective in learning from the training data, requires careful consideration of the step size. Smaller step sizes provide more consistent and desirable results, avoiding overshooting during optimization.

4.3 Recommendations

Consider the scikit-learn Linear Regression model for its stability and strong generalization. Fine-tune the custom linear predictor with smaller step sizes for improved performance.

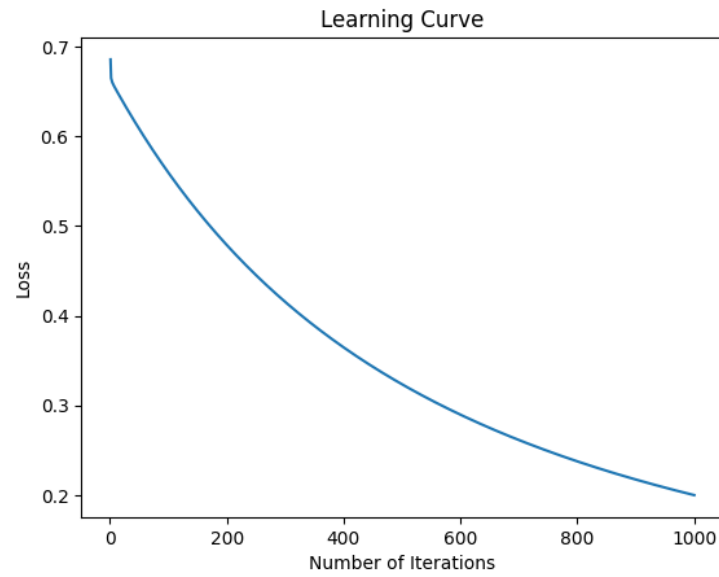# 5 Visualizations

5.1 Graphs
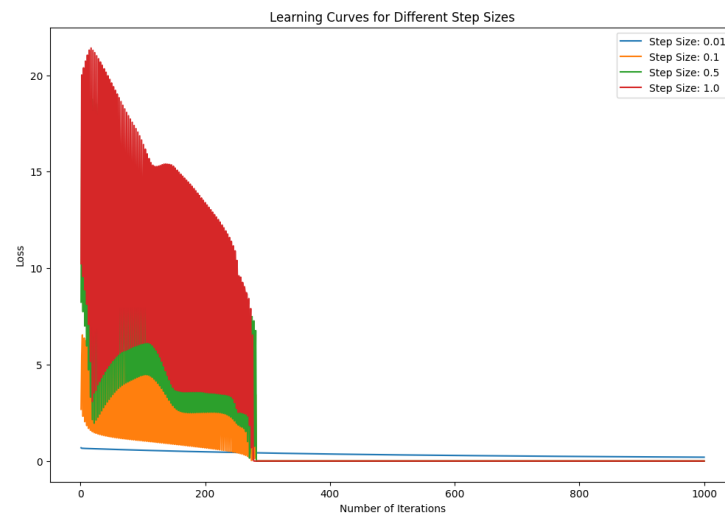
Figure 1: Custom Predictor Learning Curve
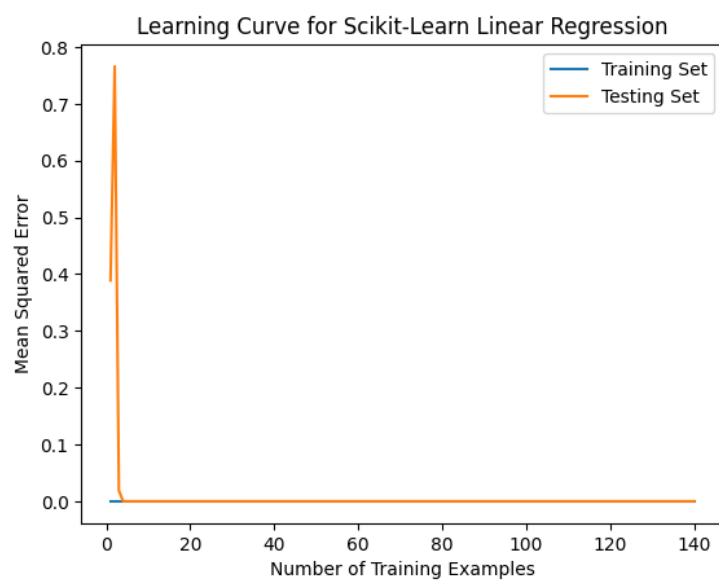

Figure 2: Custom Linear Predictor Learning Curve

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Figure 3: BuiltIn Predictor Learning Curve