

Predicting intelligence based on cortical WM/GM contrast, cortical thickness and volumetry

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INTRODUCTION

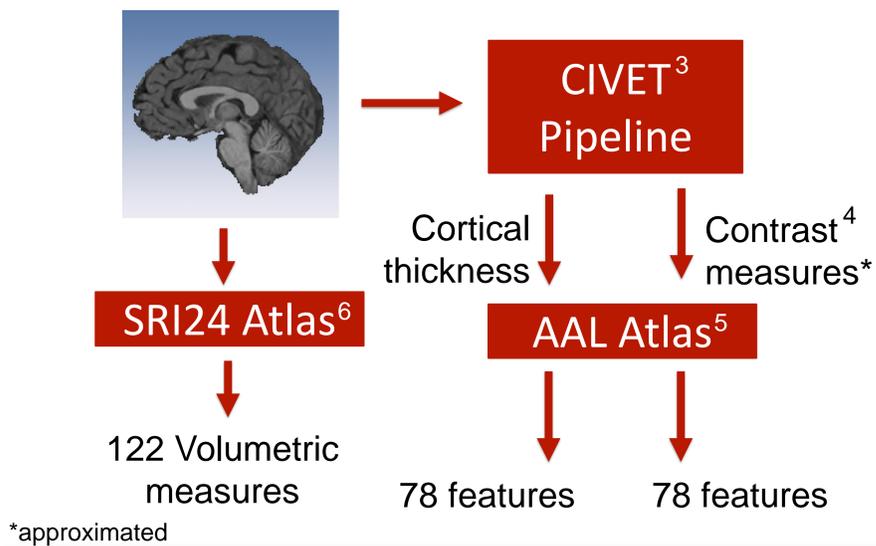
- Goal

Predicting fluid intelligence¹ for the ABCD data with demographic confounding factors removed.

- Material²

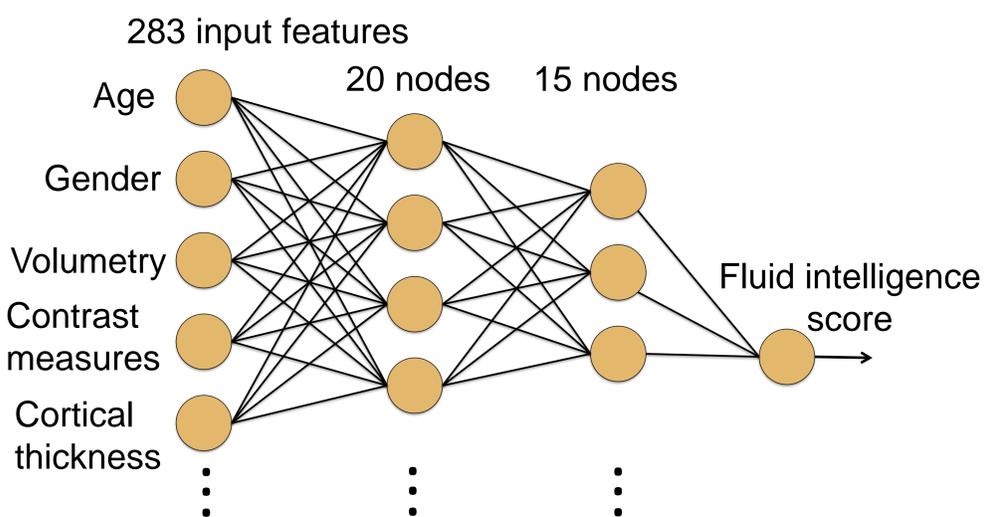
- 8553 subjects from the ABCD data set
- Children between 9-10 years old
- T1-weighted images
- Volumetric measures
- Age, gender, scanner
- Fluid intelligence scores

- Image pre-processing



APPROACH

Fully-connected Neural Network



Acknowledgements

This project is co-funded by Horizon 2020 Framework Programme of the European Union (Marie Skłodowska Curie grant agreement No 740264)

References

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4. Lewis, J. D. et al. "T1 white/gray contrast as a predictor of chronological age, and an index of cognitive performance". Neuroimage (2018) 173, 341-350.
5. Tzourio-Mazoyer, N. et al. "Automated Anatomical Labeling of Activations in SPM Using a Macroscopic Anatomical Parcellation of the MNI MRI Single-Subject Brain". NeuroImage (2002), 15, 273-289
6. Rohlfing, T. et al. "The sri24 multichannel atlas of normal adult human brain structure". Human brain mapping (2010), 31 (5), 798-819.
7. Ritchie, S. J. et al. "Beyond a bigger brain: Multivariable structural brain imaging and intelligence". Intelligence (2015), 51, 47-56.

EXPERIMENTS

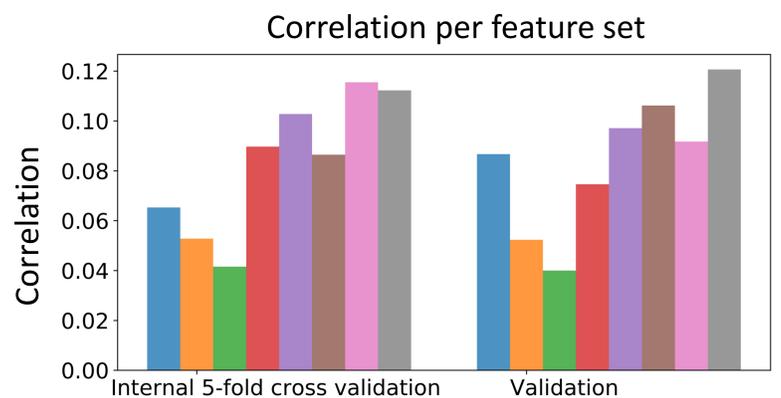
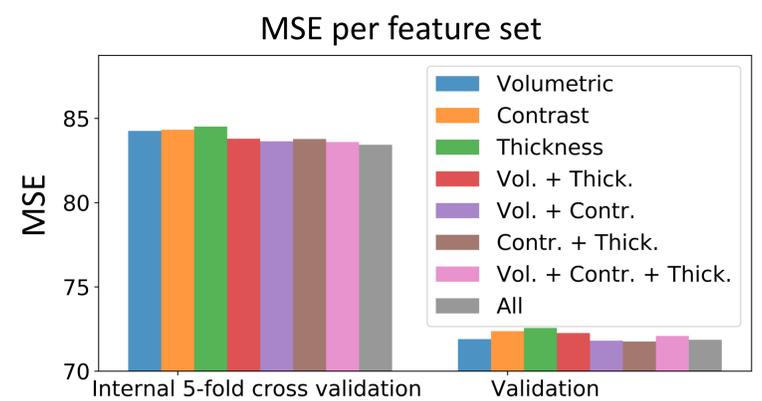
1. Five-fold cross validation

Data set: Training set (3736 subjects)

2. Testing on the validation set

Training on Training set (3736 subjects)

Testing on Validation set (415 subjects)



3. Submission

Training set (3736 subjects)

Validation set (415 subjects)

Test set (4383 subjects)

MSE

94.0270

CONCLUSIONS

MRI-derived features were **insufficient** to predict fluid intelligence residuals after confounds were removed with a linear regression model.

Our conclusions are in line with other participants' results and in conflict with what has been reported in the literature, e.g. Ritchie et al (2015).



arXiv:1909.05660