

CSAI

Assignment-3

Report

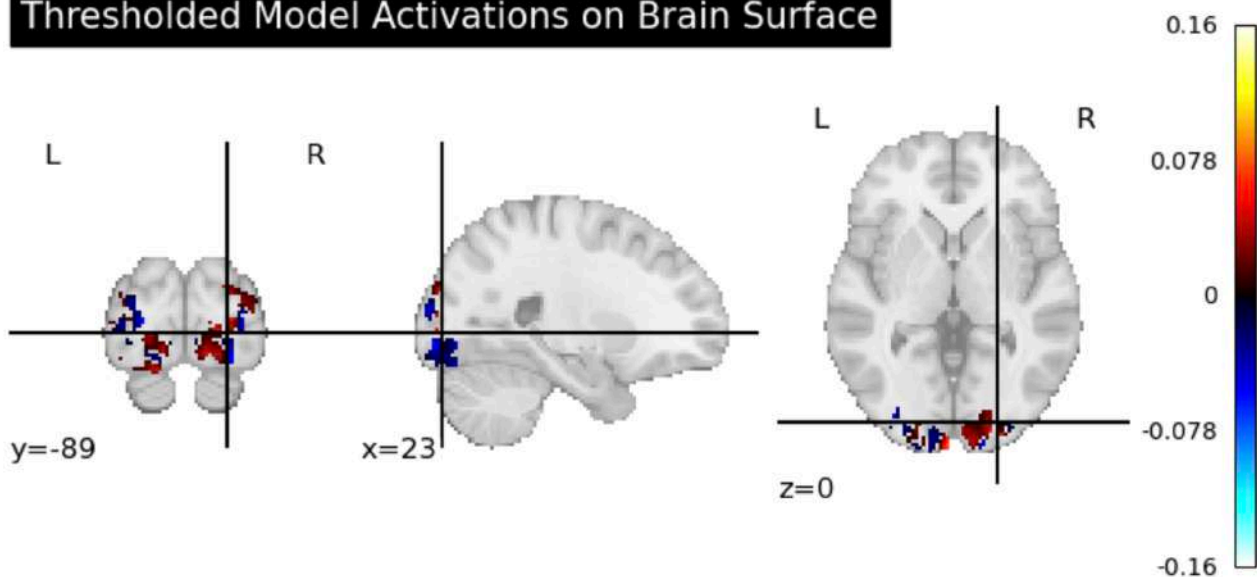
Akshit Sharma
2021101029

Activation Maps and Threshold Model Activations on Brain Image

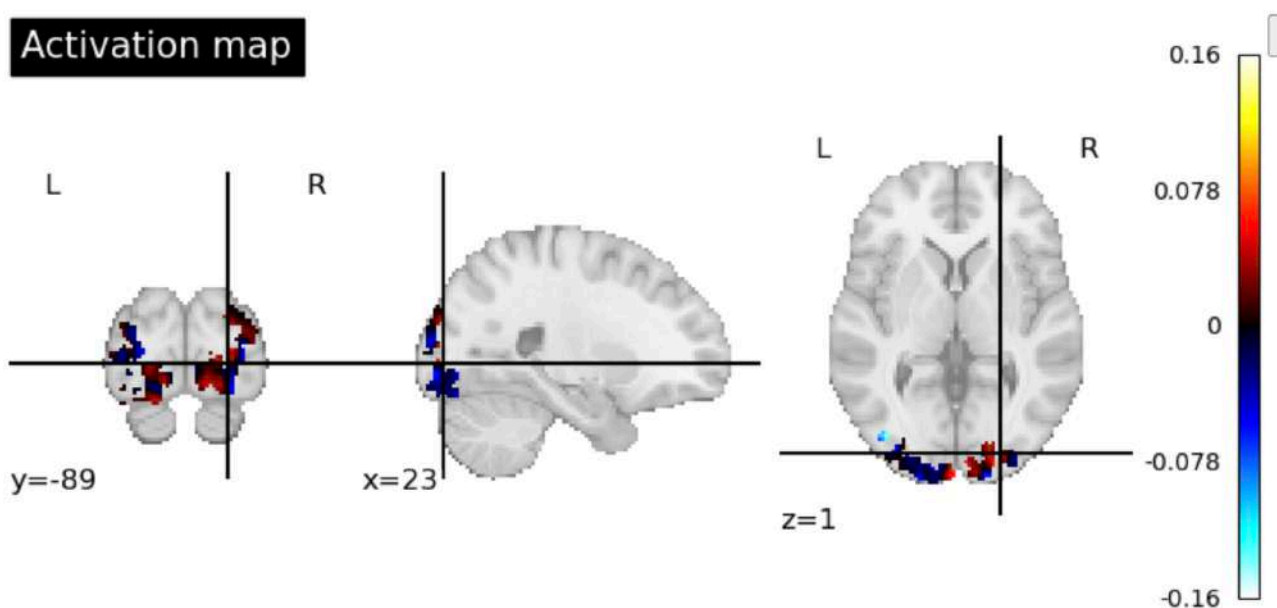
The weights have been obtained from the SVM classifier after training on data for the specific ROIs, which have then been used to obtain the top 5% voxels (thresholding), corresponding threshold image and the coefficient images as well (labelled as activation map).

