

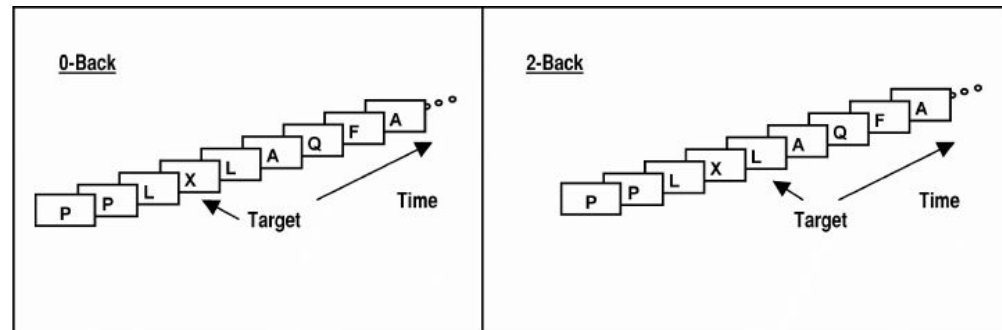
Decoding working memory: a predictive model of memory loads in the n-back task

Leptoceratops_Shoulder

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Working memory

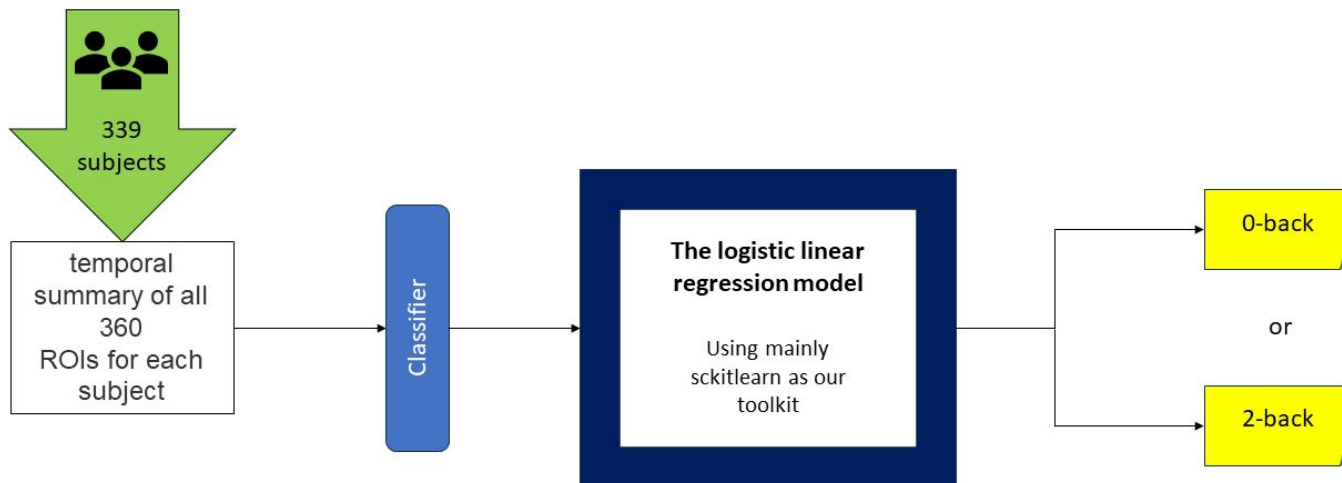
- A cognitive function that is essential for carrying out daily tasks
- Store and processing of information
- Limited capacity, relies on multiple brain regions
- Assessment: N-back task
- Memory load increase -> regional brain activity respond



Goal

Is it possible to reveal the WM load by using signals from brain regions?

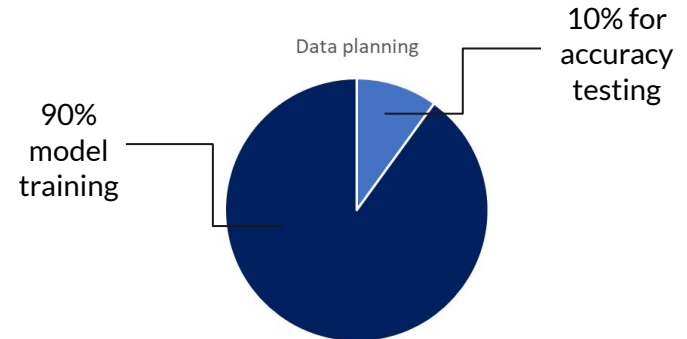
Investigate the possibility of using a logistic regression model to classify the load type of the N-back task based on the activity level derived from 360 brain regions



