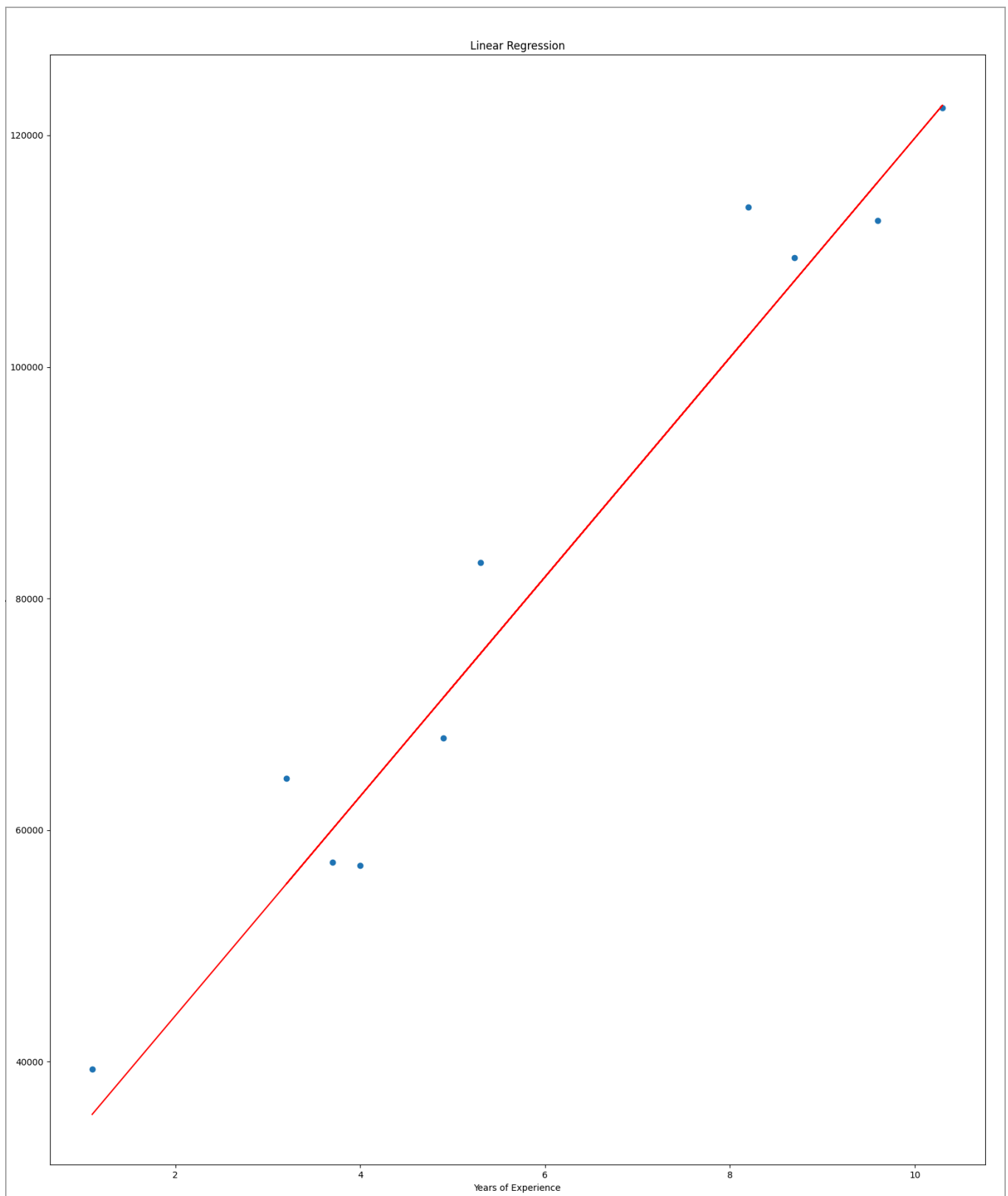


# CS422 Project3 writeup

1. Linear Regression algorithm, works by making a relationship between two variables trying to make a line of best fit between all the points. The algorithm strengths are that it is a very simple algorithm and is fast to train. It is also scalable to larger data sets. It's weaknesses however are that for it to work it assumes the relationship is linear between variables. It's also very sensitive to outliers which can alter the line of best fit drastically. The data also must be independent. Gradient Decent gets also used in neural networks due to minimize the loss functions in the model's .



2. The algorithm works by making a neural network and creating hidden and output layers. It also creates the activation function for the hidden layers with relu. It then the hyperparamters are inputted: hidden layers, learning\_rate and epochs. Then the optimizer algorithm is chosen and the cross entropy loss is used as the loss\_function. Then in a for loop the optimizer loss function, back propagation are applied along with gradient decent. My hyper parameters were 800 hidden layers, a learning rate of 0.0001, epochs of 10 and

using the adam optimizer. After several tries I got an accuracy of 93%. The hidden layers added more layers of the neural net to calculate, the learning rate determines how much should be learned each epoch, and an epoch is each round of training. The Stochastic Gradient Descent (SGD) optimizer works by computing the gradient of the loss function against each parameter and then adjusting parameters accordingly. The Adam optimizer or Adaptive Movement Estimation works by keeping two averages for each parameter. The difference between the two being how they compute off of each parameter. Cross entropy loss is the performance of a classification model that outputs either a 1 or 0. When cross entropy loss increases it means that the predicted diverges from the label. If cross entropy loss decreases that means the predicted converges with the label.