Early Visual Area

Thresholded Model Activations on Brain Surface

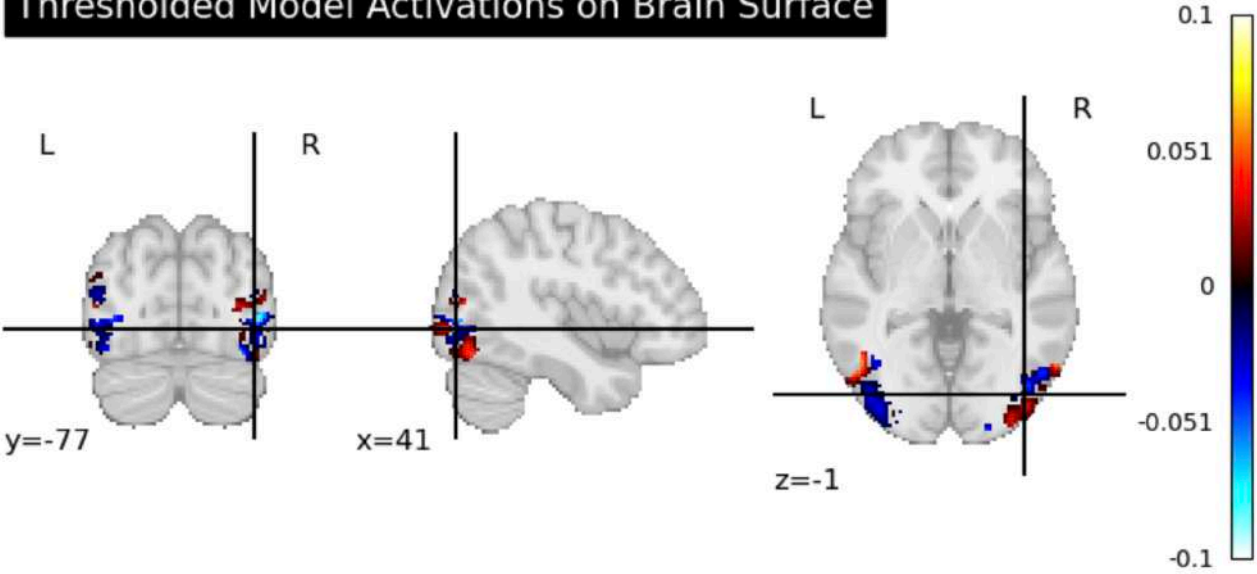


Activation map

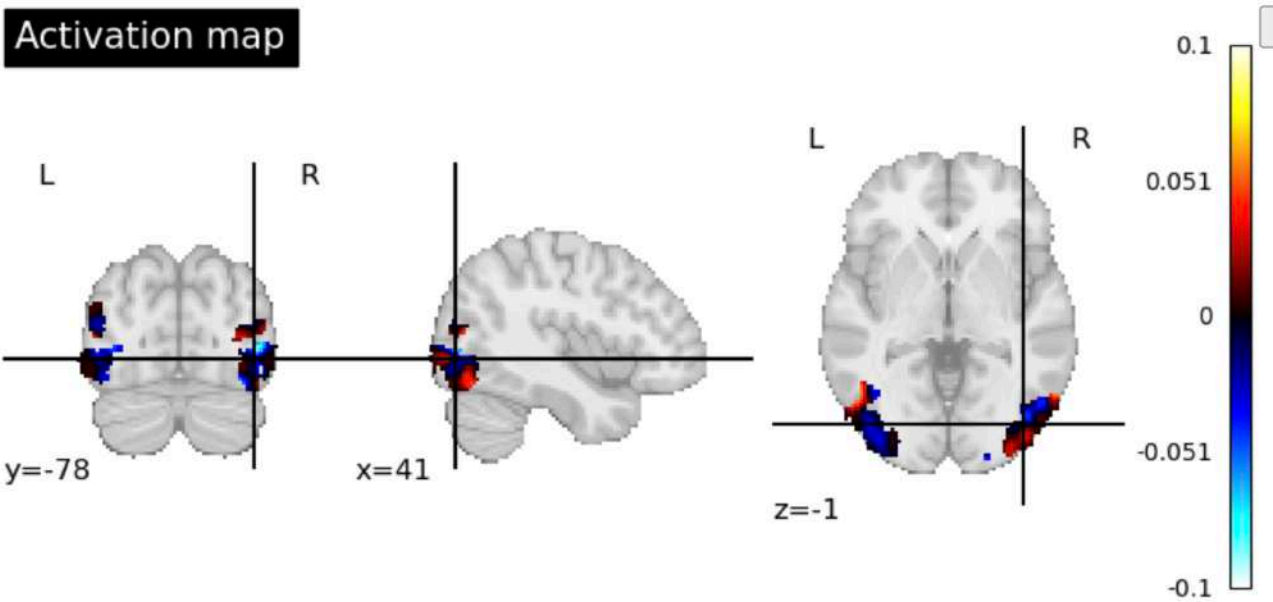


LOC

Thresholded Model Activations on Brain Surface

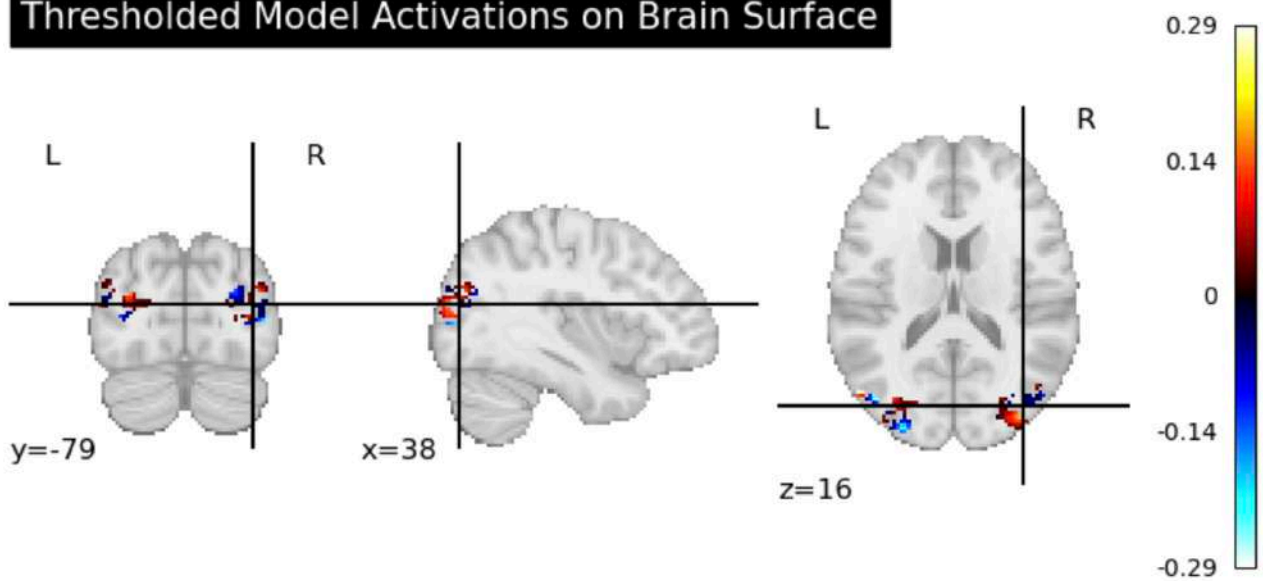


Activation map

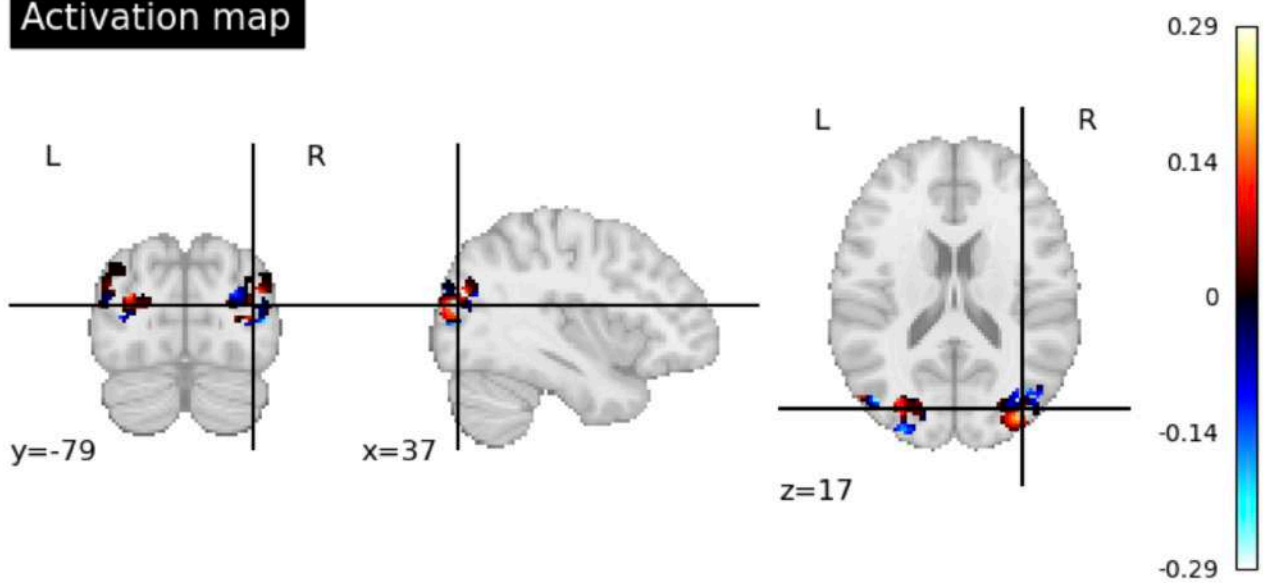


OPA

Thresholded Model Activations on Brain Surface

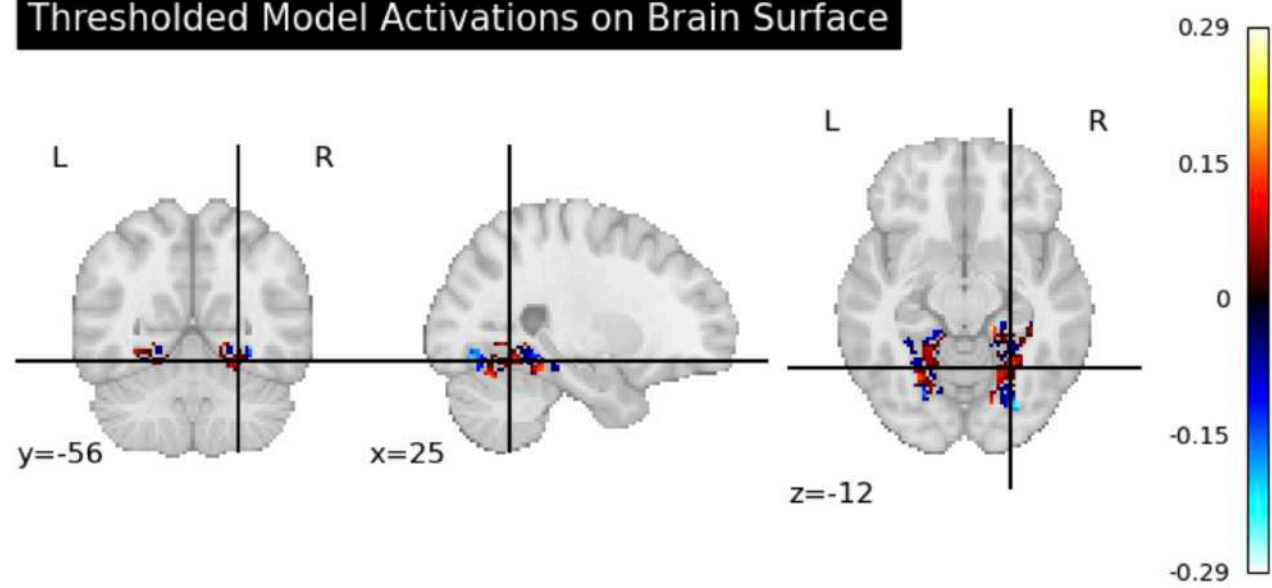


Activation map

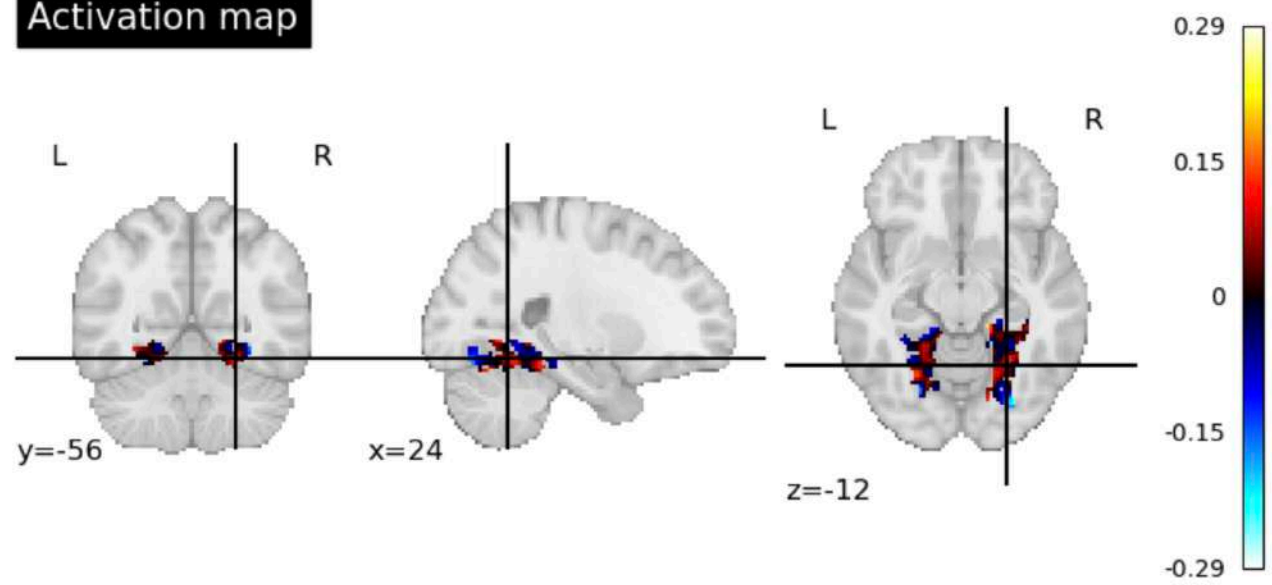


