CIBM Center for Biomedical Imaging

Bridging Structural MRI with Cognitive Function for Individual Level Classification of Early Psychosis via Deep Learning

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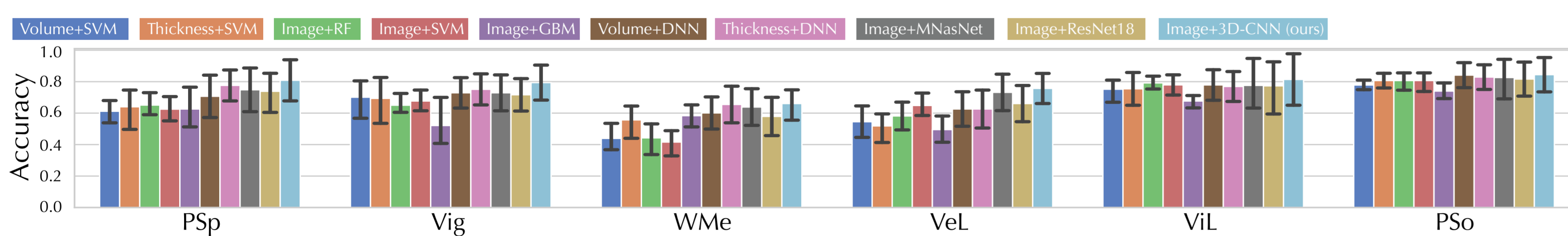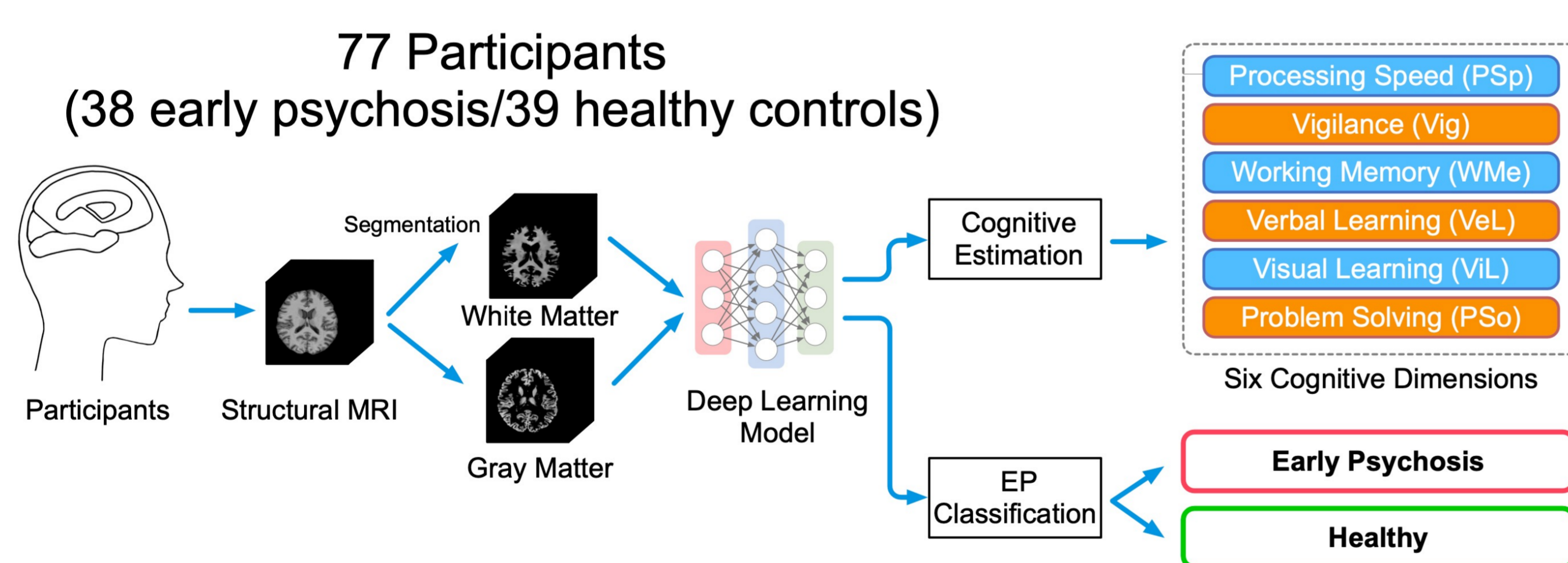[4]Center for Biomedical Imaging, EPFL, Switzerland
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BACKGROUND

Recent efforts have been made to apply machine learning and deep learning approaches to the automated classification of schizophrenia using structural magnetic resonance imaging (sMRI) at the individual level. However, these approaches are less accurate on early psychosis (EP) since there are mild structural brain changes at early stage.

METHODS

- Unlike previous studies, we used sMRI as the direct input to perform EP classifications and cognitive estimations.
- The proposed model does not require time-consuming volumetric or surface-based analysis and can provide additionally cognition predictions.

AIMS

As cognitive impairments is one main feature in psychosis, in this study we apply a multi-task deep learning framework using sMRI with inclusion of cognitive assessment to facilitate the classification EP patients from healthy individuals.

RESULTS

- Extensive experiments were conducted on a sMRI data set with a total of 77 subjects (38 EP patients and 39 healthy controls), and we achieved $74.9 \pm 4.3\%$ five-fold cross-validated accuracy and an area under the curve of $71.1 \pm 4.1\%$ on EP classification with the inclusion of cognitive estimations.

CONCLUSION

By introducing cognitive estimation as a subtask, deep learning model is able to estimate the cognitive state of an individual and improve the classification performance of early psychosis by an appreciable margin.

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