Methods and approach

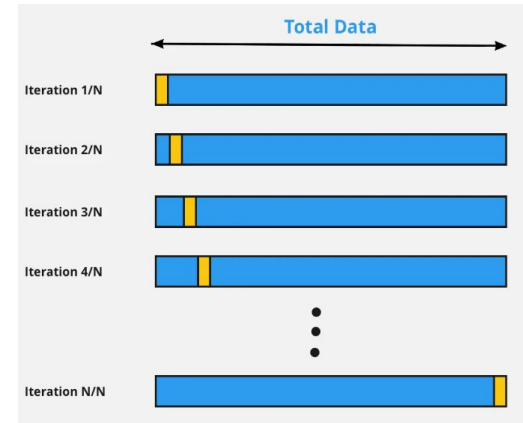
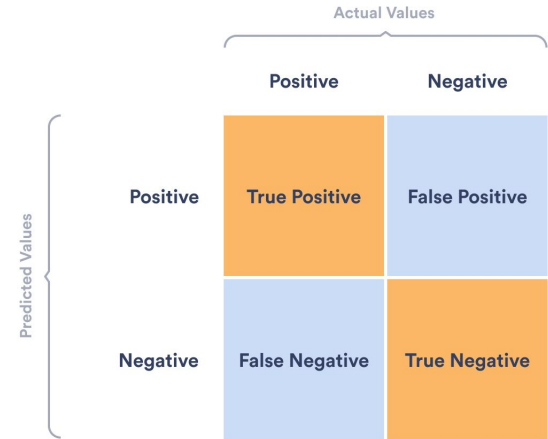
- 1) **HCP dataset** (0 back vs 2 back, four stimulus types: faces, body, tools, places) was used to retrieve the data for working memory task of 360 parcel of 339 subjects, then the data extraction was structured as the following:
- 2) data were split into 10% to be used for testing the accuracy and the other 90% were split into train and and test

X	Y
maximum value of ROIs activity for each parcel in a subject	0-back or 2-back label (indicated as 0 for 0-back and 1 for the 2-back)

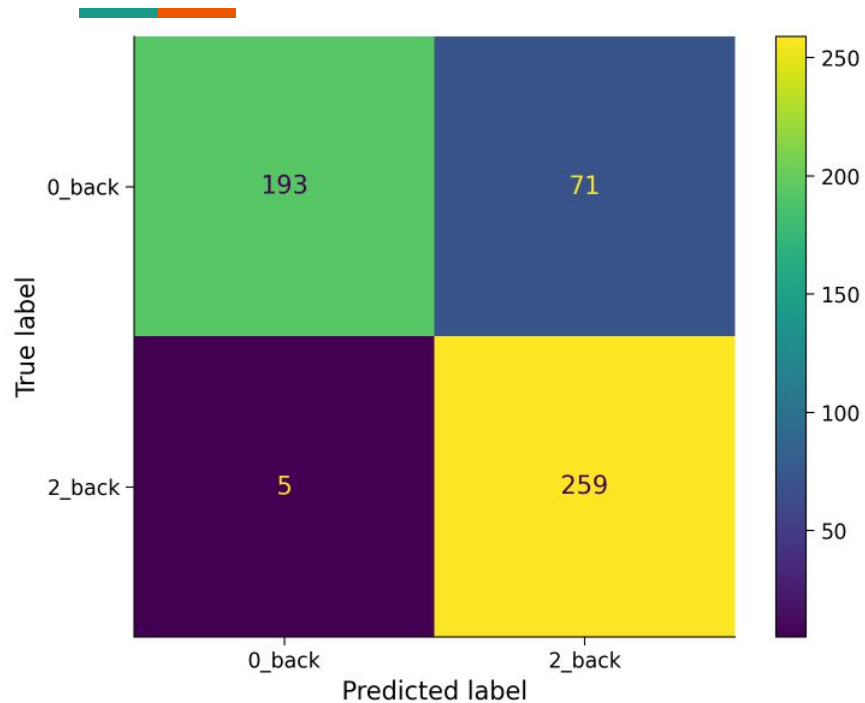


Methods and approach

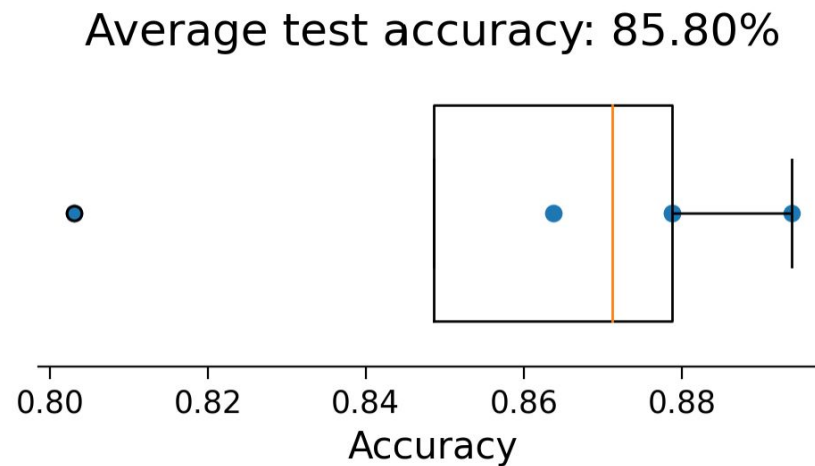
- 3) Logistic regression was used to fit our data and predict labels then confusion matrix and classification report was performed to elevate the performance of the model
- 4) cross validation was performed to test prediction power and screen for problems such as overfitting



