A deep learning model for Alcoholism detection in Brain MRI

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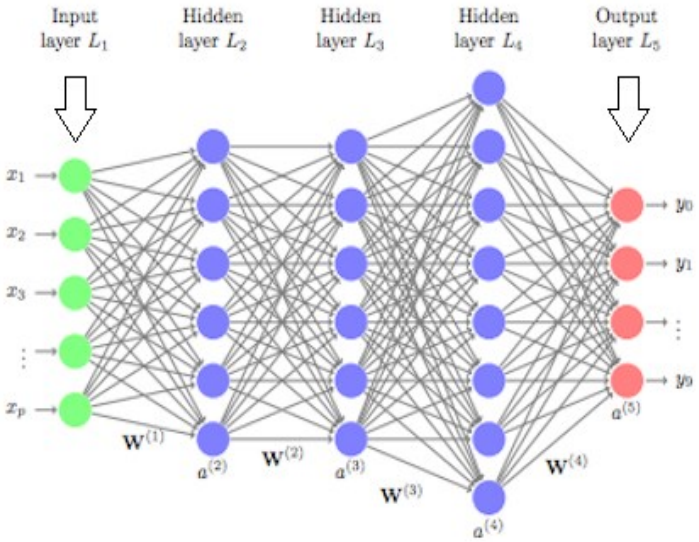
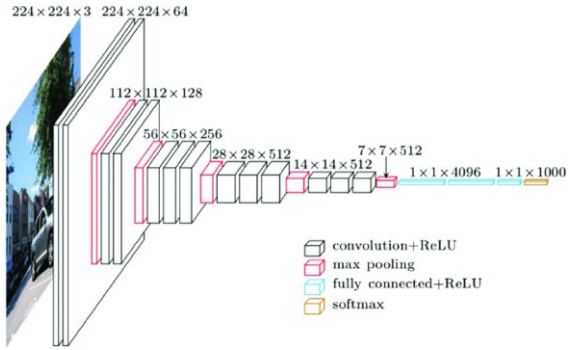
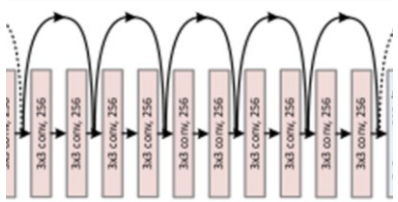
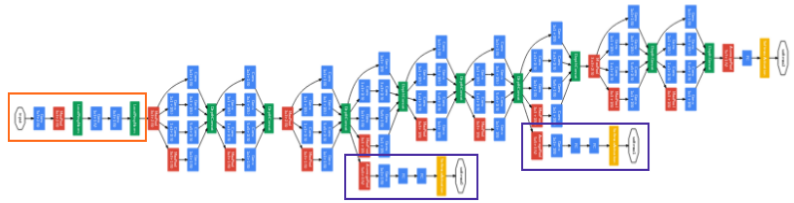
what does Deep Learning mean?









Deep Learning for neuroimaging (1)

- Convolutional Neural Network (CNN) demonstrated high performances for processing data that has a known grid-like topology, as images.

