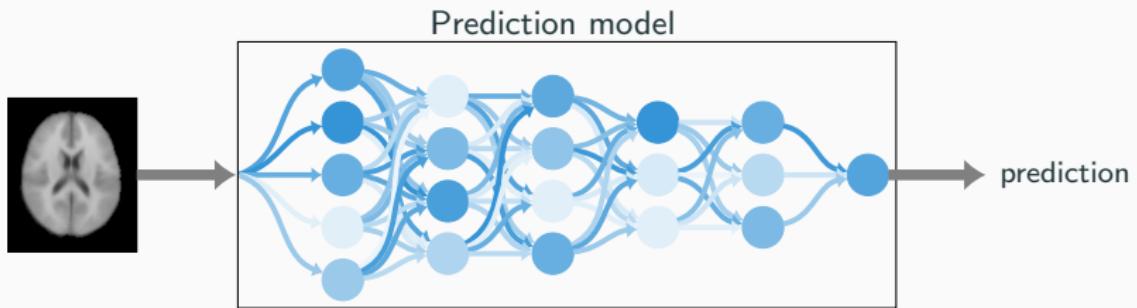


Detecting individual-level deviations in brain morphology in MCI with explainable AI

Esten Høyland Leonardsen

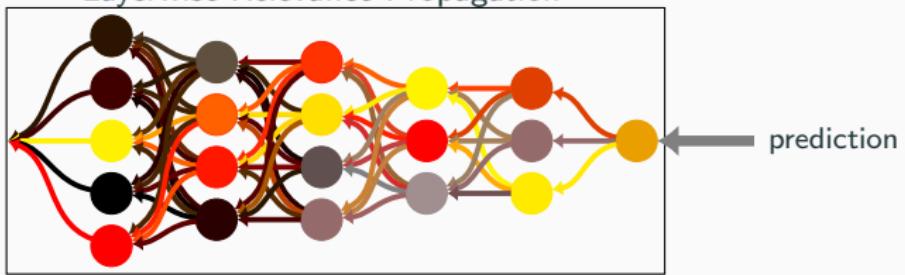
31.08.22

