# 50 shades of overfitting:
towards MRI-based neurological models interpretation

Polina Druzhinina*, Ekaterina Kondrateva*, Evgeny Burnaev

Skoltech
Skolkovo Institute of Science and Technology

Classification male/female results (1200 subjects)
Individual Scale for MRI scan based on Optimal Transport (OT)

The most relevant feature - brain size

The most relevant feature - brain gray matter stucture
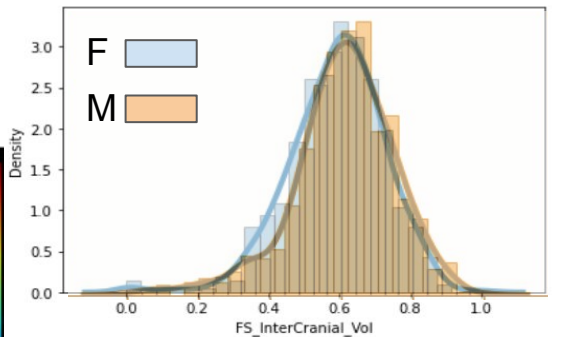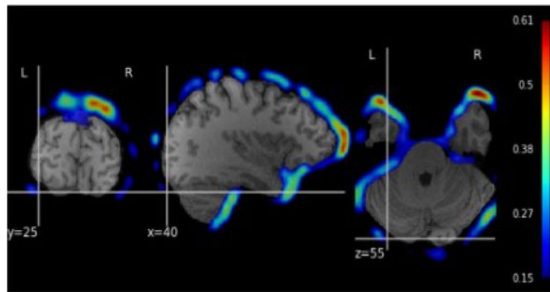
emdTransport used for minimal correction to map male and female objects in brain sizes.
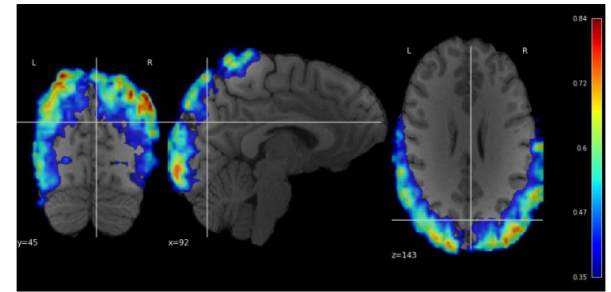
CV 3, Accuracy Mean (STD)	Training	Validation
Scull stripping (SS)	0.943 (0.012)	0.916 (0.094)
SS augmented with rotation and scaling	0.984 (0.016)	0.964 (0.020)
SS with optimal scaling	0.996 (0.009)	0.984 (0.075)

Discussion
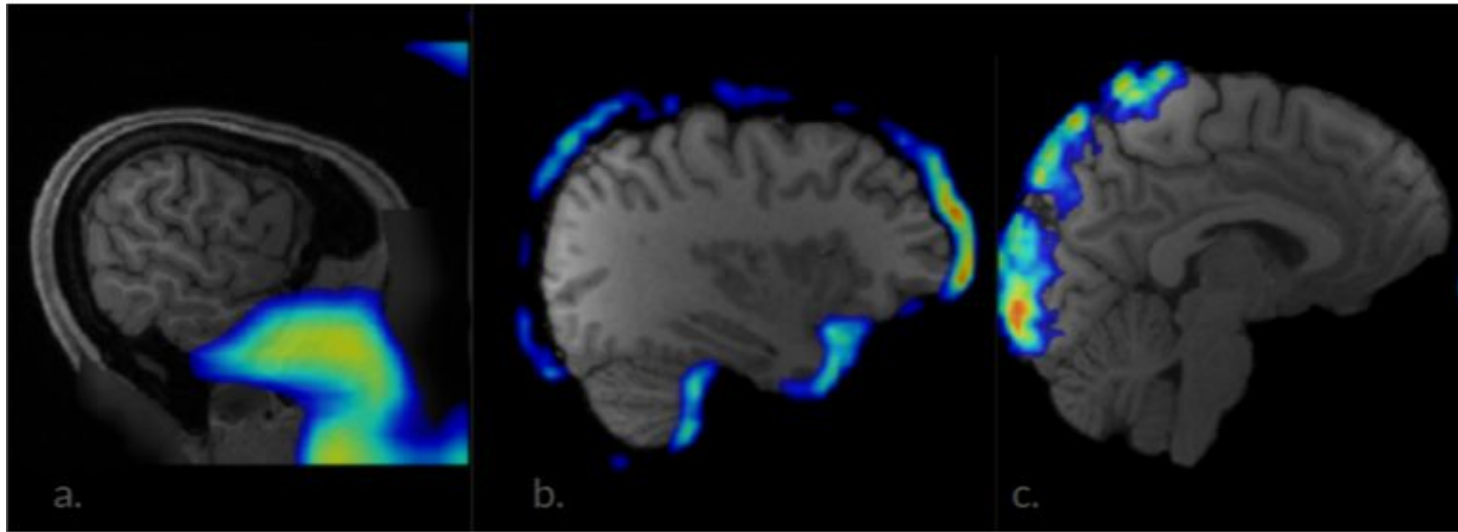
Validation accuracy: (a) 0.976, (b) 0.916, (c) 0.984

Classification male/female (1200 subjects), GradCAM attention map (for class Male):

(a): raw DICAOM data, the model attention is kept on nasopharynx and Adam's apple area;
(b): scull-stripped data, the model pays attention to the difference in brain size;
(c): optimal scaling force the model to train only on the internal structures of the brain.

//adase.group/neuro/, //github.com/kondratevakate