- Image classification

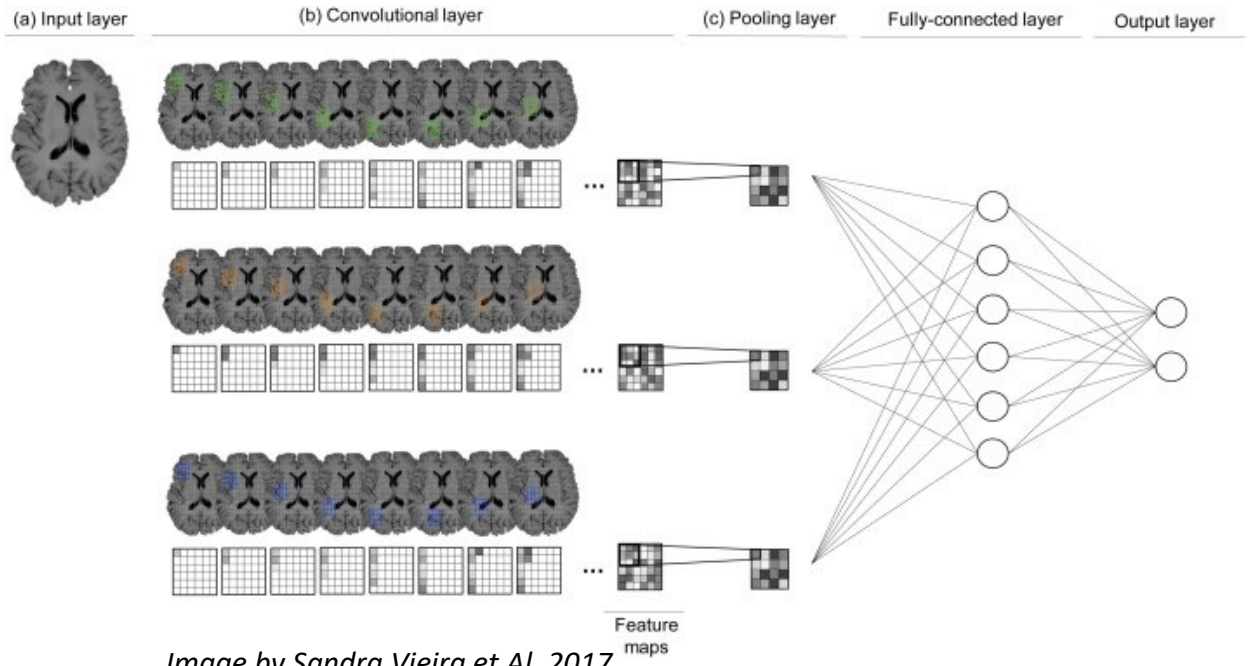


Image by Sandra Vieira et Al. 2017

Object detection/segmentation

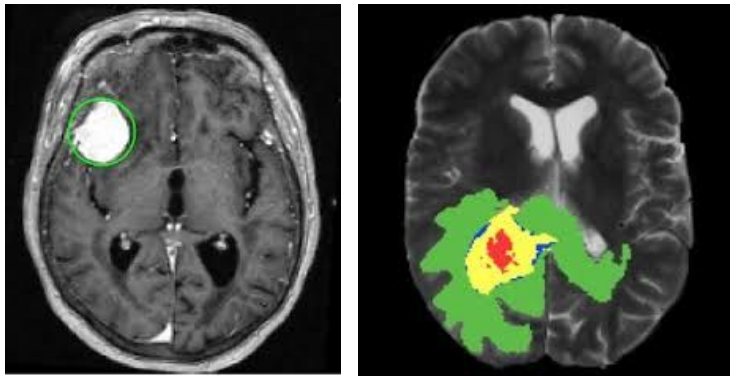
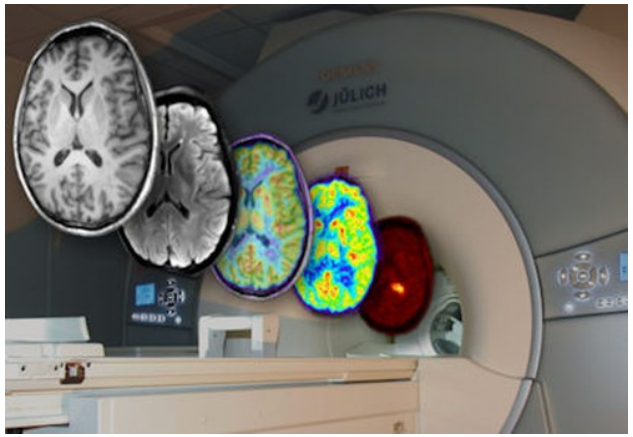