Explainable AI

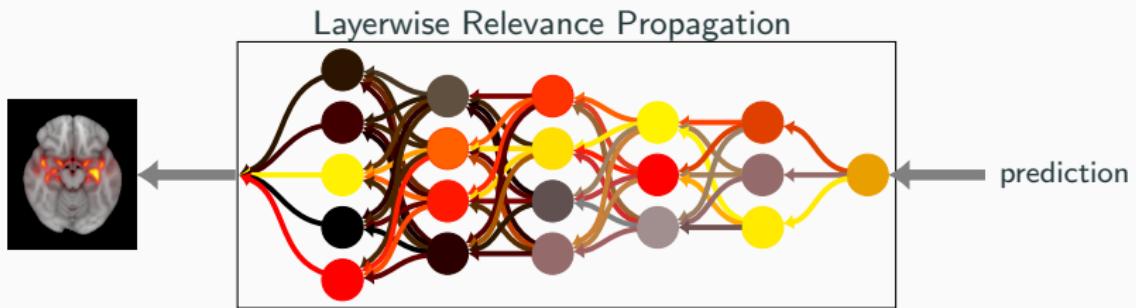


Explainable AI

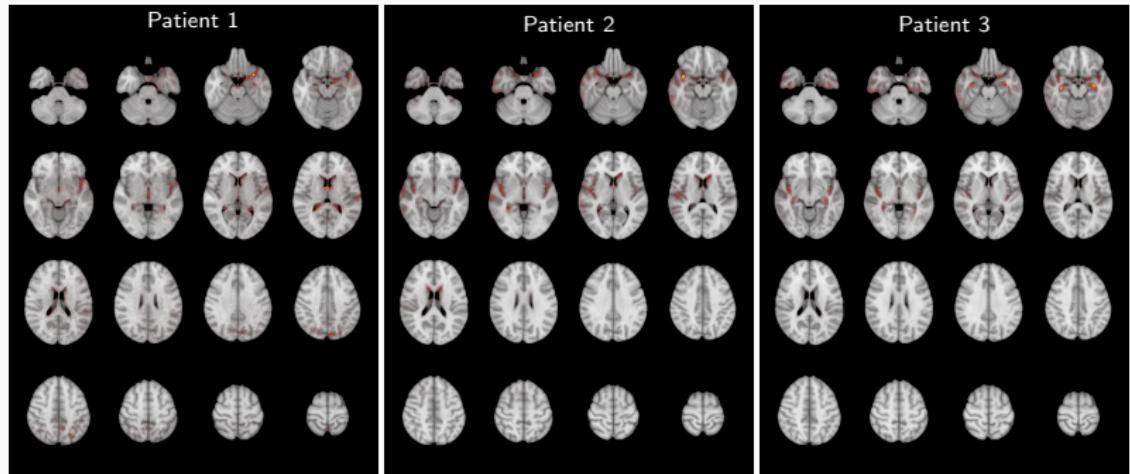
Layerwise Relevance Propagation



Explainable AI

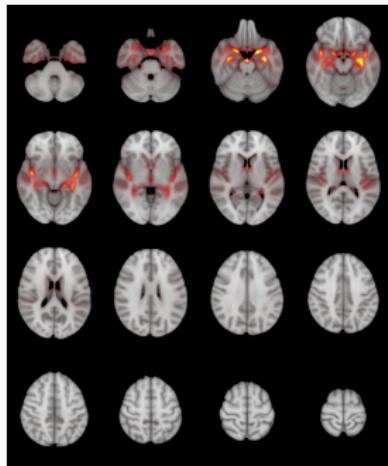


