

GPU PARALLELIZATION OF FUZZY MIN-MAX CLUSTERING NEURAL NETWORK FOR PATTERN RECOGNITION

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ABSTRACT

Clustering is data mining technique, of grouping unlabelled data by identifying underlying structure in it. Traditional clustering algorithms like K-means requires the number of clusters to be formed as an input, and it is time-consuming iterative process. Therefore, there is a need for new adaptive clustering algorithms, with less time complexity. In this paper we propose two new things, one is to modify existing overlap and contraction of hyper boxes in unsupervised Fuzzy Min-Max clustering neural network and another is to accelerate its execution on modern GPUs using CUDA. The modifications to original FMN we call it as MFMN, found superior to FMN in terms of detection of overlap and contraction process. We also proposed GPU parallel implementation of MFMN using CUDA and obtained 21 and 6 times speedup, for training and testing, respectively and 95% gain in time for training phase. Thus, we recommend MFMN and its GPU parallelization for clustering larger data sets.

KEYWORDS: Fuzzy Logic, Artificial Neural Network, Clustering, Fuzzy Min-Max Neural Network, GPU