# Machine Learning: Classifying Tools

## Approaching it as a parameter based classification problem

* Classification Problem: Can classify data into either a tool or a non-tool, typically have multiple attributes defining it e.g. presence of certain words, presence of links
* Strategy to use a training set, based on the particular parameters and plot them on a graph, use probabilities to determine the unknown data.
* Let’s say there are an infinite number of parameters – you can then use support vector machines in order to deal with those
* Minimum Probability given a cost function: Iterate and get the steepest gradient each time until you reach a local minimum (**Gradient Descent)**.
  + We want to find the rate of change of the cost function with respect to W or the weights applied to transform the data to the prediction.
  + Keep going in the direction of the smallest derivative (highest negative value that reduces the value of our cost function) until the cost reaches 0
  + Limitation: This stops at a local minimum and is not able to explore the global minimum
  + Non-Convex Loss Functions: Use stochastic gradient descent
  + # of Weights depend on the number of things that you are taking as parameters \* dataset
  + Question : Sigmoid function?
  + **Binary Class:** Linear Regression with a threshold
  + Planned Proof of Concept : Linear decision boundary -> check accuracy -> move on to non-linear decision boundary
  + Multiple Models based on perceived likelihood. Eg: basic logistic regression classification for things like links => high chance that they would be tools
  + We can implement the model in layers:
    - Classification of Tool vs Link presence (or link number) : probability of something being a tool given a link
    - Probability of a Particular resource being a tool or not given – Can we use SVMs with logistic regression so that we can have more parameters with different weights
  + Basically for logistic regression you apply a function on top of your weights \* measurements so that it takes the form of a sigmoid function