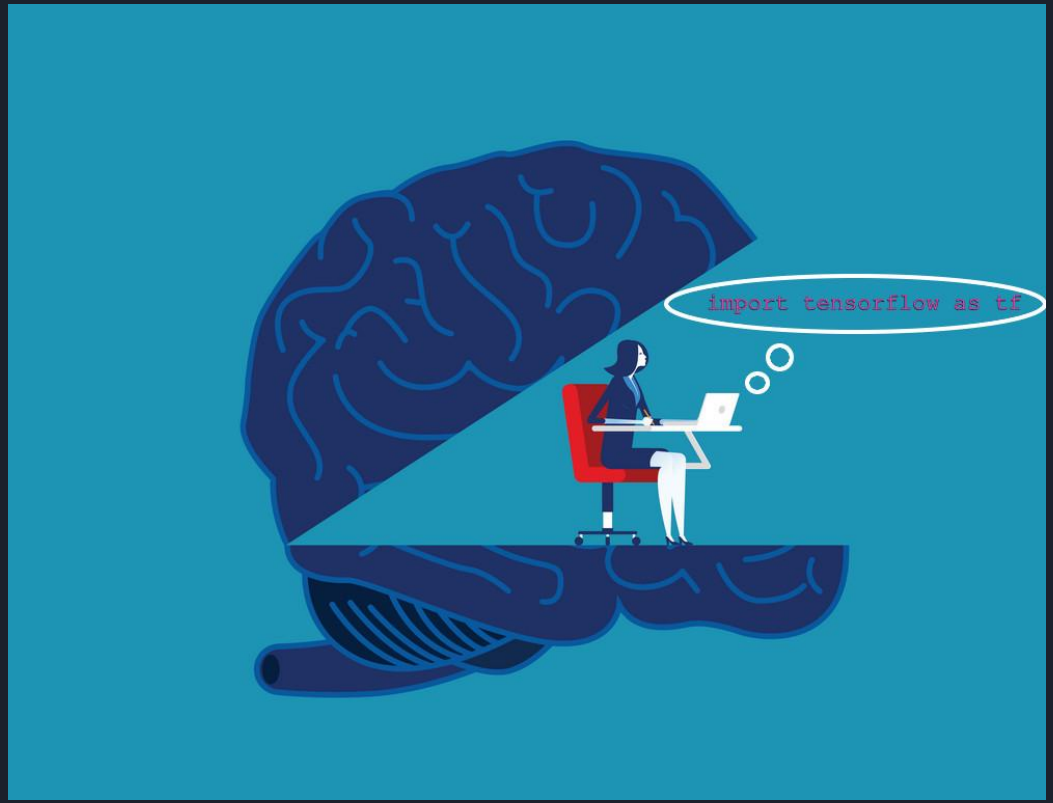
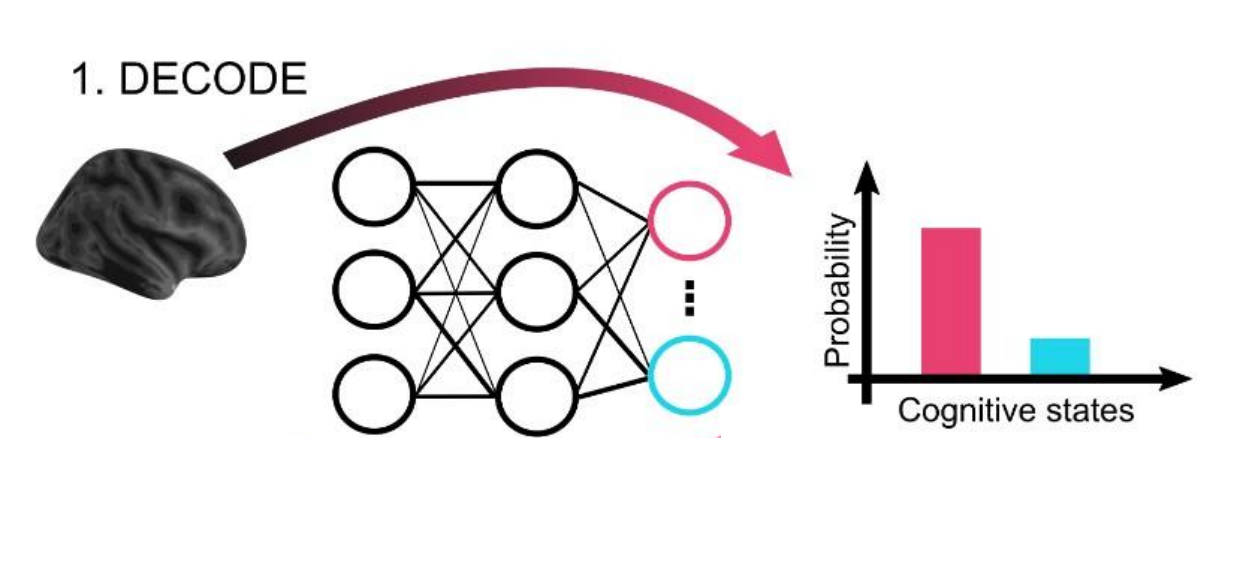
Decoding Neuroimaging Data using Deep Learning