PPA

Thresholded Model Activations on Brain Surface

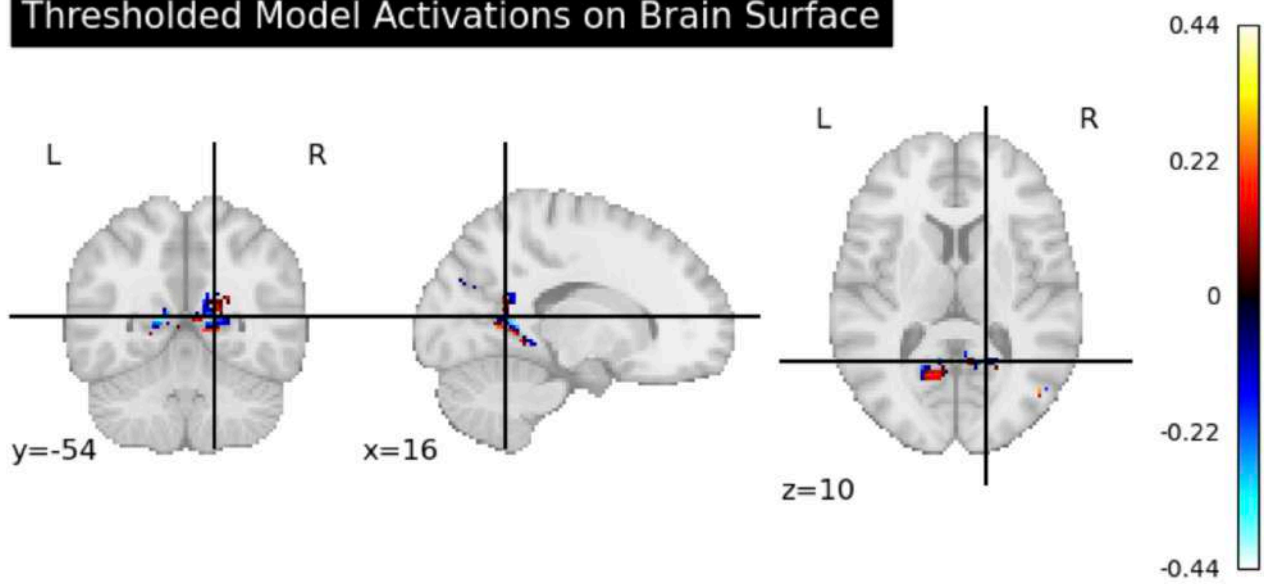


Activation map

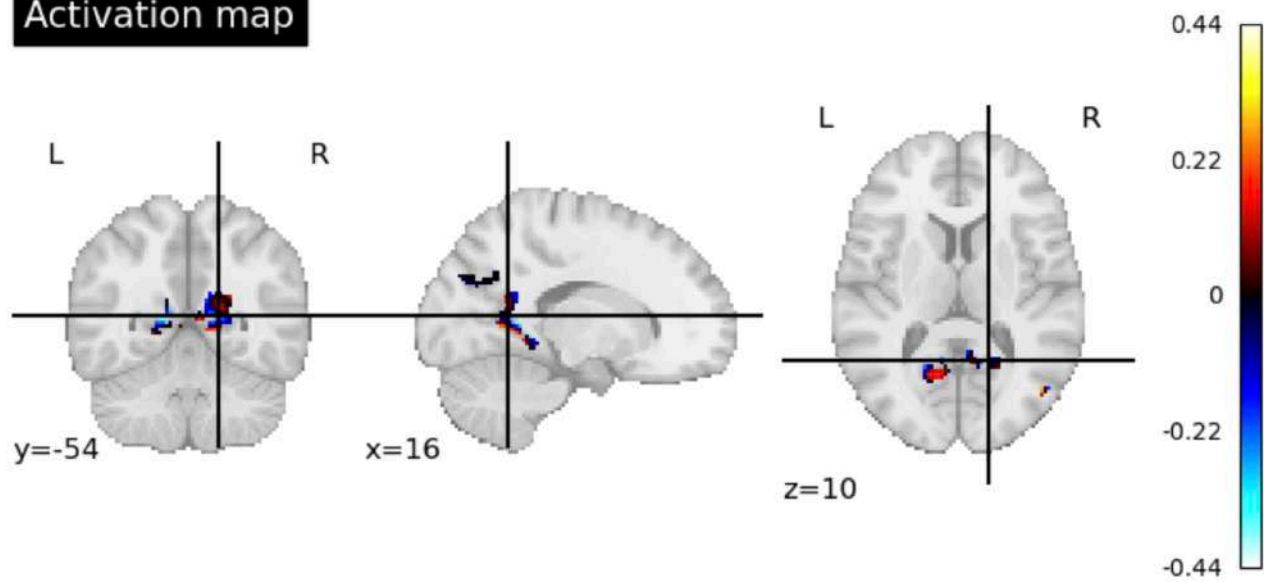


RSC

Thresholded Model Activations on Brain Surface



Activation map



Analysis of functional specialisations emerging for different ROIs based on accuracies obtained from one vs rest classification (using linear SVM) for each ROI

- High classification accuracy (around 89%) for human body part and human face objects with EVA and LOC as ROI.
