Weekly Updates Report

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Introduction

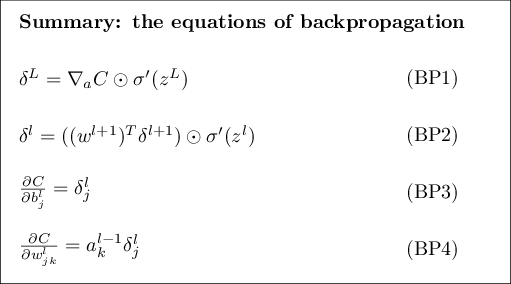
Neural Networks

Artificial Neural Networks are computing systems that are meant to simulate the working of a human brain. With the help of experience and data, a neural network improves itself using artificial neurons. ANN consist of elementary units called as neurons which takes one or more inputs and produces an output. At each node, the following computations are carried out.

A neural network comprises of input, hidden and output layers. A layer is a group of parallel neurons without any interaction between them. Neurons in the input layer are connected to the layer of hidden units, which are then connected to neurons in the output layer.

Gradient descent based back propagation technique is used to tune the weights and the bias to improve the accuracy of the model.

Backpropagation and Gradient Descent

Backpropagation is the algorithm in supervised learning of neural networks for backward propagation of errors. After every feed-forward epoch, the calculation of the gradient is done in a reverse manner, where weights of the final layer are calculated and used for subsequent calculations for the layers moving backwards. This enables efficient calculation of gradient, and optimisation of weights and biases.

The equations used in the backpropagation algorithm for gradient and

and loss computations is listed -

Week 1

Comparison of Neural Network Implementation of a 10 input AND Gate using MATLAB and Keras API

1. AND Gates

Logic gates are the basic building blocks of any digital system. It is an electronic circuit having one or more than one input and only one output. The relationship between the input and the output is based on a certain logic.

|  |  |  |
| --- | --- | --- |
| A | B | Output |
| 1 | 1 | 1 |
| 1 | 0 | 0 |
| 0 | 1 | 0 |
| 0 | 0 | 0 |

A high output results only if all the inputs to the AND gate are high. If none or not all inputs to the AND gate are high, low output results. Basic truth table –

Because the Boolean expression for the logic AND function is defined as (.), which is a binary operation, AND gates can be cascaded together to form any number of individual inputs.

1. Dataset
2. Model Parameters and Training Configuration
3. Computations and Results
4. Conclusion