Faizan Shaikh Abdul Khalil Shaikh - 22102199

Motivation

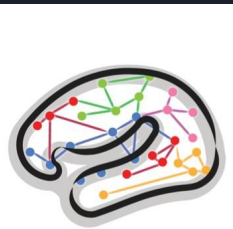


Problem Statement



Thomas, Armin W., et al. "Analyzing neuroimaging data through recurrent deep learning models." *Frontiers in neuroscience* (2019): 1321.

Technical Approach - Dataset



HUMAN
Connectome
PROJECT

Task	Cognitive states
WM	body, face, place, tool
Gambling	win, loss, neutral
Motor	left/right finger, left/right toe, tongue
Language	story, math
Social	interaction, no interaction
Relational	relational, matching
Emotion	emotion, neutral

Van Essen, David C., et al. "The WU-Minn human connectome project: an overview." *Neuroimage* 80 (2013): 62-79.

Technical Approach - Dataset

HUMAN
Connectome
PROJECT

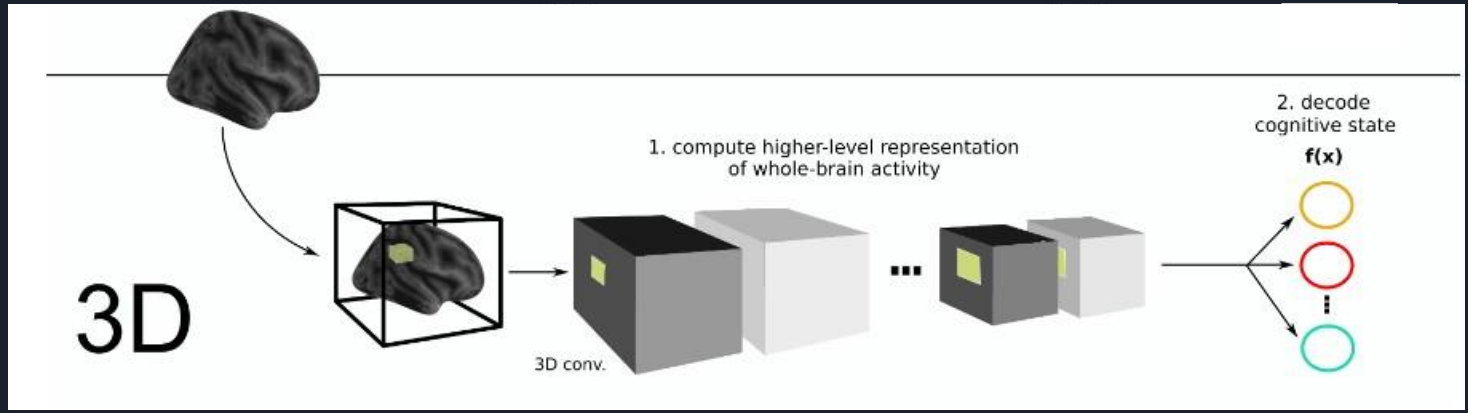
Task	Cognitive states
WM	body, face, place, tool
Gambling	win, loss, neutral
Motor	left/right finger, left/right toe, tongue
Language	story, math
Social	interaction, no interaction
Relational	relational, matching
Emotion	emotion, neutral

Fine-tuning

Pre-training

Van Essen, David C., et al. "The WU-Minn human connectome project: an overview." *Neuroimage* 80 (2013): 62-79.