- High classification accuracy (around 80%) for natural inanimate objects with OPA and LOC as ROI.
- High classification accuracy (around 75%) for non-human body part and non-human face objects with EVA and LOC as ROI.
- High classification accuracy (around 79%) for artificial inanimate objects with EVA and LOC as ROI.

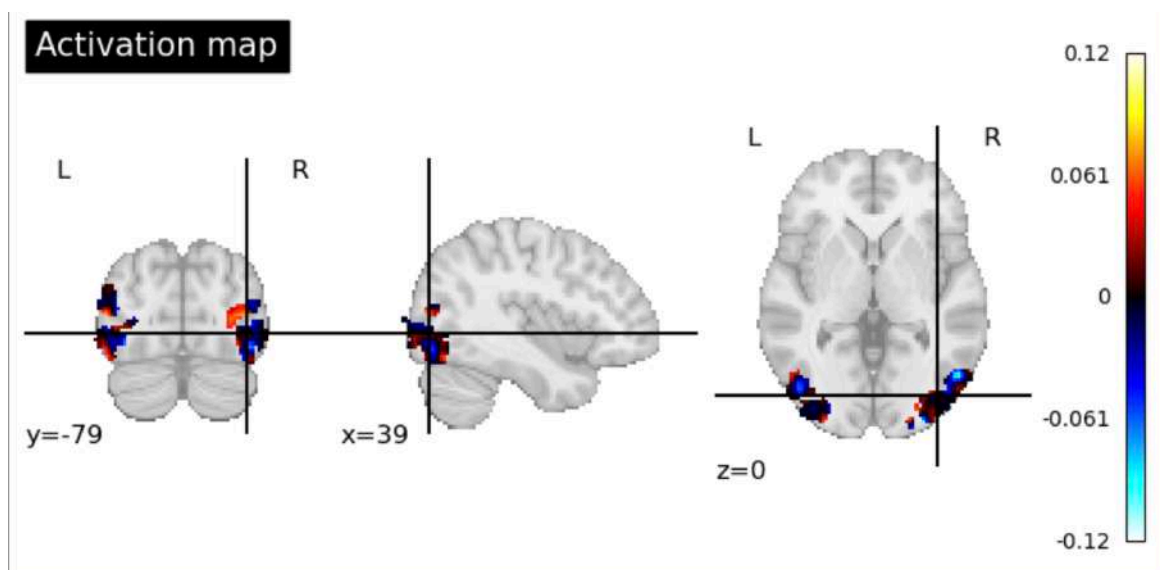
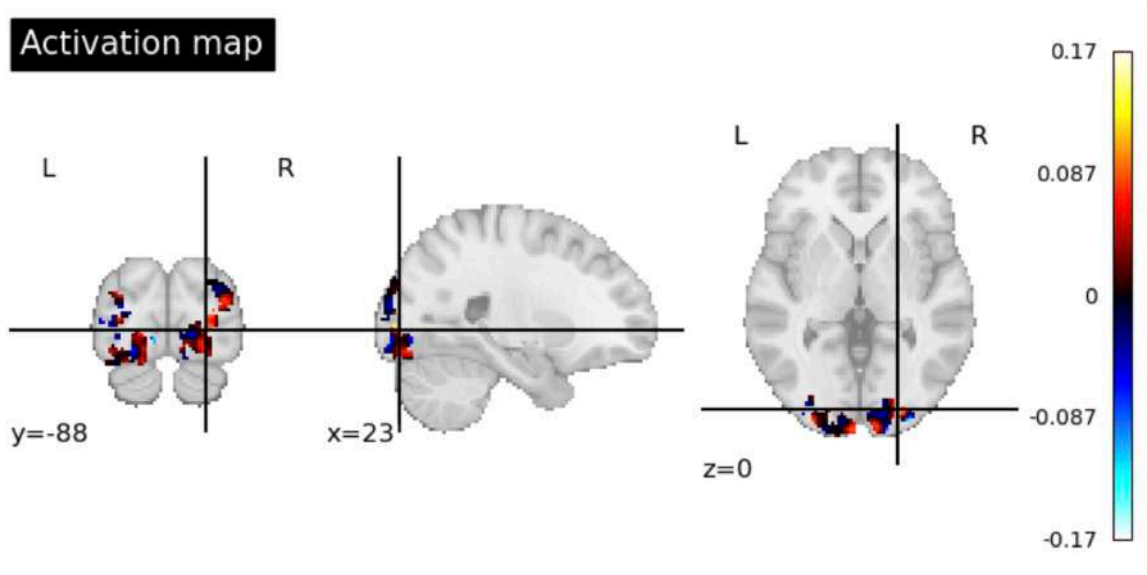
So, looking at the weights and maps, we can conclude that:

- **Early visual area (EVA)** is primarily involved in basic visual processing, including detecting edges, colours, and simple shapes. It's likely to show activation for all categories but may have stronger weights for natural inanimate and artificial inanimate categories due to their reliance on basic visual features.
- **LOC** is associated with object recognition and may be particularly important for processing complex shapes and objects. It might show stronger weights for natural inanimate and artificial inanimate categories, as these categories involve the recognition of objects or scenes.
- **OPA** is specialised in processing scenes and environmental layouts. It may have stronger weights for natural inanimate category, as it involves processing scenes and landscapes.
- **OPA** is specialised in processing scenes and environmental layouts. It may have stronger weights for natural inanimate category, particularly for images depicting landscapes or environments.
- **RSC** is associated with processing spatial information and navigation. It may have stronger weights for natural inanimate category, especially if the images depict navigable environments or spatial layouts.

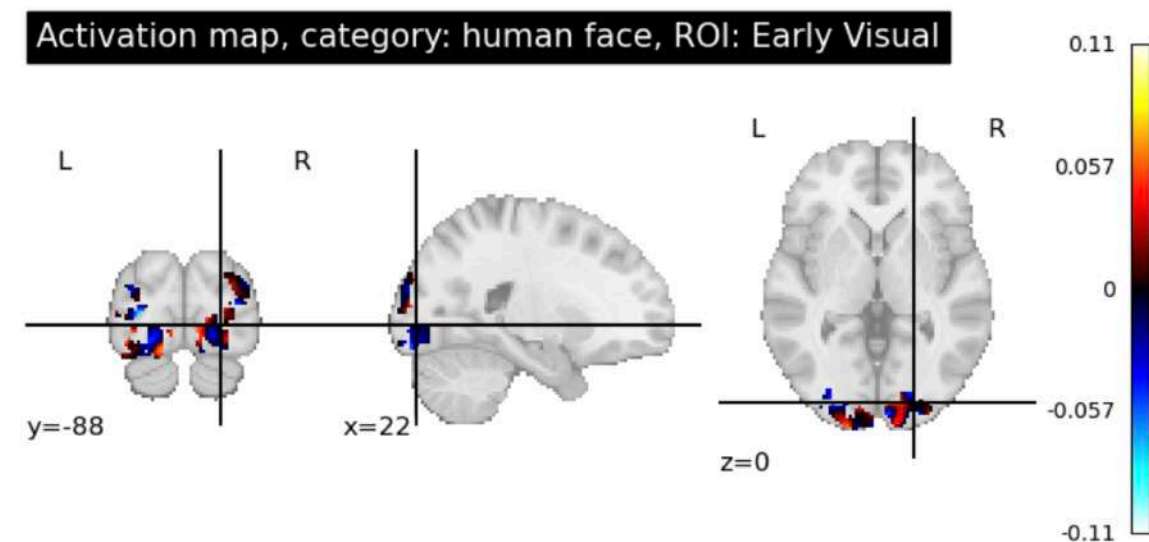
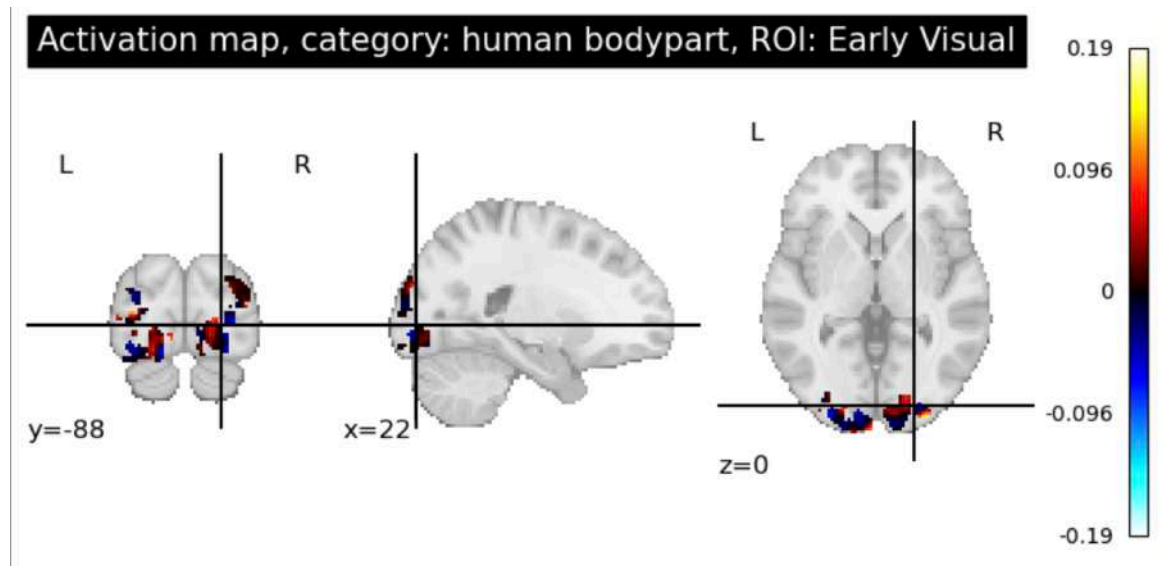
Analysing the overlapping patterns of weights corresponding to the given ROIs for each of the categories

Artificial Anime: Have significant weights in early visual area and LOC due to their reliance on basic visual features and object recognition. Some activation also be present in other regions but to a lesser extent.

