 **NETW1013: Machine Learning**

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**Assignment Report**

* **Brief:**

This report depicts the techniques used in the assignment retake for model selection and regularization.

* **Implementation:**

Firstly, the data-set is split into 3 sections; 60% for training, 20% for cross validation and 20% for testing. Secondly, the model is tested with up to 4 polynomial degrees. The idea is to compute the cost function and the gradient descent of the training set to be able to tune the theta parameters to tune and reduce the cross validation error. The aim is to choose the polynomial degree that produces the smallest cross validation error to reduce the testing error. Thirdly, the same procedures are repeated with the regularization technique; adding the regularization expression and tune the lambda parameter to try and reduce the cross validation and testing error.

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* **Results:**

The results show that the first degree produced the least cross validation error = 6.8. On the other hand, the 2nd, 3rd and 4th degrees produced cross validation errors in the powers of 10, which shows the big effect the increase in the degrees of polynomials have on the cross validation error and the testing error. Moreover, after applying the regularization effect, it produces the same conclusions that the 1 degree is the optimal degree for this model.