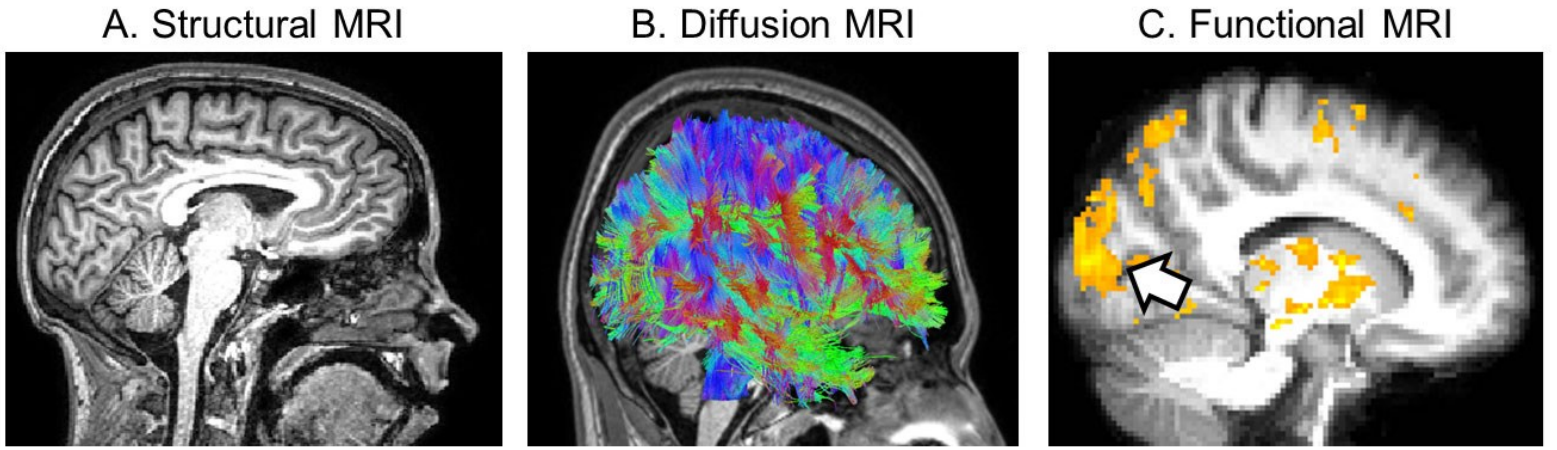
Image by D. Koshy et Al. 2011, and by Aldeborgh 2017

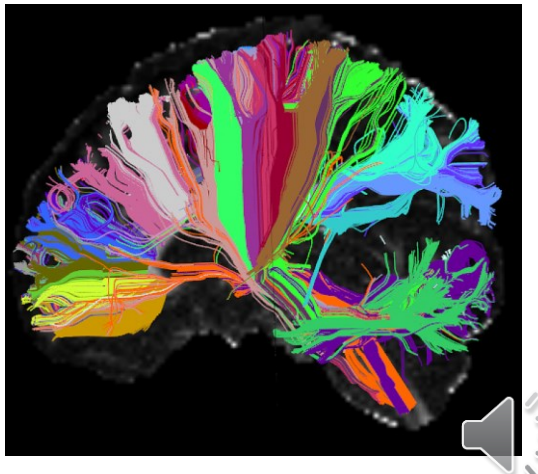
Deep Learning for Neuroimaging (2)

