Artificial Neural Networks

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Introduction

The human brain is one of the most powerful tools on Earth and has given us the power to do so much from being aware, to carrying out calculations, to creating new things. It is what gives us consciousness and what allows us to experience and understand the outside world. So, if the human brain is so powerful and great, why not build a computer that works like one? This is where the idea of an Artificial Neural Network has come from.

Main Body

An Artificial Neural Network (ANN) is a collection of many hundreds or thousands of small, simple processors which are highly interconnected and can work together to process information and solve problems. [1] This is an approach to computer software which is much different from the conventional computers and is inspired by the way biological nervous systems work and in particular, the way in which the brain works.

Despite ANNs having a tiny amount of neurons compared to the biological human brain which has around one-hundred billion of them [2], both work in similar ways. In Artificial Neural Networks a complicated piece of data can be broken down into many small, simple pieces of data which can each be processed separately before they are joined at the end as output information. Neural networks can be trained to work in different situations and once trained are very powerful in working with complex and incomplete data. They work differently to the conventional computer in the following way: a conventional computer must be told in a programming language exactly how to solve a problem using algorithms whereas once trained an ANN can solve a specific type of problem without having to be told how to work it out. An ANN learns from its training and puts what it has learned into action when faced with a new problem.

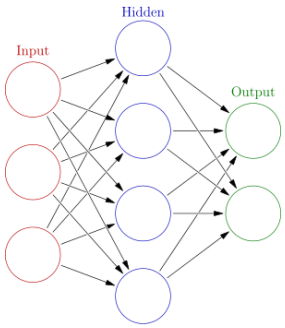

Figure 1 – A visual representation.

Figure 1 shows a simple version of an Artificial Neural Network where the circles are artificial neurons and the lines are the connections between them. They are highly interconnected and there are 3 layers, an input layer, which takes all the inputs, a hidden layer which deals with the processing, and an output layer which gives the final answer to the user.

Summary

To summarise, the human brain is extremely powerful. Artificial Neural Networks are an approach to computing which tries to model the human brain and biological brains in general. They work in a very similar way to the biological brain and are very effective when processing highly complex data. They are a huge study area in Artificial Intelligence and who knows how powerful they could eventually become.

References

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2. Phillips, H (2006) *Introduction: The Human Brain* [online] Available from http://www.newscientist.com/topic/brain [Accessed 23rd September 2014].