Relevance maps in dementia patients



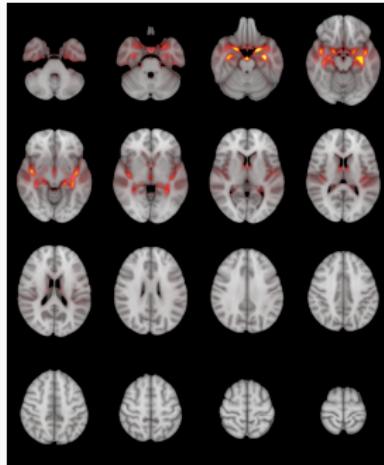
Relevance maps in dementia patients

Average dementia patient

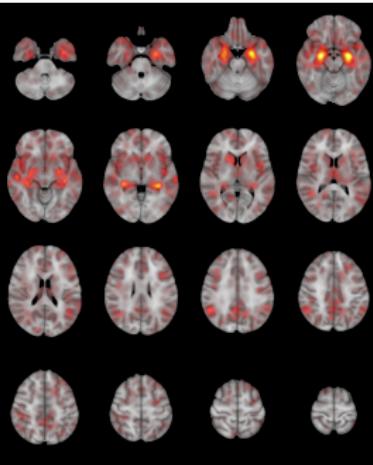