- technological growth: multimodal imaging and labeled datasets availability

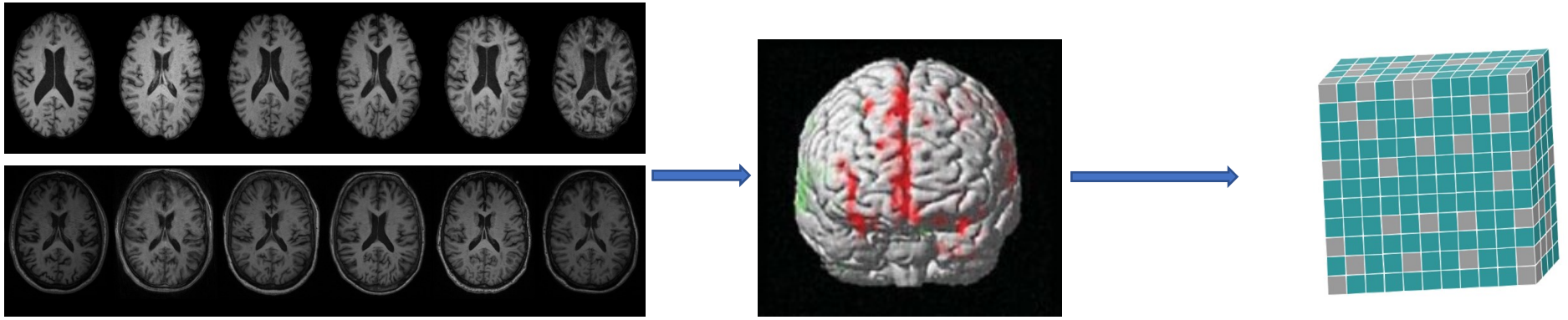


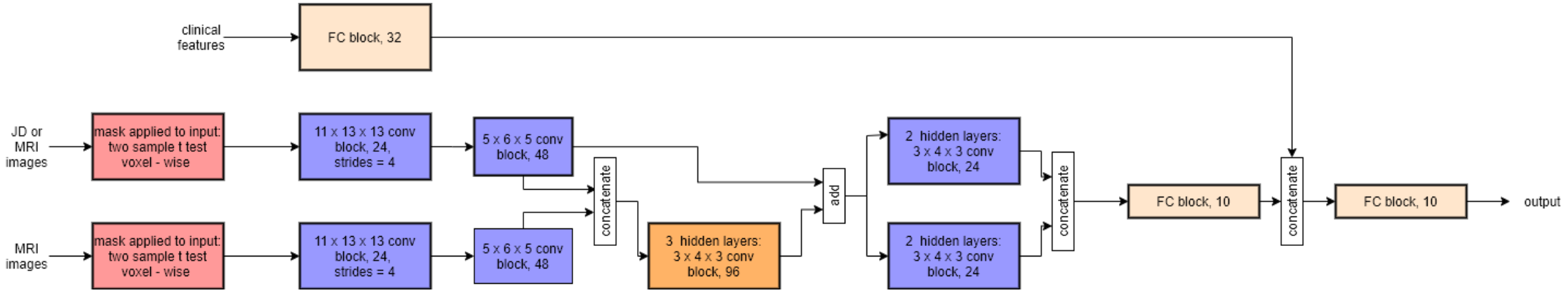
- Deep Learning in connection with statistics