Technical Approach - DL Architecture



Thomas, Armin W., et al. "Evaluating deep transfer learning for whole-brain cognitive decoding." *arXiv preprint arXiv:2111.01562* (2021)

Technical Approach - Tech Stack

Hardware

- Google Colab Cloud Platform
  - 2 vCPU @ 2.2 GHz
  - 13 GB RAM
  - 40GB HDD
  - Tesla T4 GPU (16 GB VRAM)
- Google Drive
  - 5GB Disk Space

Software

- Ubuntu 18.04
- Python 3.7
- HCPrep
- Tensorflow 2.8 (incl. TF Keras)
- WandB
- GitHub

Technical Approach - Tech Stack

Hardware

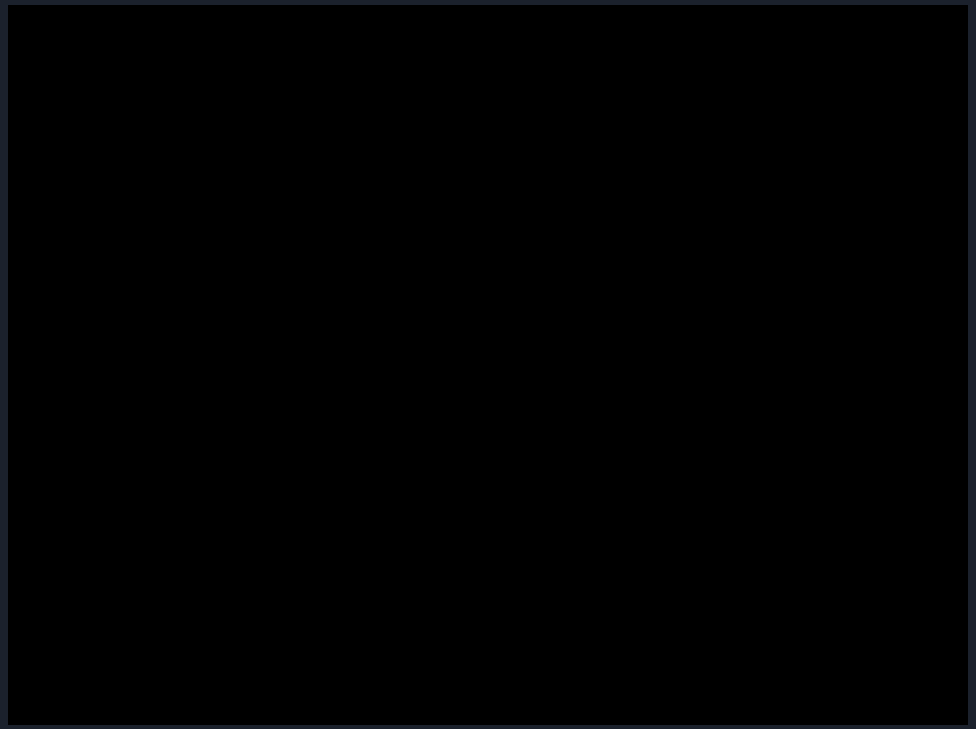
- Google Colab Cloud Platform
  - 2 vCPU @ 2.2 GHz
  - 13 GB RAM
  - 40GB HDD
  - Tesla T4 GPU (16 GB VRAM)
- Google Drive
  - 5GB Disk Space

Software

- Ubuntu 18.04
- Python 3.7
- HCPrep
- Tensorflow 2.8 (incl. TF Keras)
- WandB
- GitHub

Implementation

Technical Approach - Outcome



Thomas, Armin W., et al. "Evaluating deep transfer learning for whole-brain cognitive decoding." *arXiv preprint arXiv:2111.01562* (2021)

References

- Thomas, Armin W., et al. "Analyzing neuroimaging data through recurrent deep learning models." *Frontiers in neuroscience* (2019): 1321.
- Thomas, Armin W., et al. "Evaluating deep transfer learning for whole-brain cognitive decoding." *arXiv preprint arXiv:2111.01562* (2021)
- Van Essen, David C., et al. "The WU-Minn human connectome project: an overview." *Neuroimage* 80 (2013): 62-79.

Questions?