ABSTRACT

The object of the project is to study the use of Artificial Neural Networks (ANN) to perform predictions of one of Earth's rotation parameters, UT1 and to extend the possibility to use those networks to predict the introduction of Leap Second.

Artificial Neural Networks – ANNs

Like the human brain, the ANN learns by training and can perform tasks such as function approximation, pattern recognition or prediction of future events. Fig. 1 shows a typical example.

INTRODUCTION

AANN

The input vector, p of dimensions R, is multiplied by the weight matrix, W. This matrix is randomly generated by the toolbox every time a new network is created. Inside the ANN, the activated weighted input that is selected by the bias, b, forms the net input, n. (1)

\[ n = W x + b \]

This net input is then passed through the transfer function, f, which will transform the network's output. The most common and the one used for this project is the tangent sigmoid function.

Training the Neural Network

Cycling training, the values of weight and bias are changed to increase the network's performance. When a certain performance function – mean squared error (MSE) between output and targets.