Our architecture

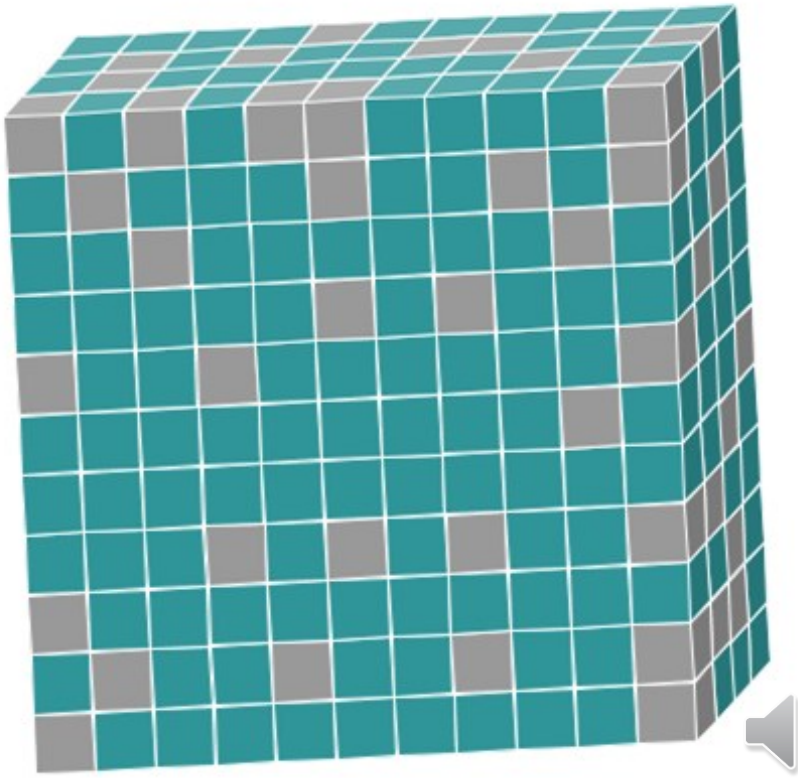




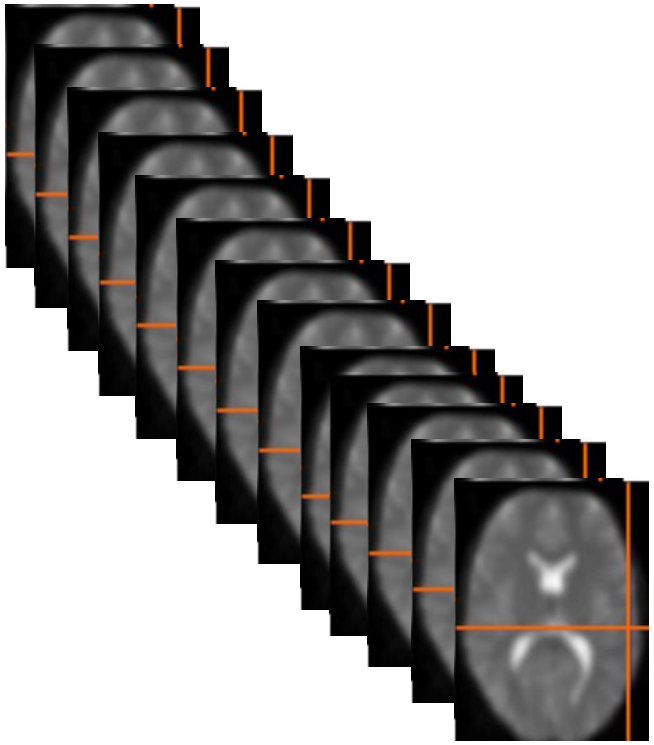
Feature Selection

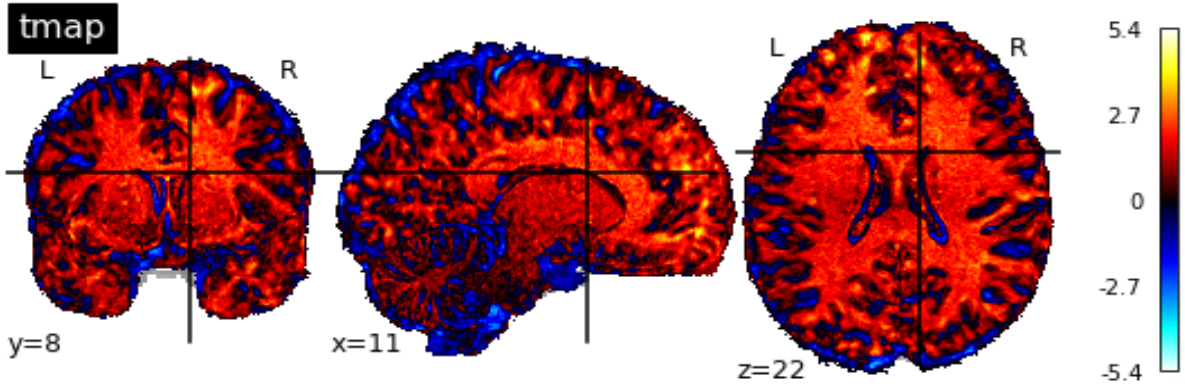
- handcrafted methods in classical machine learning

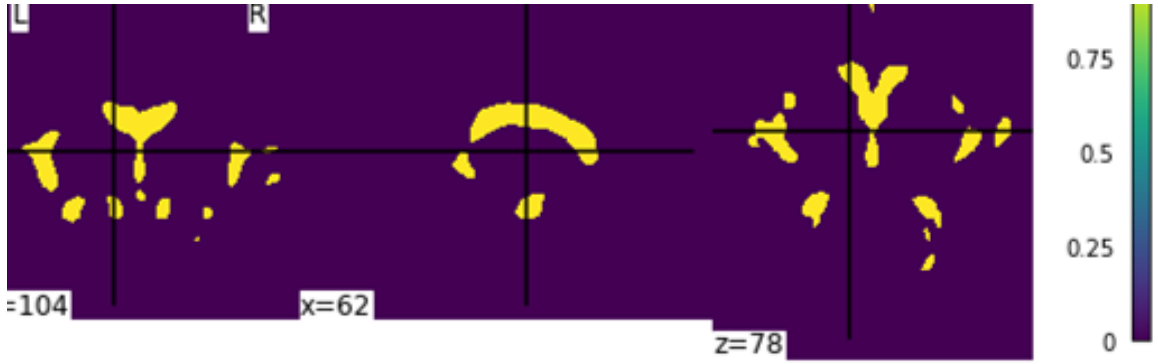
- simplify models
- avoid the curse of dimensionality
- reduce training times
- reduce variance (avoid overfitting)
- not much applied in deep learning



