

**Lab 5 report**

**Submitted to:**

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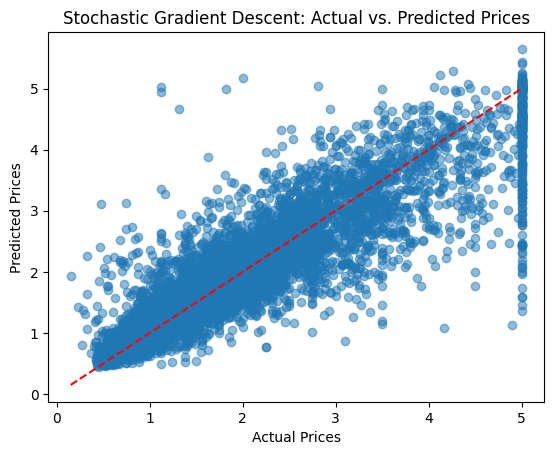
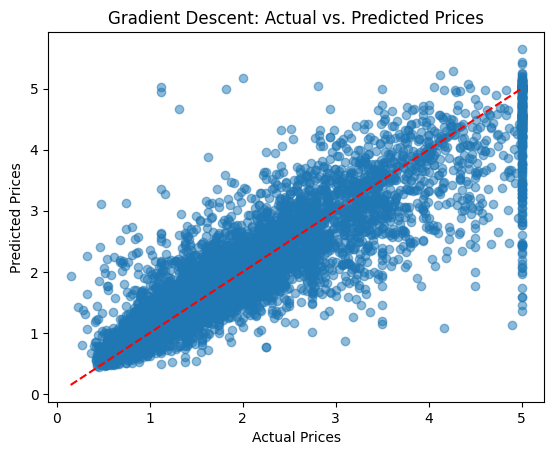
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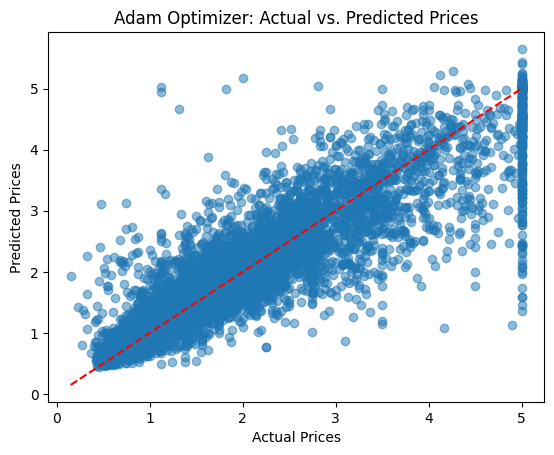
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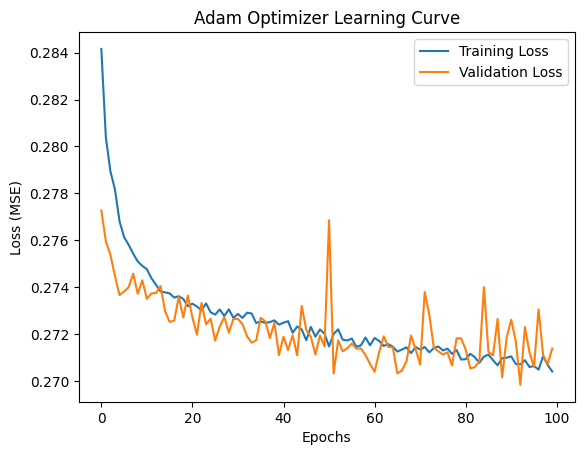
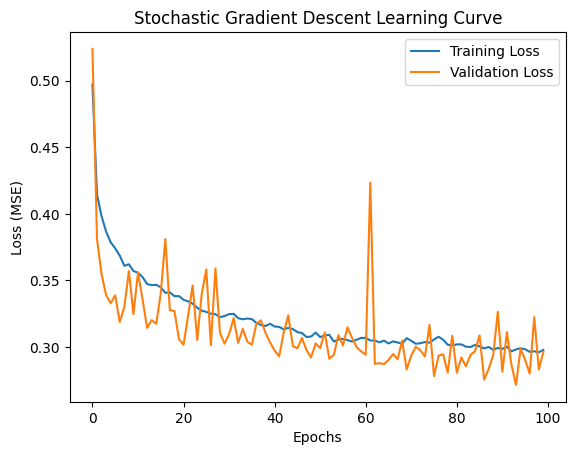
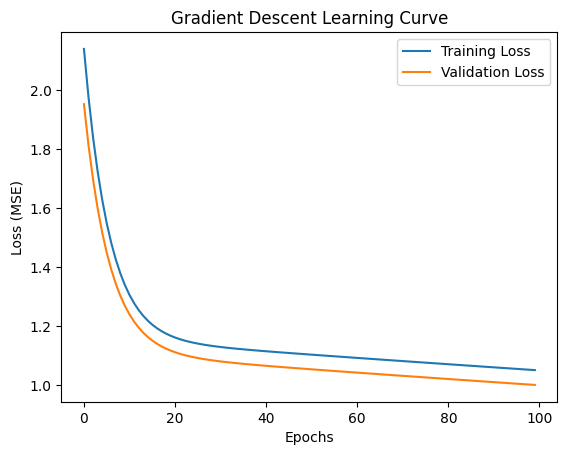
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**Results:**







**Analysis:**

**Actual vs predicted price:**

All the optimizers give same result for this graph. We can see, it gives very accurate result when the price is between low and medium. But as the price goes up, the accuracy starts to deplet. Specially, when the price is highest, it gives less accurate result.

**Loss curve:**

In the loss curve, we can see significant differences.

**Gradient descent:**

Among the three optimizers, this one gives the best curve. We can see a very smooth loss in the data. The validation loss is always lesser than the training loss. And it’s gradually decreasing. The difference between training loss and validation loss starts to increase after around 10 epochs. It’s a pretty smooth transition.

**Stochastic gradient descent:**

This graph shows many noise in the validation loss curve. The training loss curve has some noises too, as it doesn’t have the smoothest loss curve. We can see even though validation curve is decreasing, it has some random spikes, there are cases when these spike causes the validation loss to be greater than training loss. But overall, the loss is decreasing . But it’s kind of expected in Stochastic gradient descent. In SGD, the model updates its weights after every single training example, which introduces randomness into the learning process. Despite the noise and spikes, since the overall trend of both training and validation loss is decreasing, it suggests that the model is still learning effectively.

**Adam:**

This optimizer is also causing a downward loss curve. But This one has the most random training loss curve. Even though it’s decreasing, we can see many randomness in the graph. The validation loss spiky but downward slope, which is most of the time lesser than the training loss upto almost 43 epochs, but then it starts to have huge spikes. Also the curve starts to get higher as it reaches 80 epochs. Which means even though training loss was decreasing, validation loss seems to increas after 80 epochs.This trend indicates that the model is beginning to overfit the training data. This suggests that the model is learning noise or peculiarities of the training set rather than the underlying patterns.