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NEURON OPTIMIZATION FOR COGNITIVE COMPUTING PROCESS AUGMENTATION

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ABSTRACT

The management process is aimed to optimise the process to increase the efficiency according to the applications. The operational management techniques are generally used for the process optimization and find the maximum level with minimum efforts. The maximization process is used various process in computing process. The maximization and load balancing approach is cognitive process. Cognitive process is involved in the neuron activation and execution of human behaviour.

The combination of neuroscience, Supercomputing and nano technology are involved in the cognitive computing. But the design architecture involved the computational approach to increase the speed of computing while neurons are communicated one with another at a instance. The activation process based on the selection of neuron which are expected to activate in the instance of time. This work attempted to increase neuron activation process through cluster techniques to identify similar process neuron from the Magnetic Resonance Imaging (MRI) analysis. The cluster algorithm and generated frequency along with the obtained results are discussed as part of this paper.

KEYWORDS: Neuron Activation Management, Cognitive Computing, Neuron Processing, Clustering, MRI Analysis

INTRODUCTION

Management techniques are aimed to minimise the effort and increase the speed of the process for various applications. The managerial processes are used business industry, educational sector, automobile, sales and services and computational management. The management process and the functionalities are viewed in the operational research techniques to maximize the process. The current computing techniques are adopted for the clinical result optimisation and enhancement of computing. The medical and computing research are attempted to make a human process through device in the cognitive computing.

Cognitive computing is a combination of neuroscience[1,6] , supercomputing and nanotechnology integrated application to execute human interface process[3]. The three major innovative fields are has the com mon properties that has he complexity on execution. As per the discussion of Dharmendra S. Modha[3] Cognitive computing focused to develop a coherent, unified, universal mechanism inspired by the mind's capabilities.

Rather than assemble a collection of piecemeal solutions, whereby different cognitive processes are each constructed via independent solutions. The combinational process are obtained the analytical process of assigning the optimised weight and fine tune the same .The brain analysis , computational process and manufacturing the nano devices are involve in the implementation of cognitive computing .In the cognitive computing process neuron process is playing vital role.

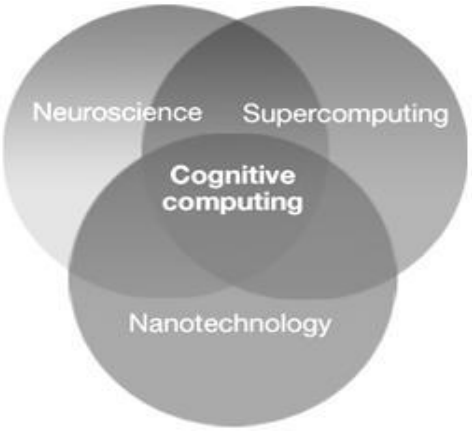

Figure 1: Cognitive Computing

As part of Systems of Neuromorphic Adaptive Plastic Scalable Electronics (SyNAPSE) project IBM is combining principles from nanoscience, neuroscience and supercomputing as part of a multi-year cognitive computing initiative.[2,4]. The cognitive computational process has many complex computation however the brain mapping and its signal processing etc. Artificial Intelligent system is branch of cognitive science, takes a system-level approach to synthesizing mind-like computers. The human minds and the neuron are working in a immeasurable speed. In the cognitive process , neuron process inter processed one with another and the thoughts are generated.

SCOPE AND OBJECTIVES

This paper is attempted identify the neuron action process to increase the neuron communication speed between the neurons to increase the cognitive performance. The neurons are identified using clustering techniques through the analysis of MRI. The neuron connectivity activation are processed in the cognitive computing.