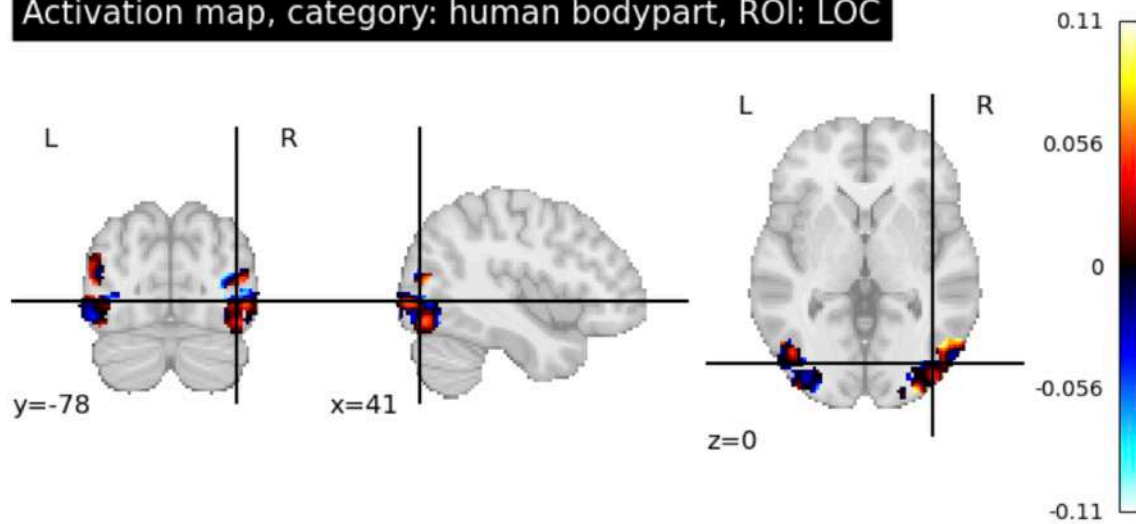
EVA:



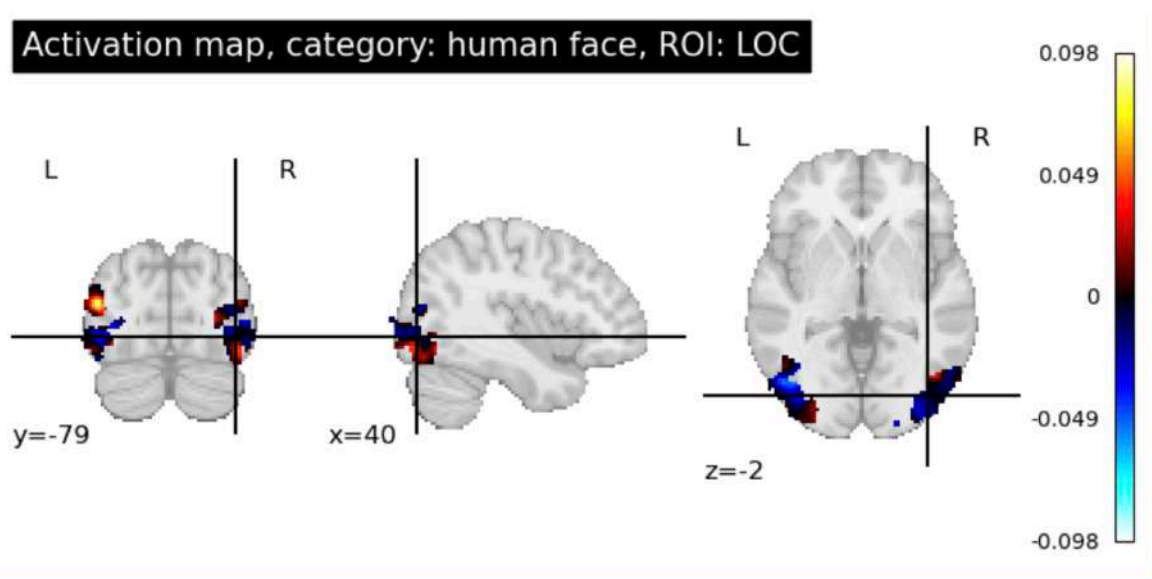
Human Body part and Human Face: Have stronger weights in early visual area, as they involve processing basic visual features of human bodies and faces. LOC also show significant activation for these categories due to its role in object recognition.



