BRAINCHILD: A FAULT TOLERANT NEURAL NETWORK

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Abstract

Brainchild is a neural network designed to bridge the gap between current neural models and the brain. It models the physical organization of neurons by using both feed-forward and lateral connections. It also has a high depree of fault tolerance in keeping with neural connections. A series of tests were run on both Brainchild and a Hopfield model network to compare fault tolerance. Both hard and soft faults were used, as well as combinations of the two. Brainchild proved to be the more fault tolerant of the two.

ERROR CORRECTING NETWORK

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Abstract

For many applications a simple neural network model with a high storage capacity would be sufficient. There have been networks proposed that are easy to implement, but have a low storage capacity. There are other networks that have high capacities, but are more tedious to implement. We propose a network that uses the simplest learning rules but exhibit a high storage capacity. This increase in storage capacity is achieved by introducing error correction on the output of traditional low capacity networks. Experimental error corrected recall indicated the Error Correcting Network had the ability to recall very nearly all of the available information produced by a simple Hopfield-type network long after the Hopfield-type network had failed to recall any association by itself.

TEMPORAL ASSOCIATIVE MEMORIES USING CASCADE & RING ARCHITECTURES

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Abstract

Three methods to store temporal associative patterns, which are ordered vectors, are presented. The first one is to use a single Bidirectional Associative Memories (BAM), the second one is to use a Cascade Bidirectional Associative Memories (CBAM) and the third one is to use a Ring Unidirectional Associative Memories (RUAM). Their performances are compared by simulations which use words of four letters as the temporal associative data. These words can be recalled after one letter is input. Finally, the application of the RUAM to store autoassociative data is also discussed.

RECALL IN SATURATED ASSOCIATIVE NEURAL NETWORKS

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Abstract

An associative neural network was enhanced to provide both primary and secondary associative relationships on recall. Input patterns, which were conceptually related, established extra relationships in the modified associative network. Not only did this network recall the original associated pattern when presented with a given input, but it could identify the conceptually related input patterns. The output was separated into two groups. The primary output was the expected pattern associated with the input during training. The secondary output consisted of the patterns associated with other inputs. This secondary information was limited to output patterns which were conceptually related to the training input.