Relevance maps in dementia patients

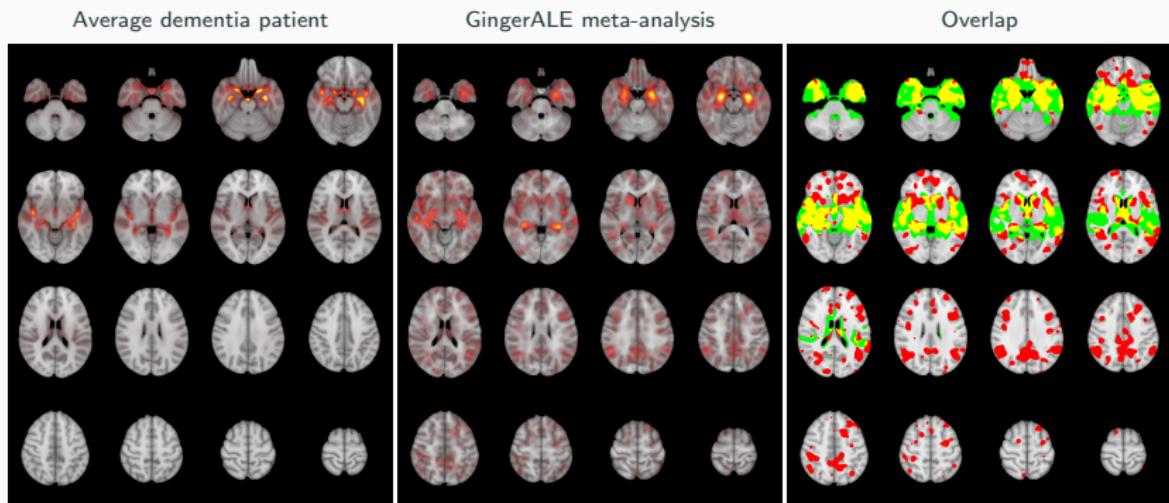
Average dementia patient



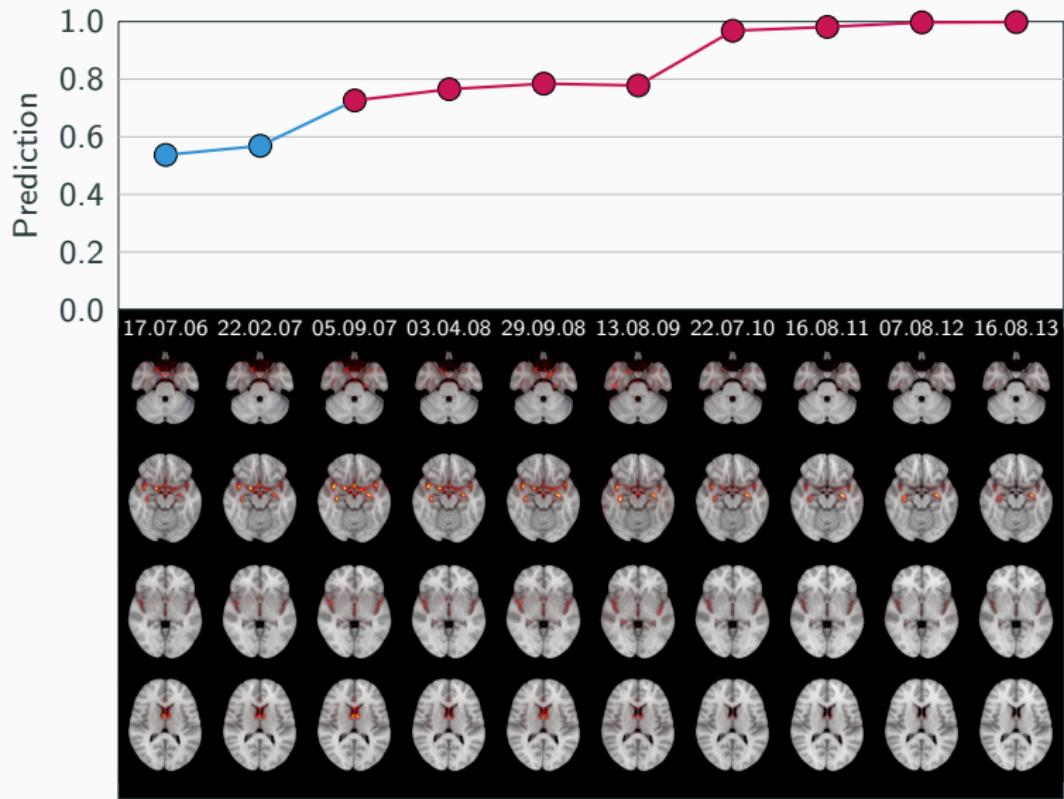
GingerALE meta-analysis



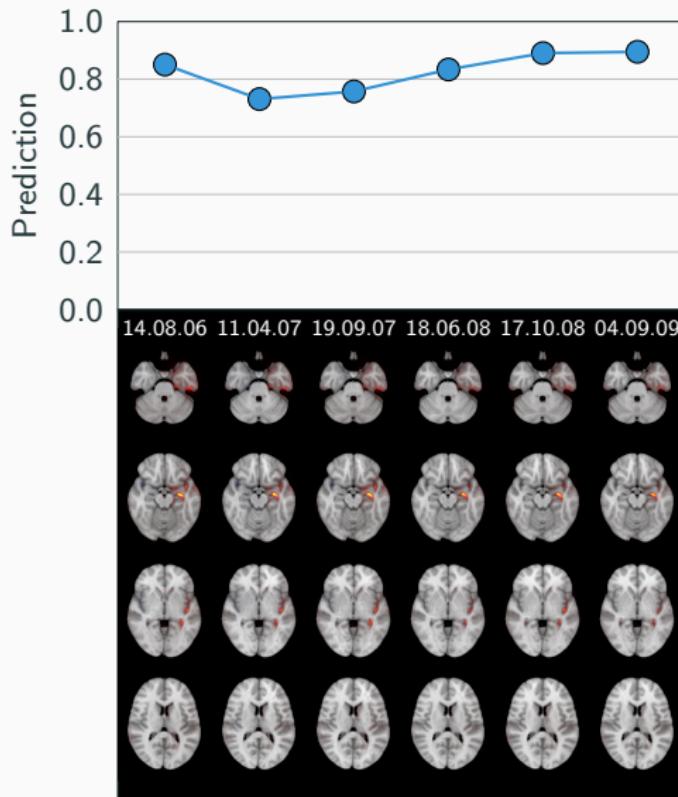