Statistical Parametric Mapping

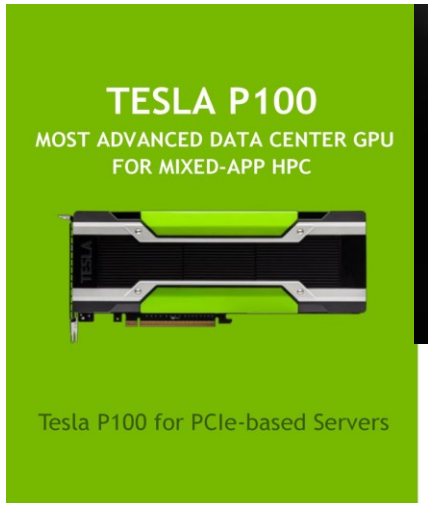


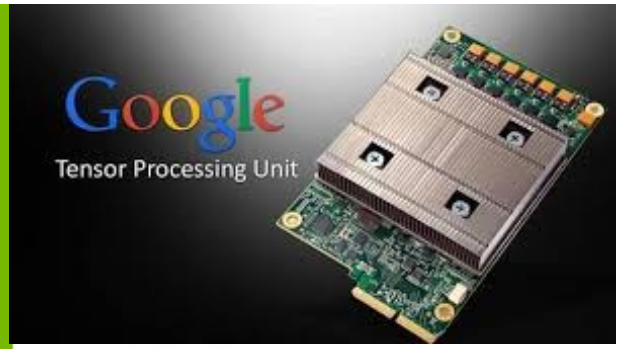




Google colab and cloud computing

Google Colaboratory





TensorFlow

Untitled0.ipynb ☆

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+ Code + Text