METHODOLOGY

The density based clustering approach for the mapping neuron communication to enhance the cognitive performance is attempted using the following procedure

Step 1: Fetch the MRI image

Step 2: Convert the fetched image into the nrrd file format

Step 3: Convert and represent the images into cubical data set

Step 4: Adopt the liner data set and compute the density of the variation

Step 5: Generate the density based clusters using equal interval algorithm

Step 6: Grouping the neuron group according to the density

The equal interval algorithm procure is given below

Procedure for Equal Interval Method

- Collect the pre processed MRI with the process able Image.
- Convert the multilayer integrated image into the Digital vales.
- Convert the cubical values into two dimensional array (Number of Pixel ,5) Each row represents (X,Y,R,G,B) values

- Collect the number of classification(NC) aimed to process
- Determine the minimum (Min) and maximum(Max) value form the Digital vales
- Determine the difference dx = Max – Min
- The Range R = dx / NC
- Fix the starting pixel value and End pixel vales for each classification based on the range values
- Process all row values and verify the rage . According to the individual and combinational range vales construct the classification data and sub image.
- Repeat the step 9 until all the classification to be processed

ROLE OF NEURON IN COGNITIVE COMPUTING

The biological cell into a structure capable of receiving and integrating input, making a decision based on that input, and signaling other cells depending on the outcome of that decision is a remarkable feat of evolution.[7].The mapping of neuro cell and the functions to be mapped for the cognitive computing process. This paper is attempted to evaluate the exiting brain neuron process structure and attempted to increase the speed of communication among the neuron to obtain the high speed performance using classification techniques.

The classification process is based on the density signal approach according to the brain atlas. The brain atlas the MRI image analysis is considered for the mapping process.

SOURCE OF THE DATA

A MRI converted nrrd image is captured from the slicer public database. The data set is presented in the nrrd format and its is converted into the cubical data format using matlab. The converted cubical data set presented into 512x512x139 representation. The each layer could presentable in a two dimensional format. The three dimensional axies points of the data are fetched and the changes between the 139 pixels are computed and graph is generated.

MAGNETIC RESONANCE IMAGING (MRI) INTO CUBICAL DATABASE

Magnetic resonance imaging (MRI) is one among the familiar and famous three-dimensional viewing of the brain and structures, precise spatial relationships. the image resolution is somewhat limited. Stained sections, on the other hand, offer excellent resolution and the ability to see individual nuclei (cell stain) or fiber tracts (myelin stain), however, there are often spatial distortions inherent in the staining process.

For this work, nrrd file is fetched from slicer 3d download data base. Nrrd is a library and file format designed to support scientific visualization and image processing involving N-dimensional raster data. Nrrd stands for "nearly raw raster data".

The network path way analysis is made by Modha, et.al., identified the movement and the distance of the neuron via analysing the MRI three dimensional coordinated image. The similar approach made to attain the signal communication analysis to increase the speed of the neuron process.

The images which is fected at the time of MRI scanning is processed using matlab and converted to the two dimensional image and converted into the corresponding digital values.