Relevance maps in dementia patients



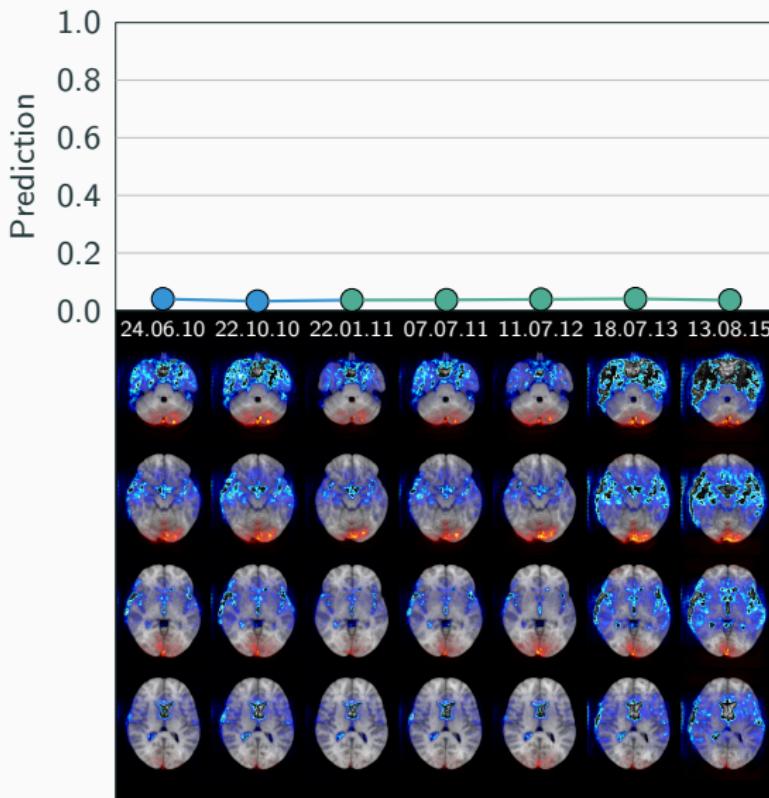
Relevance maps in MCI patients



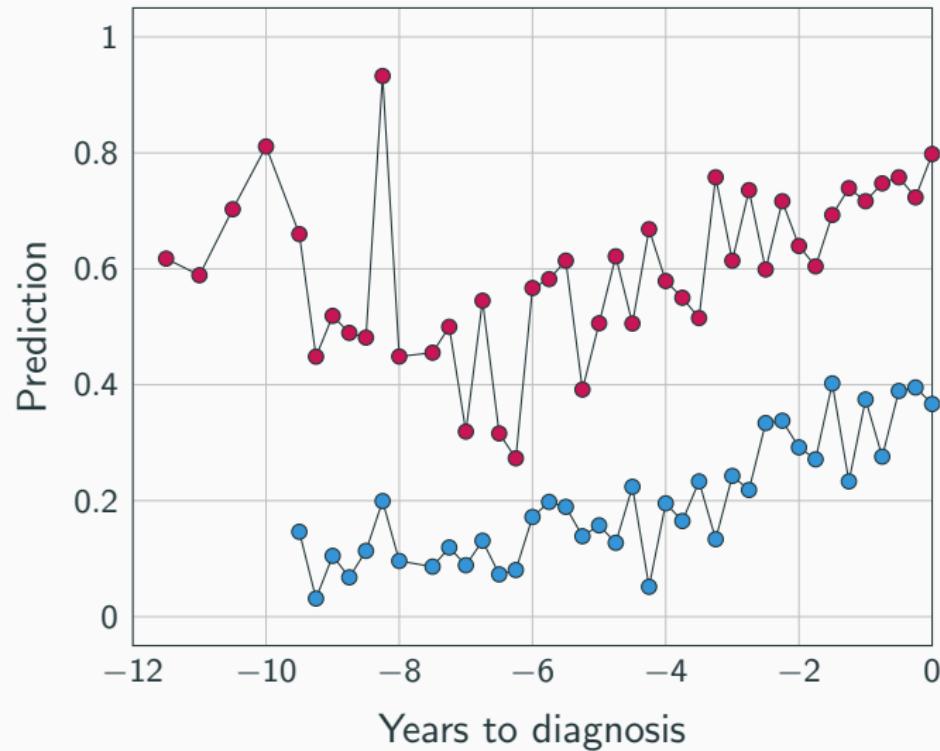
Relevance maps in MCI patients



