Multiple Sclerosis Lesion Segmentation in MRI Images

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Abstract

The abstract paragraph should be indented 1/2 inch (3 picas) on both left and right-hand margins. Use 10 point type, with a vertical spacing of 11 points. The word **Abstract** must be centered, bold, and in point size 12. Two line spaces precede the abstract. The abstract must be limited to one paragraph.

1 Introduction

What is MS? Why it is an interesting problem? Problem definition and motivation. What are the challenges?

1.1 Related Work

Segmentation of Lesions in MRI images is an active area of research. The 3 main objectives 1) Extracting features that can differentiate healthy tissues from scar tissues. 2) Selecting the most relevant features that help achieve the task 3) Improving the performance of the classification.

1.1.1 Review of Segmentation Methods

Here we talk about what methods have been used so far. The features and the classifier used should be discussed. Basically a literature survey. We could just use Review paper that Dana sent us earlier.

1.1.2 Exploring Combinations

What is it that we intend to do, i.e., compare performance of different classifiers and features.

2 Feature Detection

What is feature extraction? Why is it important? Reasons for using the particular features

2.1 Context (Haar-Like Features)

2.2 Image Filters

2.2.1 Leung-Malik Filter Bank

2.3 Entropy & Gaussian based Features)

2.4 Atlas Features

All the features need to explained briefly with good images.

3 Classifiers

Reasons for using each classification method. Brief description about them. No need for images here I guess.

3.1 Support Vector Machines

3.2 Neural Networks

3.3 k-Nearest Neighbours

3.4 Random Forests

3.5 Markov Random Fields

3.6 Logistic Regression

4 Experiment Design

Pipeline Diagram is required here

4.1 Validation Measures

False Positive, false negative, etc. Why Dice is preferred?

4.1.1 Dice Score

4.1.2 Accuracy

4.1.3 Sensitivity

4.1.4 Detections

4.2 Training and Test Data

BrainWeb and Miccai Challenge Data. Explain how sampling is done on data to train the classifier.

5 Results

Lots of Images! Table with comparative results. Explanation for why we get these results.

5.1 State of the art results

Brief description of the benchmark

5.2 Discussion

Detailed analysis of the results we get from different results

6 Conclusion

7 Acknowledgements

8 References

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[2] Bower, J.M. & Beeman, D. (1995) *The Book of GENESIS: Exploring Realistic Neural Models with the GEneral NEural SImulation System.* New York: TELOS/Springer-Verlag.

[3] Hasselmo, M.E., Schnell, E. & Barkai, E. (1995) Dynamics of learning and recall at excitatory recurrent synapses and cholinergic modulation in rat hippocampal region CA3. *Journal of Neuroscience* **15**(7):5249-5262.