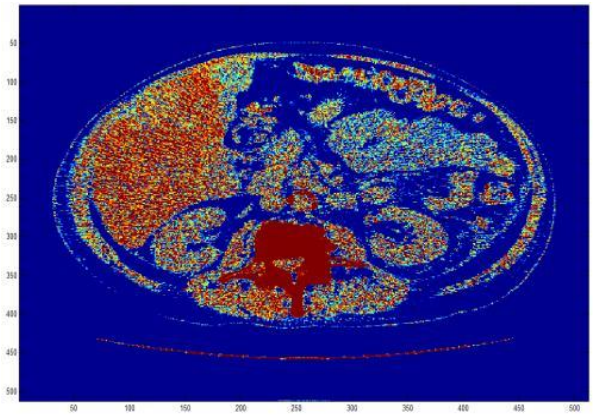

Figure 2: Converted MRI

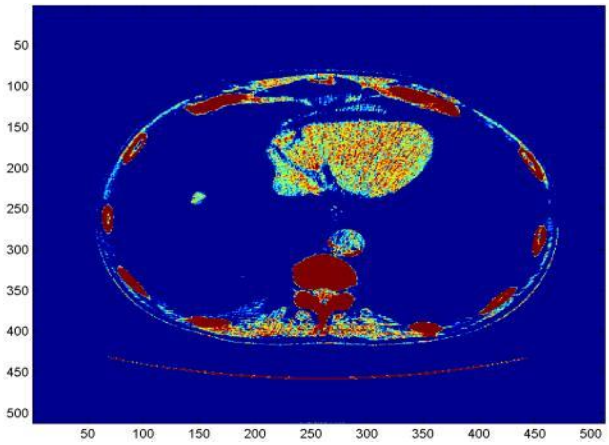

Figure 3: MRI Layer Image

The image is sequenced into 1: 139 based on the nature of the MRI file. The files corresponding digital values are converted and presented to compute the frequency of the changes.

GENERATION OF FREQUENCY

The frequency generation is a process of change of sequence of neuron process. The digital values which observed over MRI is represents the reflection of change of neuron values on the process. If the values are constant and the values are does not change. It shows that the neurons are ideal. If the values are change from one value to another the neurons are process. The below images shows the active neuron and inactive neuron

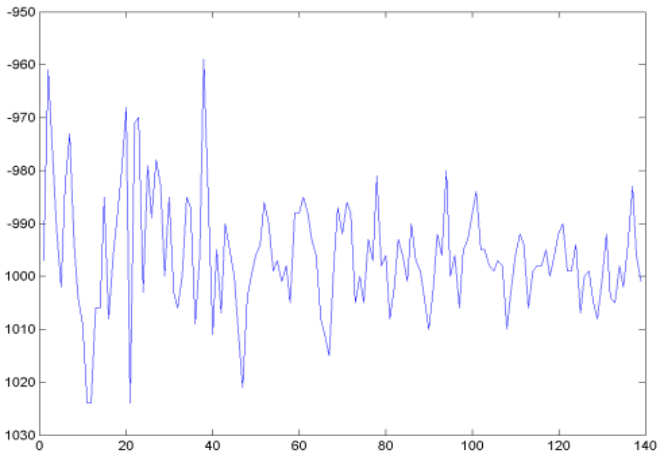

Figure 4: Active Neuron Frequency

Active Neuron: The values of the neuron are activated and changed at the observation

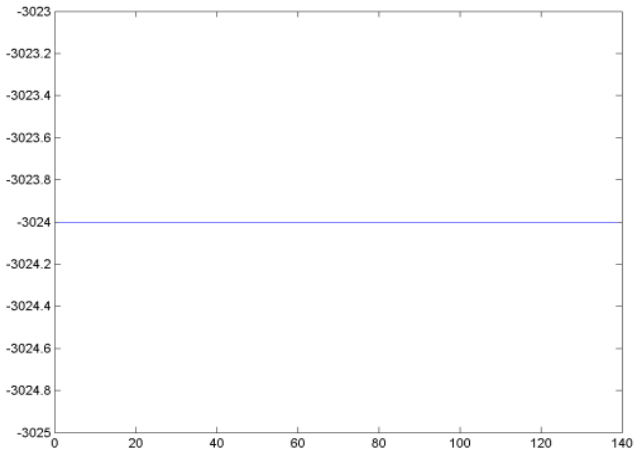

Figure 5: Non Active Neuron Frequency

In Active Neuron: The values of the neuron are non-activated and constant at the observation as per the frequency of the neuron the neurons are grouped and clustered.

TYPES OF FREQUENCY PROCESS

The neuron processes are observed at the time of MRI is observed and converted as sequence of frequency images. The major two patters are active and inactive neurons. In frequency process generated for 262144 frequency images. From that according to the frequency accordance the similar neuron are clustered in 8,16,32,64 and 128. While we are cluster into 8 the neuron sets are grouped as follows

Table 1: Eight Cluster Neuron Count

Cluster No	1	2	3	4	5	6	7	8
Neuron Count	0	0	0	0	72425	80057	51037	2853

The first 4 are not clustered. The elements are not active. The remaining are clustered and the corresponding cluster images below