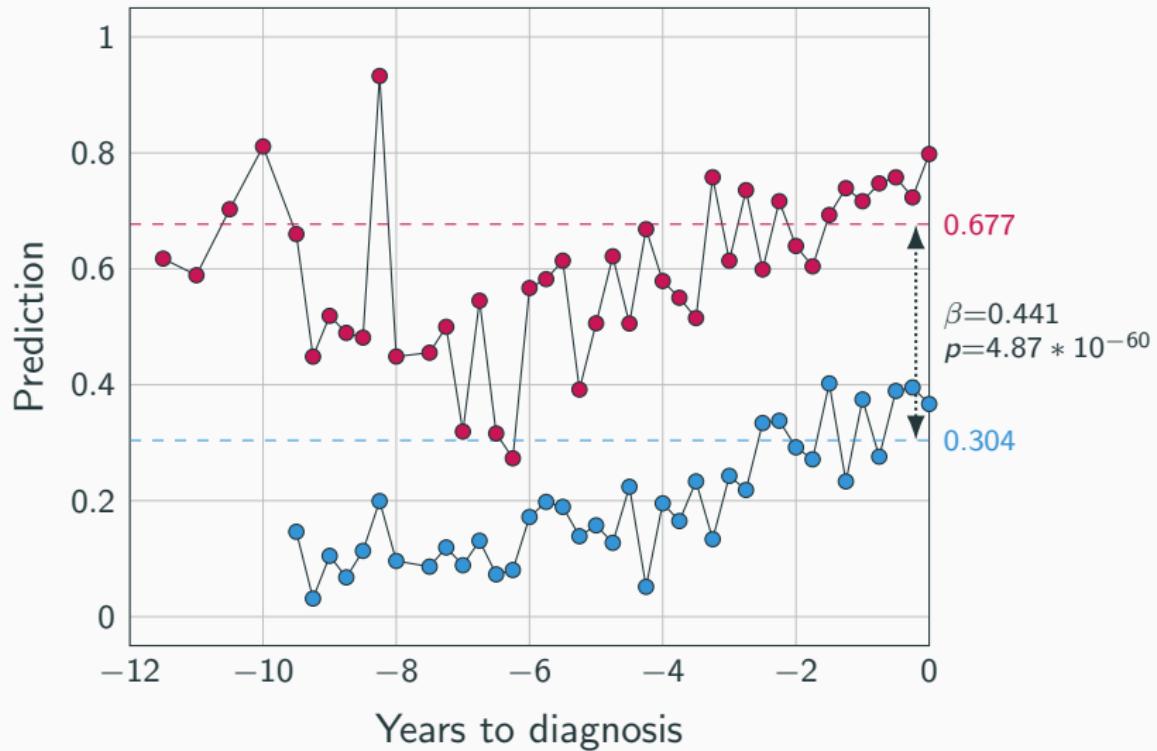
Relevance maps in MCI patients



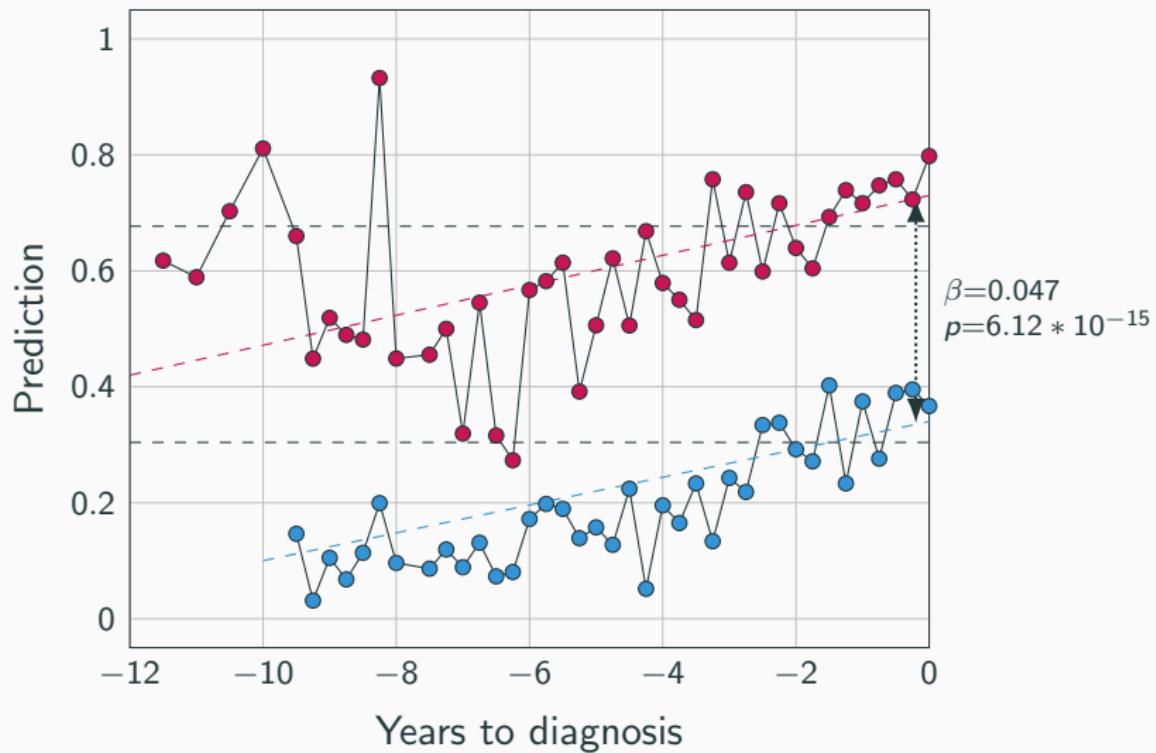
Relevance maps in MCI patients



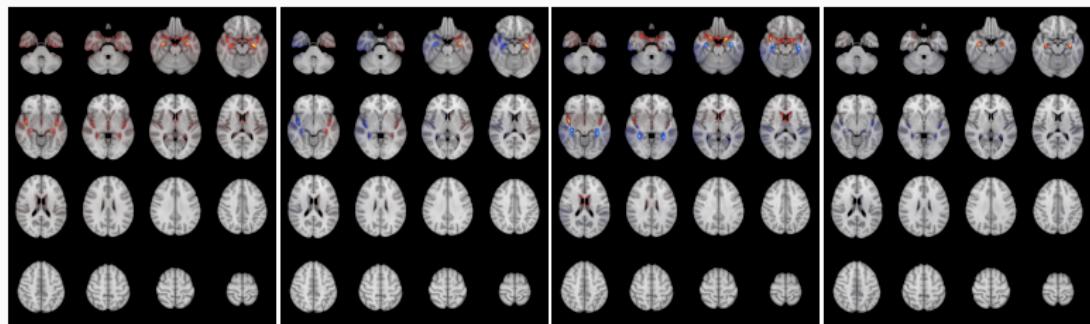
Relevance maps in MCI patients