Activation map, category: human bodypart, ROI: LOC

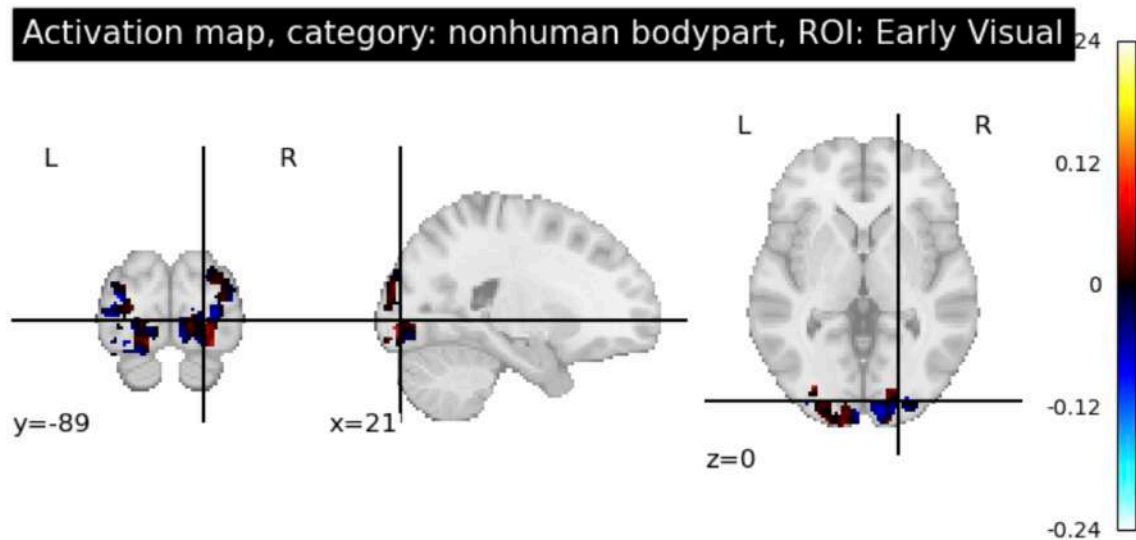


Activation map, category: human face, ROI: LOC

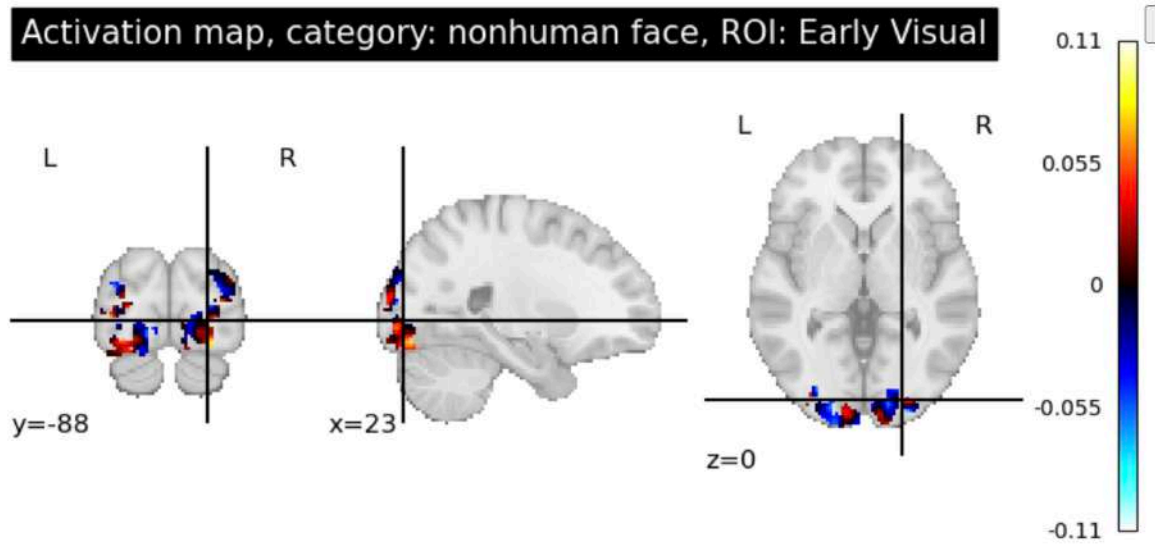


Nonhuman Body part and Nonhuman Face: Similar to human body parts and faces, these categories have stronger weights in EVA and LOC, but to a lesser extent.

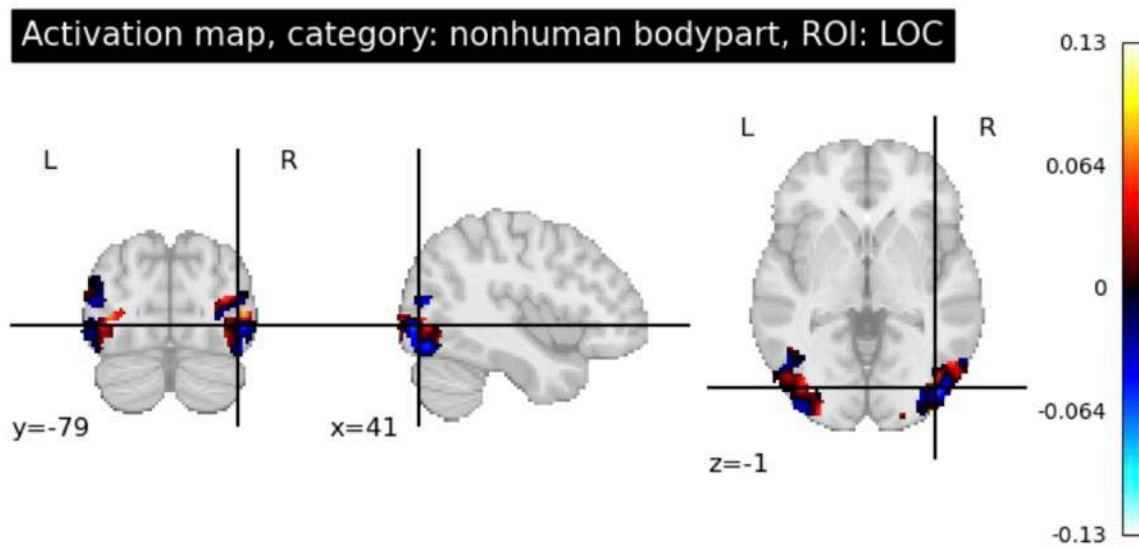
Activation map, category: nonhuman bodypart, ROI: Early Visual



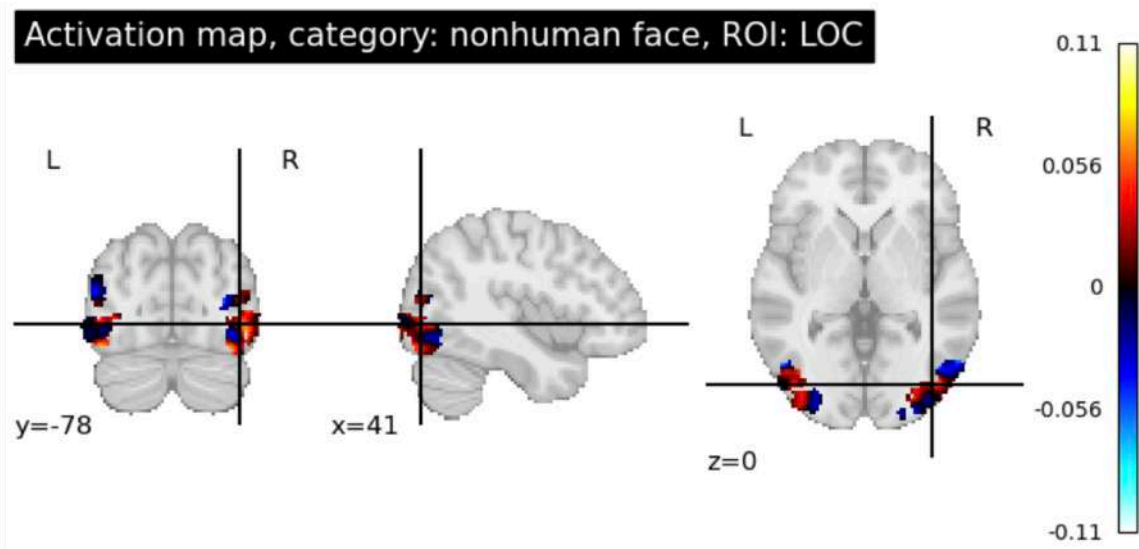
Activation map, category: nonhuman face, ROI: Early Visual



