

Prediction of a minimal inhibitory concentration of antibiotic using tensor flow on a Linux computer operating system using amd64 computer architecture

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Abstract

Using Tensorflow to get the values of variables to flow more freely, a neural network uses gradient descent in the form of an optimizer. This recognises a pattern in the input and output data to make a prediction of $y = mx + c = 0$ on the gradient produced by this function. A function can be defined as ‘for a given input there is a given output’. The input is mg / ml of antibiotic and the output is % recovery. If values of the function are plotted on a graph, the gradient of this curve can be used to determine a value of x at $y = 0$. The sigmoid model was used in this example which takes into consideration non-linear, or chaotic behaviour of the data. I have produced three Python high-level computer programming scripts that implement the Tensorflow sigmoid model for a neural network using three different models for cost, or loss during the training of the network. The loss can be seen as a neural network having an given output for an input, and when the output does not match the input, an error or loss value is produced. If the output of an output neuron matches in the input of an input neuron in a neural network the weight or activation of this neuron is increased to strengthen the connectivity of the neurons to facilitate the detection of a pattern. The three different models for loss used are maximum likelihood estimation (MLE), sigmoid cross entropy, and mean squared error (MSE). All three models gave a comparable result of -7.5mg / ml of antibiotic as a minimal inhibitory concentration of antibiotic. I have inferred that the value is negative because it depends on a previous dose of antibiotic of 7.5 mg. The conclusion I have made is that the therapeutic value of antibiotic depends on there previous use, possibly for a number of reasons such as a reservoir of bacteria or a persistent plasmid conferring plasmid mediated immunity.

Biography:

David Ronald Smith has completed Bsc in microbiology at Bristol university in 1983. His final year thesis was with Dr. Ian Chopra, now a D.Sc. The thesis was entitled “The differential inhibitory effects of Tetracycline on protein synthesis in Escherichia Coli” and involved doing enzyme assays at different doses of Tetracycline. After dispatch riding for a year in Bristol, he attempted a masters degree in Information Technology at Aston university in Birmingham during 1984 - ‘85 where he was granted deferred examinations by a board of examiners on the grounds that he had concussion during my finals. Another contributory factor was also that during this time at Aston uni I was also diagnosed as having schizophrenia.

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