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print("Hello World!")
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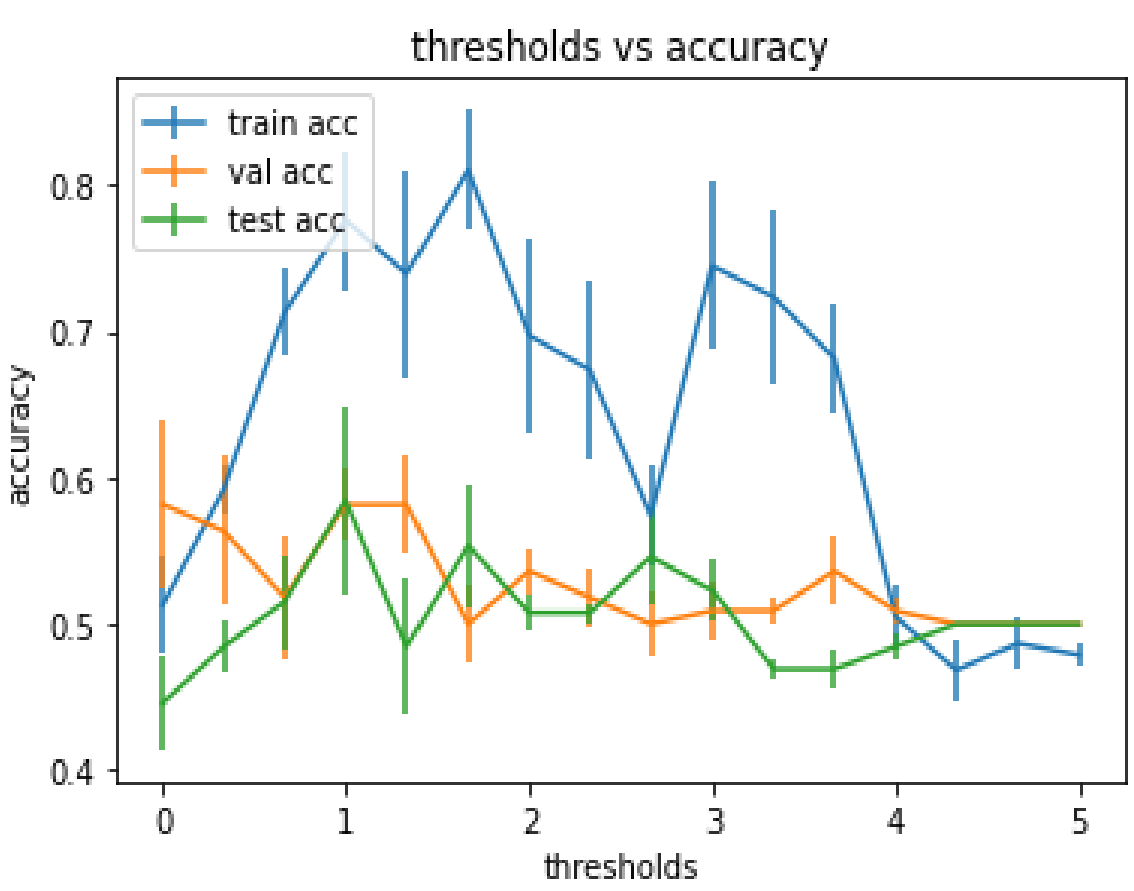
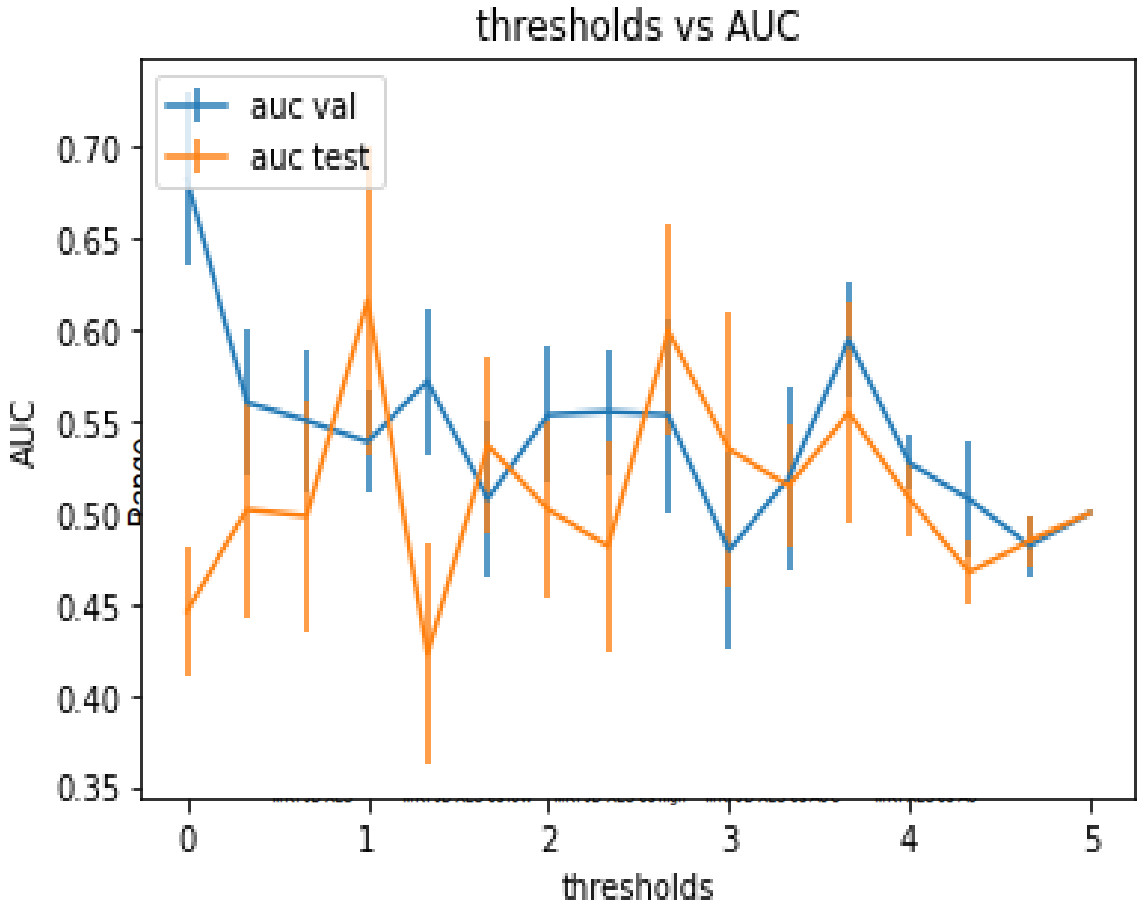
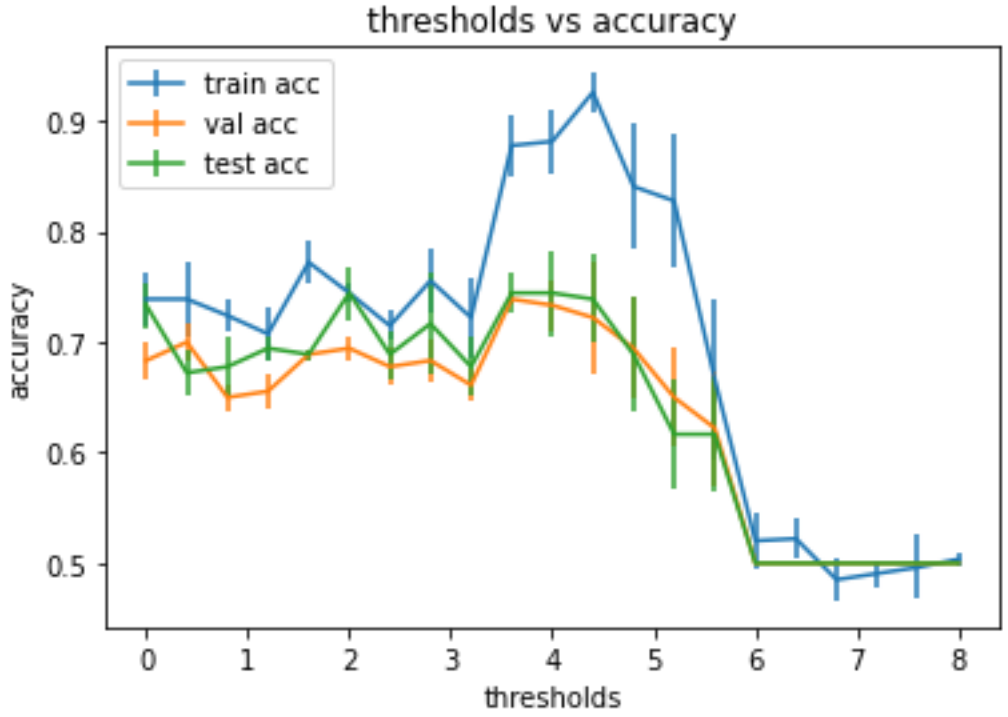
Google Cloud AutoML Vision

