Lecture 26

Decoding dreams

- fMRI activity pattern before awakening
- Machine learning decoder assisted by lexical and image databases
- Awakening index: different epics in which participants were waken up
- Every time a participant is waken up, they describe their dream
- For every possible semantic concept
    - True positive: not dreaming about a concept but I thought you were
    - False positive
    - Hit
    - Miss
- Cognitive and systems neuroscience: brain areas specialized to represent certain types of information
- AUC: accuracy
- Functional areas
    - PPA: Parahippocampal place area = Scenes
    - FFA: Fusiform face area = Humans
- Consistent with what you would expect with other studies when awake
- Provides way to determine if there is a systematic relationship between brain structures active when dreaming and description of dreaming
- How far back in time can we accurately predict what they were dreaming about compared to reported dreaming

Limitations of motor BMI

- We don’t know the true feature space
    - Train on actual movement
- Neurons adapt/change across days

Dimensionalities for experiments

- Neural activity 85–91D
- Intrinsic manifold: 10D
- Kinematics: 2D

A brain-machine interface for memory

- Ted Berger
    - First hippocampus decoder
- Nonlinear MIMO model
    - Multi input multi output

How good your decoder

- How well you can measure
- How well you can model
- how fast