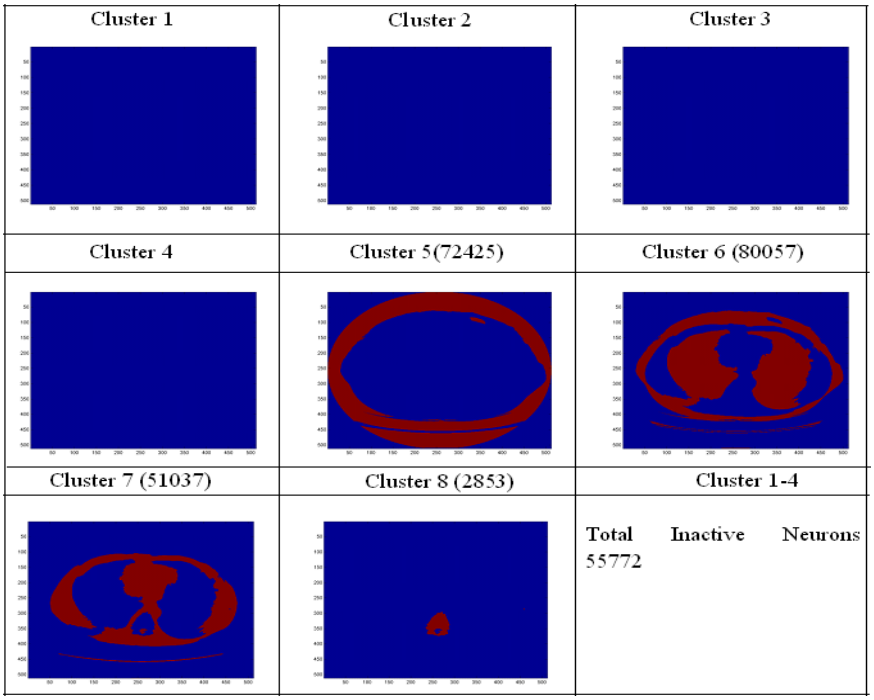

Figure 6: Cluster Images for 8 Clusters

Similarly the neurons are clustered into 32 and the following results are obtained

Table 2: 32 Cluster Neuron Count

Cluster No	1	2	3	4	5	6	7	8
Active Neuron	0	0	0	0	0	0	0	0
Cluster no	9	10	11	12	13	14	15	16
Active Neuron	0	0	0	0	0	0	0	0
Cluster no	17	18	19	20	21	22	23	24
Active Neuron	0	0	22447	32258	11198	11987	9077	20442
Cluster no	25	26	27	28	29	30	31	32
Active Neuron	27423	20155	17723	12809	7464	1632	1301	56

As per the observation of 32 clustering the non active neurons are 55772 and active neurons are 206372. The first 1-18 clusters are inactive. The remaining 19 to 32 are active clustering. The minim neuron cluster are 56 and the maximum of 32258. The obtained active neuron cluster images are.