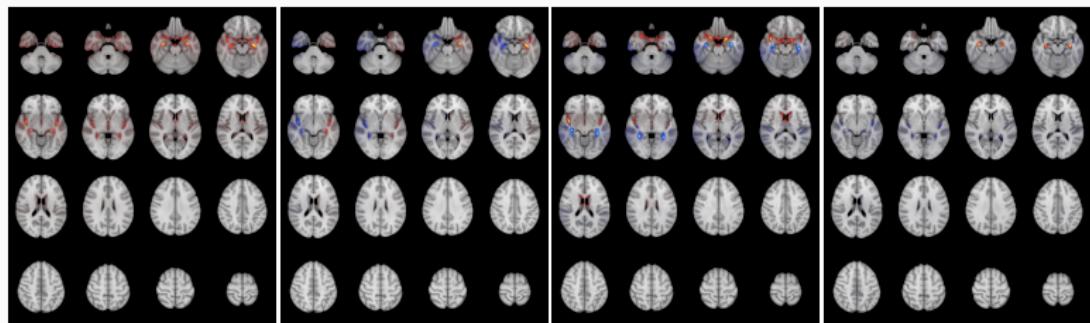
Relevance maps in MCI patients



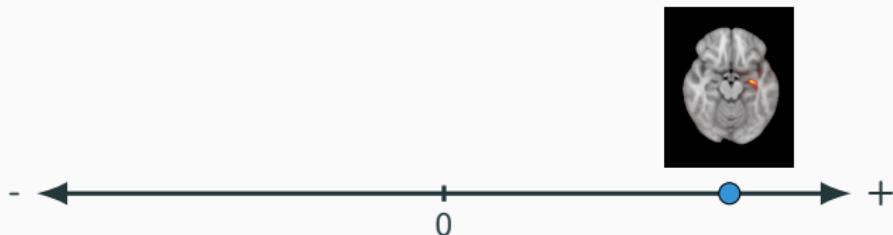
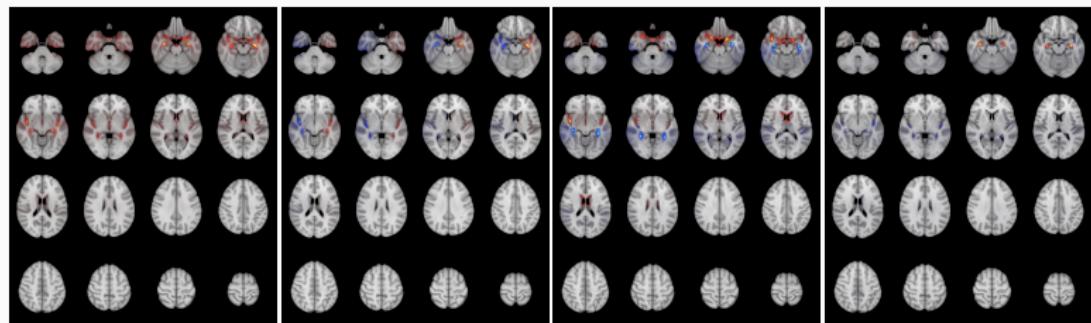
Relevance maps in MCI patients