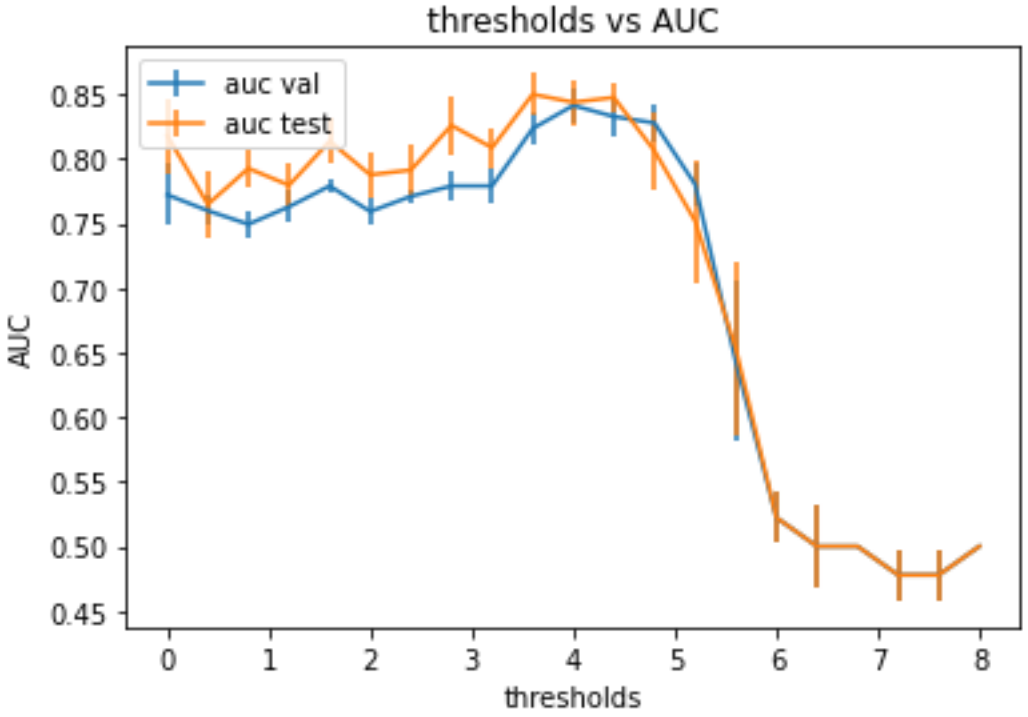
Alcoholism vs Sobriety Results





Results FNIRT 90 + 90 very mild AD vs NC (cdr 0.5)





Final Remarks

- Limits of the model:
    - binary classification
    - what happens in bigger dataset?
- multimodal imaging
- further improvements to the algorithm