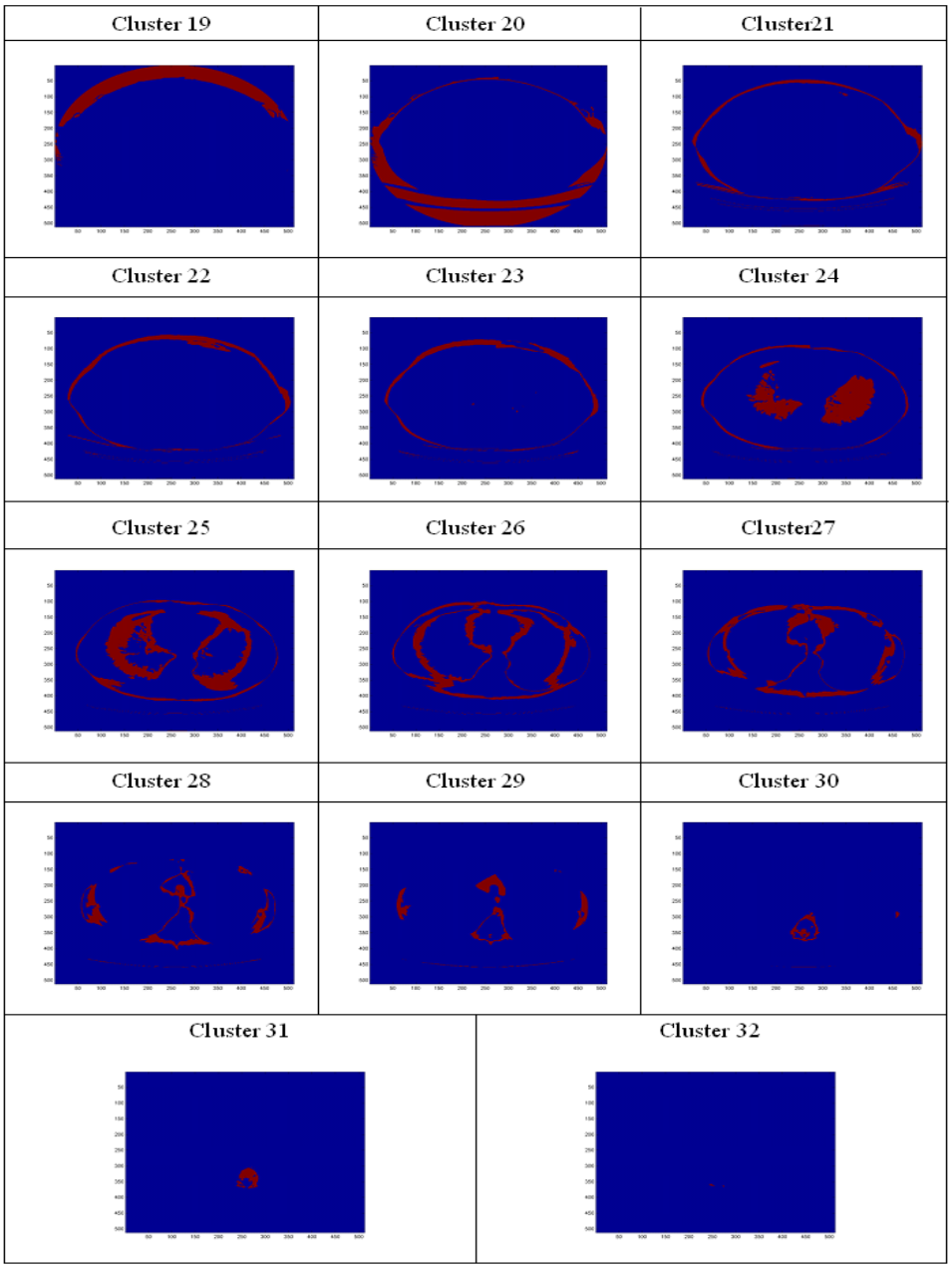

Figure 7: Cluster Images for 32 Clusters

While clustering into the high level of clustering the communication neuron are reduced. Comparison of Communication strength of Neuron

Table 3: Comparison of Active Neurons

Cluster	Non Active Cluster	Active Cluster	Min	Max	Average	Active Neuron	Non Active Neuron
8	4	4	2853	216372	82549	204372	58225
16	9	7	1671	60542	29482	204372	58225
32	18	14	156	30258	14741	204372	58225
64	38	26	168	32188	7937	204372	58225
128	77	51	37	20343	4046	204372	58225

When the number of cluster are increased the neuron are communicated quickly with the clusters. When numbers of neurons in the cluster are less the communication speed is increased.

CONCLUSIONS

The neuron activation depends on the number of cluster, the active neuron are minimised when number clusters are more. The activation process are depends on the selection of neurons and the connectivity of layer one to next layer. The MRI cluster analysis of the communication of neuron which model for cognitive computing process will increase the speed. While number of neurons are decreased and the communication process speed is increased this will aid to design the nano device with high speed process in cognitive computing.

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