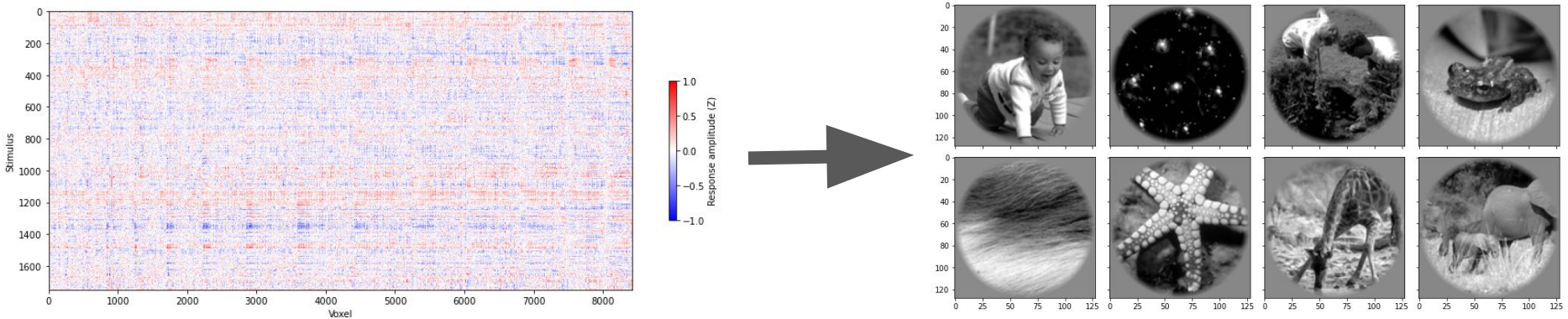
NeuroTranslator

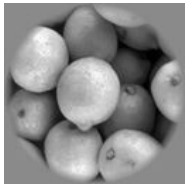
Neuromatch Academy | pod-020-offbeat-caterpillar | 31.07.2020

Project description

- Visual cortex voxel responses translation to images feature vectors
- Kay dataset
- Python, TensorFlow, scikit-learn
- Code: https://github.com/zeevikal/NeuroTranslator

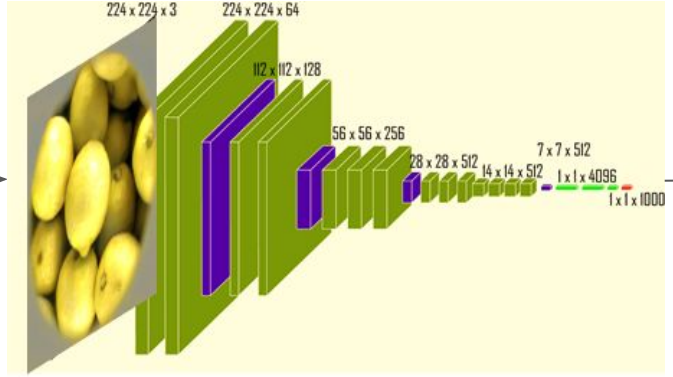


Method



128X128
Grayscale

Colorization
Super-resolution
512X512 RGB



Feature vector extraction using NASNetLarge
pre-trained model on ImageNet dataset

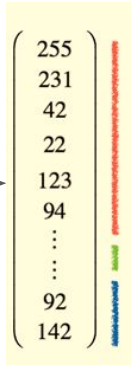
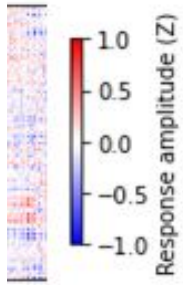


Image
feature
vector



Response
voxels

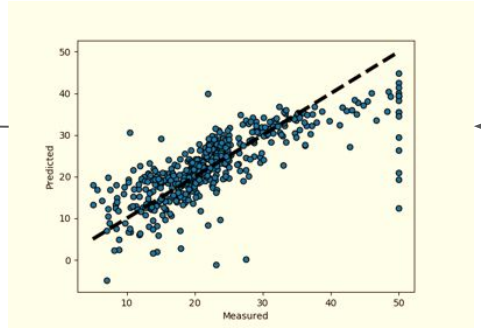
```
x = np.array(x)
y = np.array(y)

x_test = np.array(x_test)
y_test = np.array(y_test)
x.shape, y.shape, x_test.shape, y_test.shape
```

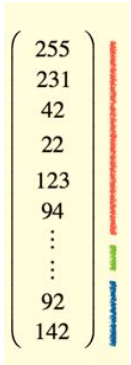
executed in 913ms, finished 20:49:37 2020-07-30

```
((1750, 8428), (1750, 4032), (120, 8428), (120, 4032))
```

Prepare data for training
process



Training linear regression
model



Predicted image
feature vector

Results

ImageNet class: steel_arch_bridge
predicted class: [('n03126707', 'crane', 1.0)]

ImageNet class: killer_whale
predicted class: [('n09332890', 'lakeside', 1.0)]

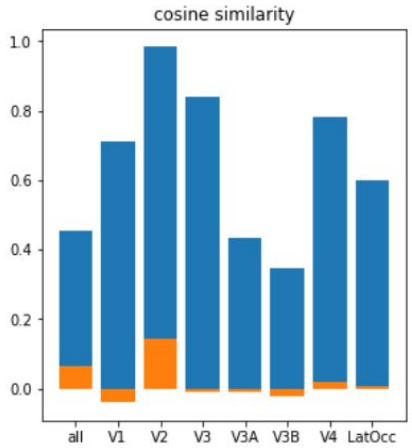
ImageNet class: head_cabbage
predicted class: [('n04005630', 'prison', 1.0)]

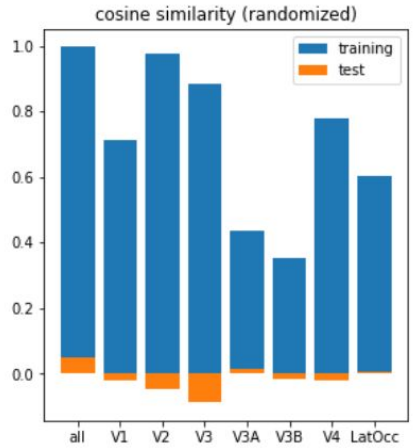
Additional work:

1. Training linear regression model on specific voxels ROI.
2. Voxel responses data manipulation.
3. Metrics & statistics - cosine similarity, correlation coefficients, etc.
4. Regularization using sparse linear regression model.

What's next?

1. Understand why?!
   - results
   - regularization issue
   - voxel role
2. Deep learning (non-linear training)





Our team :)

Mentor:
Gunnar Blohm

Junya

Chris

Zeev

Jade