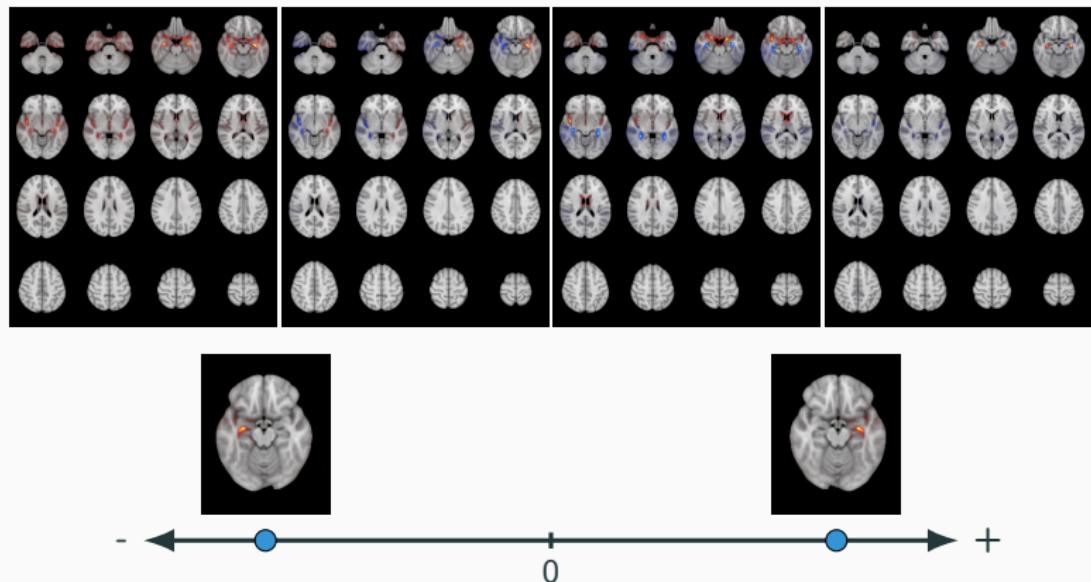
Relevance maps in MCI patients



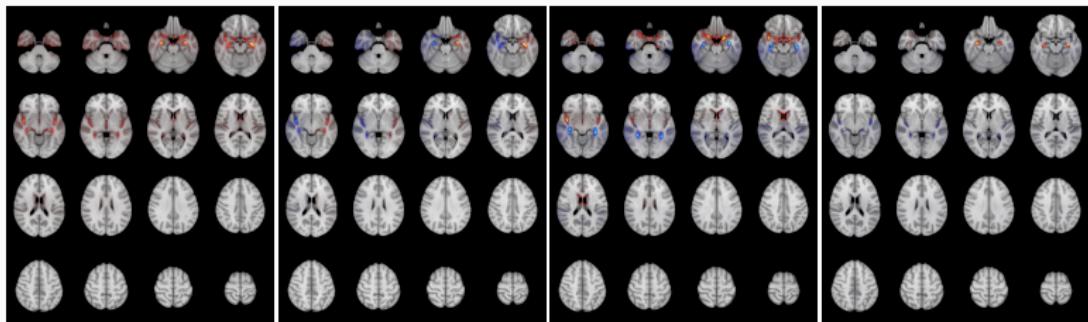
Relevance maps in MCI patients



Relevance maps in MCI patients



Relevance maps in MCI patients



$$p=1.19 * 10^{-15}$$

$$p=6.62 * 10^{-4}$$

$$p=1.06 * 10^{-5}$$

Summary

- A pipeline for describing individual-level deviations in brain morphology related to dementia using deep learning and explainable AI
 - Corroborates existing knowledge
 - Is predictive of future outcomes
- Use cases?
 - Fully data-driven, hypothesis-free, characterization of the brain which can be used for e.g. subtyping
 - Clinical tool?