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RESEARCH ARTICLE

# Utilizing WM and GM for Finding Intelligence of Human Behavior

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***Abstract— The behavior economics play a prominent role for human decision making. Human behavior on the other hand depends on functioning of the brain behavior. So behavior economics is a factor for decision making. By using behavioral discipline, economists' can understand how people make decisions as individuals and for policymakers as a whole. Gray matter represents information processing centers in the brain, and white matter represents the networking of – or connections between – these processing centers. The purpose of this paper is to explore and integrate Gray Matter (GM) and White Matter (WM) of the brain for economic decision making.***

***Key Terms: - Behavior Economics; GM; WM and Brain Economics***

## I. INTRODUCTION

Thus manual segmentation of WM and GM are very time consuming as well as fatigue. Here a method segmentation of WM and GM has been proposed with considering complexity and error rate.

Researchers who study the functions of the cortex divide it into three functional categories of regions, or areas. One consists of the primary sensory areas, which receive signals from the sensory nerves and tracts by way of relay nuclei in the thalamus. Primary sensory areas include the visual area of the occipital lobe, the auditory area in parts of the temporal lobe and insular cortex, and the somatosensory area in the parietal lobe.

Proposed methods divide into two stages pre-processing and post-processing. In pre-processing an effective binarization, artifact and skull removal are used due to artifacts and skull may hamper the automated detection, and in the post-processing actual detection of WM and GM has been proposed. It is our assumption that current view in decision-making research is that multiple sub-processes are at work in the brain when we are making decisions.

## II. REVIEW

There are different White matters (WM) and Gray matter (GM) extraction procedure had been established in the past decay but research of accurate segmentation and detection till going on, but those methodology have certain restriction also for fully automated system. Vicente Grau et. al. (2003) [1] proposed a methods for accurate segmentation of GM, WM, cerebrospinal fluid (CSF) from the MRI of brain images, they proposed an improvement of watershed methods and functions are based on probability calculation, normal distributions and Markov Random Field. The results show an accurate detection of the overall volumes and a clear development in recognition of the accurate location. P. Valsasina [2]et. al.(2005) examine the progression of gray matter volume loss in 117 patients with relapsing–remitting MS, scanned monthly for a 9-month period. They studied and show that gray matter damage in relapsing–remitting Multiple Sclerosis (MS) progress noticeably over a short period of examination, follow up the stability, and discover the different possibility of WM. P. Kochunov [3] et. al. (2006) has considerable attention in with diffusion tensor imaging as measure of fiber integrity in aging, dementia, and other disease processes.

Human behavior thus requires a fluid interaction between controlled and automatic processes, and between cognitive and affective systems. However, many behaviors that emerge from this interplay are routinely and falsely interpreted as being the product of cognitive deliberation alone (George Wolford, Michael Miller and Michael Gazzaniga 2000). These results (some of which are described below) suggest that introspective accounts of the basis for choice should be taken with a grain of salt. Because automatic processes are designed to keep behavior "off-line" and below consciousness, we have far more introspective access to controlled than to automatic processes. Since we see only the top of the automatic iceberg, we naturally tend to exaggerate the importance of control.

The resulting data is understandable in which correlations are mediated by age-dependent atrophy and also persist in the presence of age correction of various complementary imaging techniques in the assessment of brain aging. Lucia van Eimeren (2008) [4] gives a description of white matter microstructure for the children. Individual differences in the performance in the Numerical Operation, but not the Mathematics Reasoning test correlate most strongly. Betty M et al. (2011) [5] proposed the procedure of gray matter volume, different tissue and edge connectivity of different tissue by the graph theory and the results describes with different situation. They show the results in intracortical similarities that can be used to provide a robust statistical description of individual gray matter morphology. An artefact removal methodology briefly described by S Roy et.al. (2013) [6] which statistical and geometric approach. M. Masroor Ahmed [7] et. al. proposed a methods to detect brain tumor, they use WM and GM extraction as a preprocessing steps, and shows all the steps for WM and GM extraction with the combines Perona and Malik anisotropic diffusion model for image enhancement and K-means clustering methodology and due to unsupervised learning it is very efficient and low error sensitive, also claim that unsupervised methods are better than that of supervised methods due to supervised methods needs some preprocessing.

## III. ALGORITHM FOR WHITE MATTER AND GRAY MATTER EXTRACTION

### 3.1 Procedure

```
Begin
Step 1:  Input a gray scale image P (x, y); x and y being coordinates of the image.
Step 2:  B = PTATBIN(Image I);
        /* compute the binarized image*/
Step 3:  FOR i = 0 to x DO
           FOR i = 0 to y DO
                IF B(i,j) =1 THEN
                        set B(i,j) ← 0
                ELSE
                        set B(i,j) ← 1
                END IF
            END FOR
  END FOR
        /* Complement of the image has been done */
Step4: Compute two dimensional wavelet decomposition is done using 'db1' wavelet up to level two.
        /* this step has been done using [c1,s1] = wavedec2(B,2,'db1') matlab function */
Step5: Re-composition of the image is done using the approximate coefficient of previous step.
        /* this step has been done using RC = appcoef2 (c1, s1,'db1', 2) */
Step6:  FOR i = 0 to x DO
           FOR i = 0 to y DO
                IF RC(i,j) =1 THEN
                        set RC(i,j) ← 0
                ELSE
                        set RC(i,j) ← 1
                END IF
            END FOR
END FOR

Step9: A quick hull algorithms for convex hull is applied.
```

```
Step10: GRAYIMAGE1 = I* BConvex

Step11:  BIN2=STATBIN(GRAYIMAGE1);
Step12: GRAYIMAGE2 = BIN2*GRAYIMAGE1
     /* pixel wise multiplication has been done */
Step13: set sum ← 0 and set count ← 0
Step14: FOR i=0 to x DO
         FOR j=0 to y DO
             IF GRAYIMAGE2(i,j) > 0        THEN
                    intensity ← GRAYIMAGE2(i,j)
                    sum ←sum + intensity
                    count ←count+1
             ENDIF
          ENDFOR
ENDFOR
Step15:  average ← sum/count
Step16:  white←zeros(a111,b111)
/* set all pixel of the white matrix zero */
Step17:  gray←zeros(a111,b111)
/* set all pixel of the gray matrix zero */
Step18:  FOR i=0 to x    DO
           FOR j= to y DO
              IF i6(i,j)>0       THEN
                         IF GRAYIMAGE2(i,j) >average
                             white(i,j)←1
                          ELSE
                              gray(i,j)←1
                          END IF
              END IF
           END FOR
END FOR
Step19:   white= GRAYIMAGE2*white;
Step20:   gray= GRAYIMAGE2*gray;
End
```

