Introduction:

Linear regression is a simple method in machine learning, used to create a fit of a dataset of which it can produce continuous predictions. This is achieved by assuming that we can model the output values as a linear combination of continuous functions of the input values. For example, we can assume that the observed values in our dataset can be approximated by different polynomial degrees of the input values and find the linear coefficients $\beta$ which minimize the difference between our observed and predicted values. This general idea that we can create a model which approximates our observed data with a minimal difference between observed and predicted values is a problem at the very heart of machine learning.

However, in order to create an optimal model, we require optimal parameters which cannot be known a priori. Thus, we require excessive testing and tuning of parameters to inform our decision on model selection.