Content-addressable Search Engine

FIT5139 task3

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# Identification

Hierarchical Graph Neuron (HGN) network is a fast-distributed associative memory technique which is suitable for distributed searching for images and other multi-media on the internet. HGN is an improvement of graph neuron which implement real-time storage and pattern recall (Nasution & Khan, 2008). Associative memory (AM) can generate a structure which wouldn’t be dependent on the accuracy of preprocessing.

As an improvement of graph neuron, HGN is consisted of multiple GNs. It could be some or even thousands of GNs in one HGN to recognize maybe hundreds of patterns. Even each pattern could be independent, it’s still not possible to use parallel in each GN. Even one GPU contains thousands of cores but it still not as remarkable in sequential calculation as CPU. The problem in CPU is its limited cores. One CPU can only have several cores, for example 8 in general. Thus, it will be good to parallel the HGN by dimension.

A higher dimensional HGN architecture will reduce the number of GNs efficiently in a certain pattern model. For example, the pattern number is 105. In 1-D model, there will be 105+103+…+3+1=1809 in number of GN. In 2-D model, the GN number decreases into 279 and in 3-D model, it only need 105 GNs. Thus, the model will be more efficient in high dimension model. Each dimension is separated in processing; thus, it will be good to put each dimension into each processor. And then, each processing will work as a smaller HGN model and do the sequential process with a not very complexity algorithm. Also, without parallel, HGN communication will waste a lot of time because the communication of input value pair sending is sequential work. Parallel of communication will reduce the time. Each processor can translate their massage separately and translate with other processors only when it is necessary.

# Reference

NasutionB.Benny, & KhanI.Asad. (2008年february月). A Hierarchical Graph Neuron Scheme. IEEE TRANSACTIONS ON NEURAL NETWORKS,, 页 212-218.

# Flow Chart of parallel HGN