Activation map, category: nonhuman bodypart, ROI: LOC

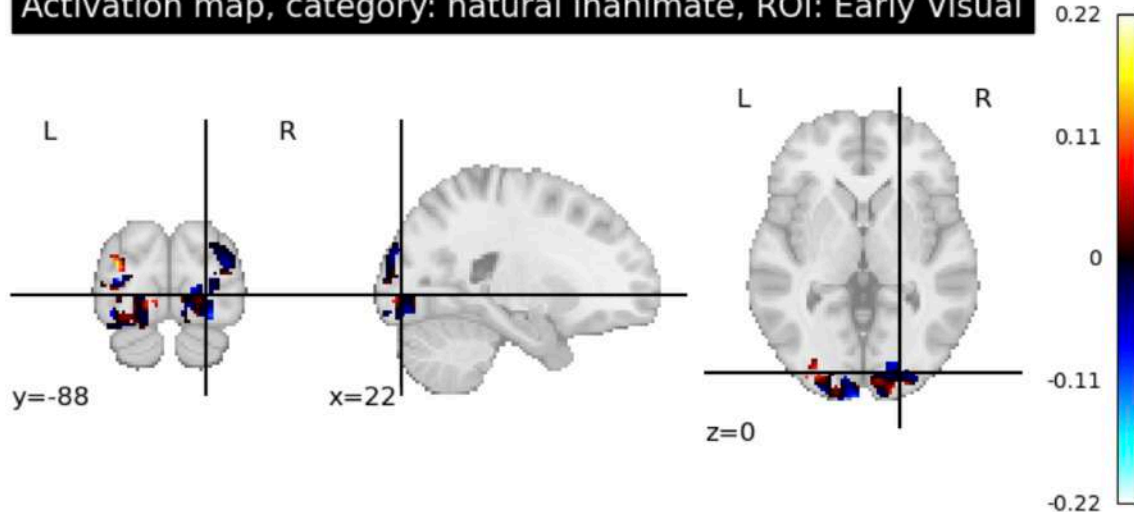


Activation map, category: nonhuman face, ROI: LOC

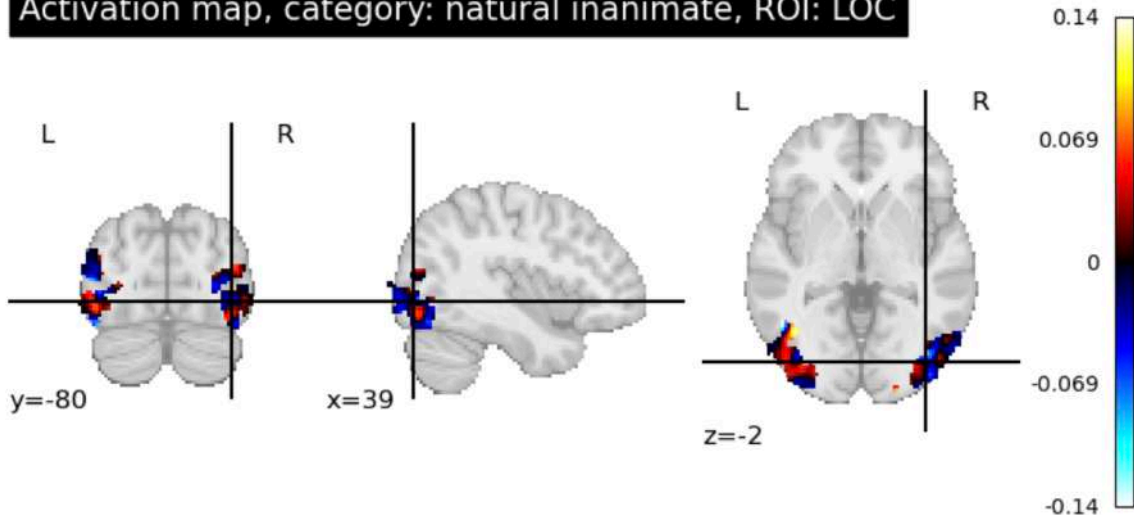


Natural Inanimate: Have significant weights in LOC, OPA, PPA, and somewhat RSC, as these regions are involved in processing scenes, environmental layouts, and spatial contexts.

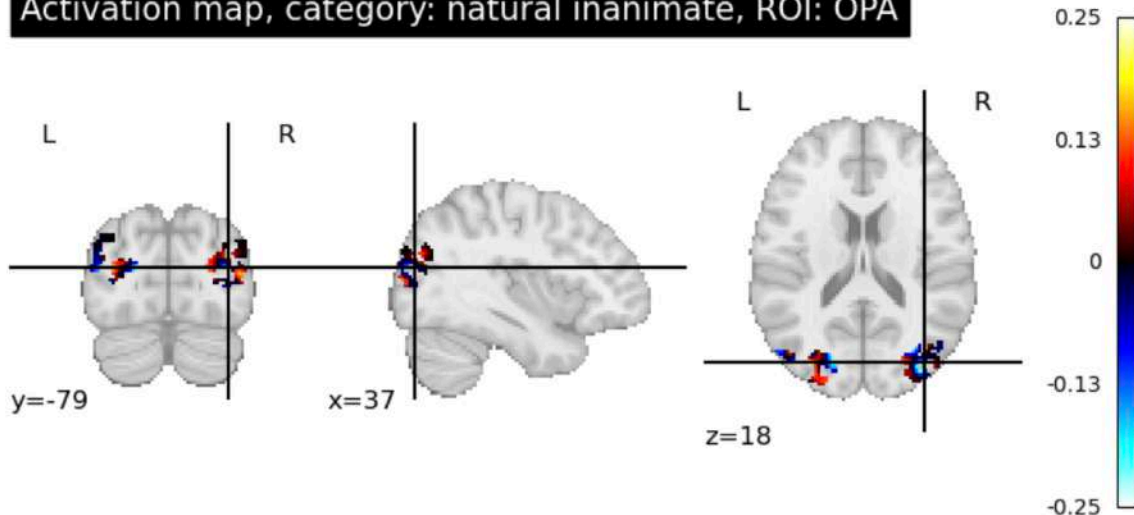
Activation map, category: natural inanimate, ROI: Early Visual



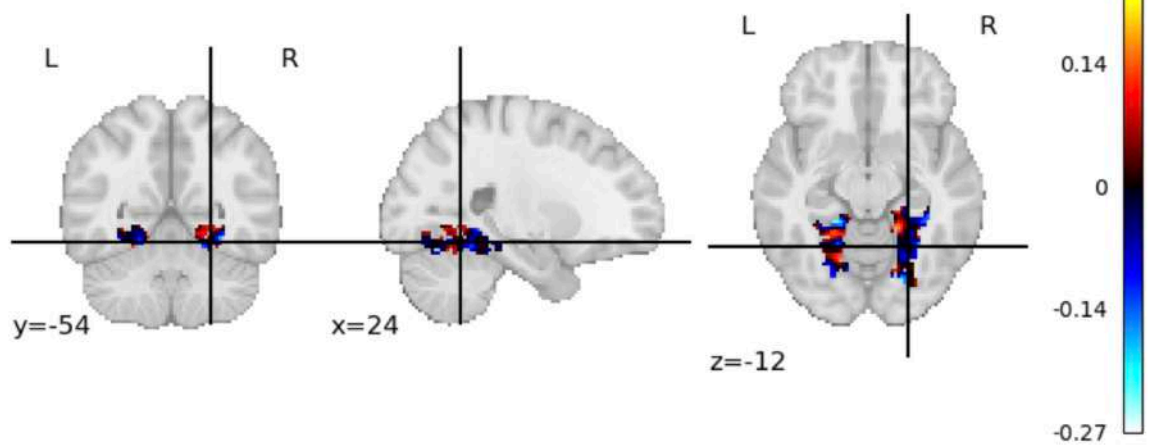
Activation map, category: natural inanimate, ROI: LOC



Activation map, category: natural inanimate, ROI: OPA



Activation map, category: natural inanimate, ROI: PPA



Activation map, category: natural inanimate, ROI: RSC