**3.2 Procedure STATBIN(Image I)**

```
/* procedure for binarize image*/
Step1:  INIT =zeros(a,b);
Step2:   threshold =std2(I);
     /* threshold selection by standard deviation of the image intesity */
Step3:   FOR I = 0  to  x          DO
         FOR j = 0   to Y              DO
           IF I(i,j)>threshold      THEN
               Set INIT(i,j)←1
           END IF
            END FOR
          END FOR
Step 4: RETURN (image INIT)
```

Result obtained in figure 1

*Figure 1 First two (female brain) more intelligence than the third (male) are the white matter extraction by proposed methods*

For neuroeconomists, knowing more about functional specialization, and how regions collaborate in different tasks, could substitute familiar distinctions between categories of economic behavior (sometimes established arbitrarily by suggestions which become modeling conventions) with new ones grounded in neural detail. For example, the insula activity noted by Sanfey et al. in bargaining is also present when subjects choose between gambles with ambiguous odds of winning, relative to "risky" gambles with known odds (Ming Hsu and Camerer, 2004). This suggests a surprising link between an emotional (disgust?) reaction to being treated unfairly and a discomfort (fear of the economic unknown) reaction to ambiguity in choices. The evidence for this link is tentative, but it shows how direct understanding of neural circuitry can conceivably redraw conventional boundaries in economic theory, and inspire theorizing and the search for new data.

## IV. CONCLUSIONS

Here an intelligence system for gray matter and white matter extraction with without artifact and skull region technique has been presented. The proposed methods are very useful for three different (Transvers, Sagittal, Coronal) type of image. The automated process has very low time complexity with very easy methodology. The results improve and overcome the problem of other existing methodologies. The proposed methodology has been also very useful for a pre-processing step for detecting any abnormalities of MRI of brain.

## REFERENCES

[1] Vicente Grau, Ron Kikinis, Mariano Alcaniz and Simon K. Wareld, "Cortical gray matter segmentation using an improved watershed transform", Surgical Planning Laboratory, Brigham and Women's Hospital, Harvard Medical School, 2003.

[2] P. Valsasina, B. Benedetti, M. Rovaris, M.P. Sormani, G. Comi, M. Filippi, "Evidence for progressive gray matter loss in patients with relapsing remitting MS", NEUROLOGY, 1126–1128, June 16, 2005.

[3] P. Kochunov,P.M. Thompson,J.L. Lancaster, G. Bartzokis, S. Smith,T. Coyle, R. Royall, A. Laird,and P.T. Foxa, "Relationship between white matter fractional anisotropy and other indices of cerebral health in normal aging: Tract-based spatial statistics study of aging", Elsevier, neuroimage,2006.

[4] Lucia van Eimeren, Sumit N.Niogi, Bruce D. McCandliss, Ian D. Holloway and Daniel Ansari, "White matter microstructures underlying mathematical abilities in children" , Cognitive Neuroscience Andneuropsychology , Vol 19, No 11 ,July ,2008

[5] Betty M. Tijms, Peggy Serie, David J. Willshaw2 and Stephen M. Lawrie "Similarity-Based Extraction of Individual Networks from Gray Matter MRI Scans", Cerebral Cortex Advance Access published September, 21, 2011.

[6] S Roy, K Chatterjee, I K Maitra, S K Bandyopadhyay, "Artefact Removal from MRI of Brain Image", International Refereed Journal of Engineering and Science (IRJES),Volume 2, Issue 3(March 2013), PP.24-30.

[7] M. Masroor Ahmed, Dzulkifli Bin Mohammad, "Segmentation of Brain MR Images for Tumor Extraction by Combining Kmeans Clustering and Perona-Malik Anisotropic Diffusion Model", International Journal of Image Processing, Volume (2) : Issue(1) .

[8] S Roy, A Dey, K Chatterjee, Prof. S K Bandyopadhyay, "An Efficient Binarization Method for MRI of Brain Image", Signal & Image Processing : An International Journal (SIPIJ) Vol.3, No.6,pp. 35-51 December, 2012.

[9] http://www.bic.mni.mcgill.ca/brainweb

[10] Sudipta Roy and Prof. Samir K. Bandyopadhyay "Detection and Quantification of Brain Tumor from MRI of Brain and it's Symmetric Analysis" International Journal of Information and Communication Technology Research(IJICTR), pp. 477-483,Volume 2, Number 6, June 2012.

 