Results



Confusion matrix for all the conditions

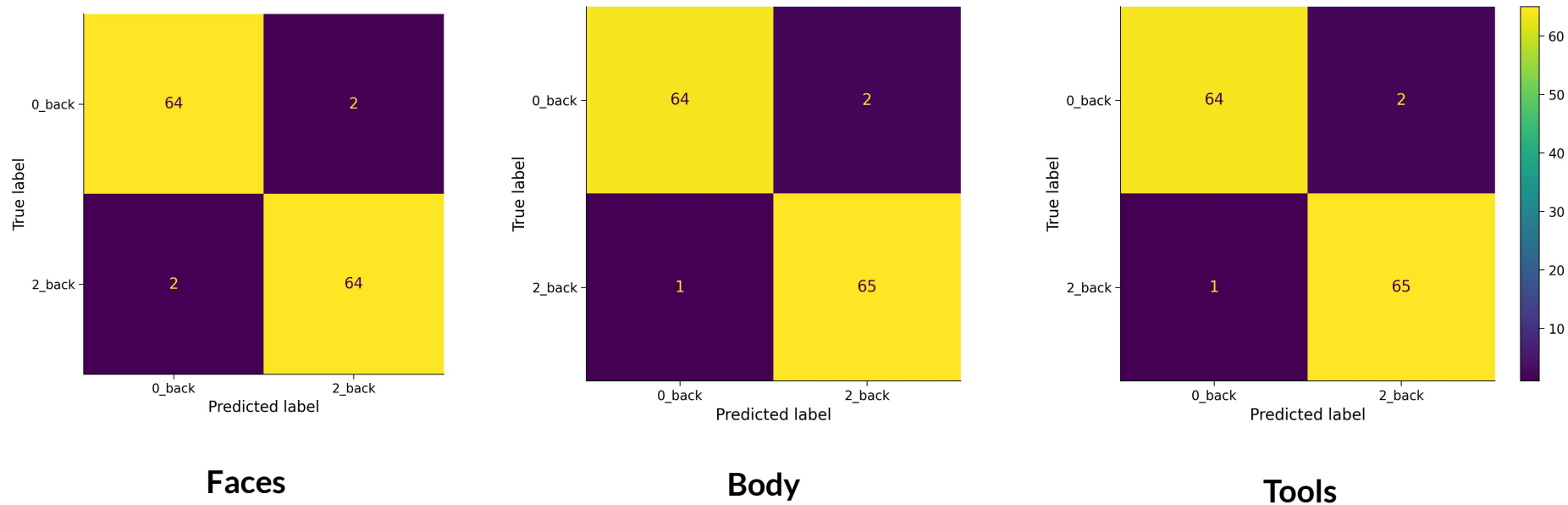


Cross-validation (k = 8)

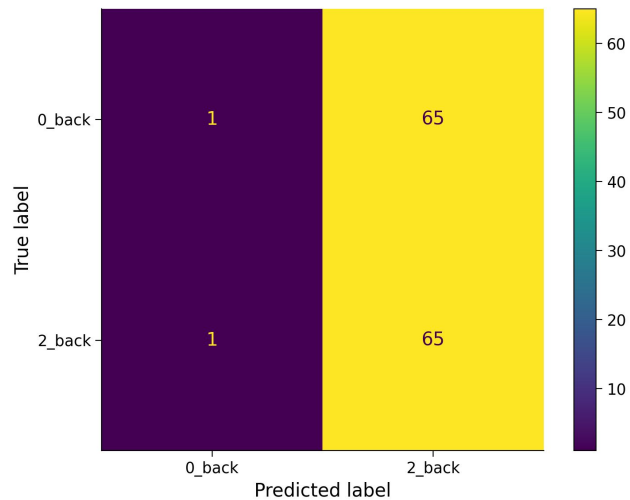
Results



Confusion Matrices for Individual Conditions



Results



Confusion Matrix for Places

Accuracy: 0.52



Finally



What is the percentage of accuracy?

- According to the results, we found that 0-back and 2-back tasks can be differentiated by BOLD signals of ROIs. When dividing the stimuli as face, body, tools, and place, the tasks can be still separated with high accuracy except for 'places.' this maybe due to the high detail levels in places which require
- Working memory activates particular regions in the brain and our predictive model is able predict load type. This distinction might be clearer, in the future studies using larger datasets.



Thanks for your time!