

# **Detecting individual-level deviations in brain morphology in MCI using explainable AI**

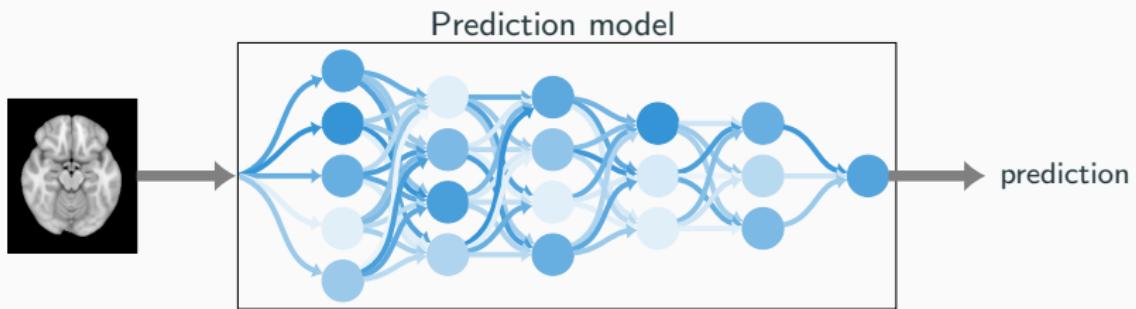
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Esten Høyland Leonardsen

02.09.22

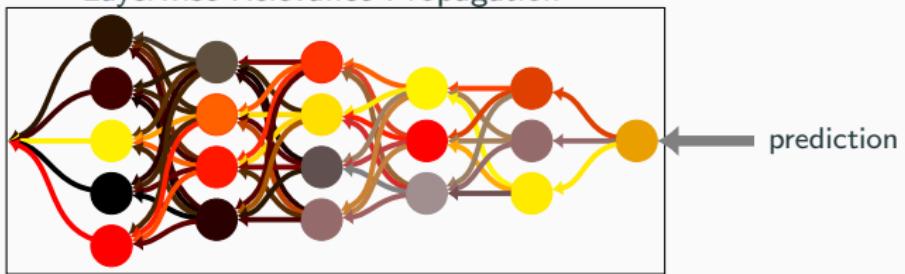
UiO:Life Science, University of Oslo

# Explainable AI

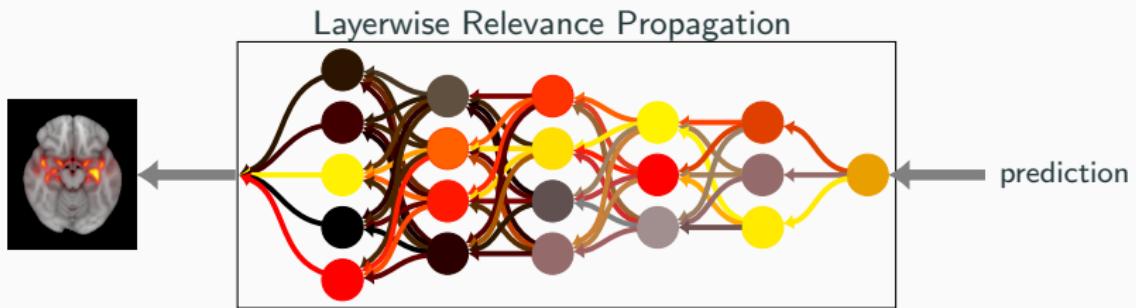


# Explainable AI

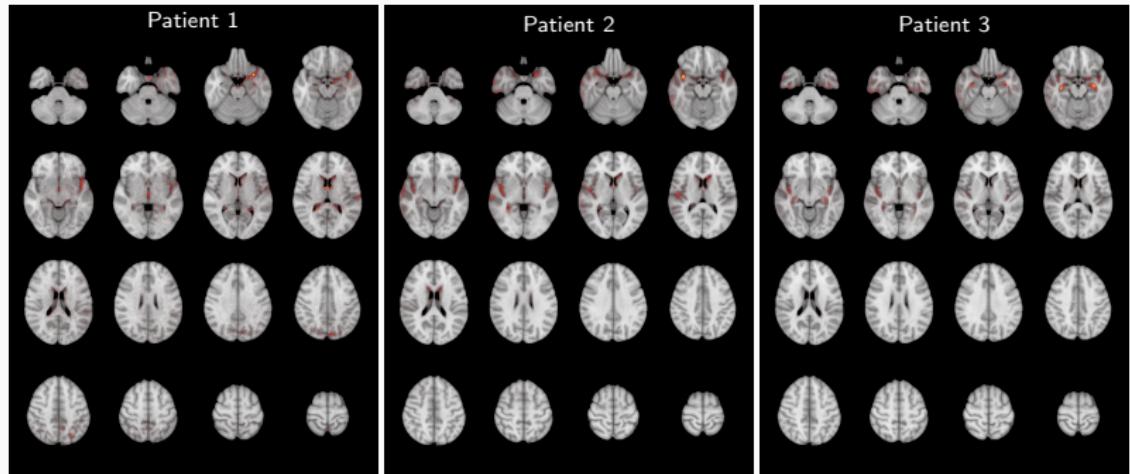
Layerwise Relevance Propagation



# Explainable AI

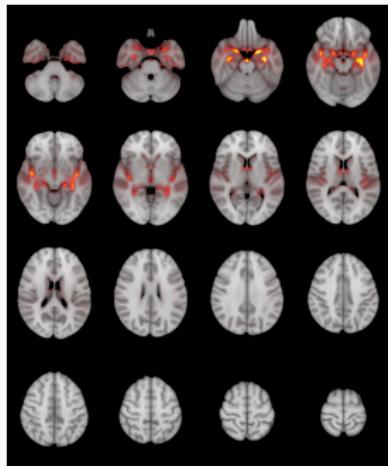


# Relevance maps in dementia patients



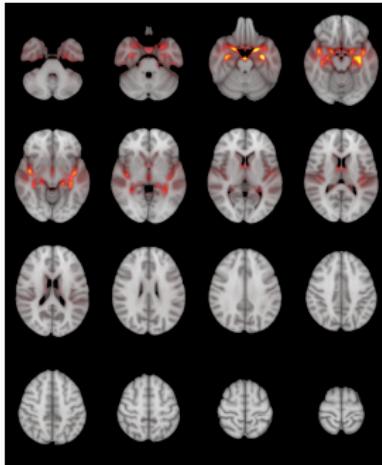
# Relevance maps in dementia patients

Average dementia patient

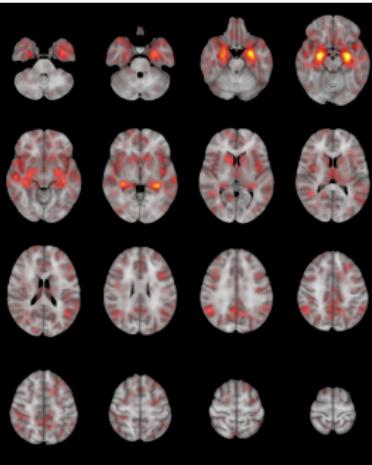


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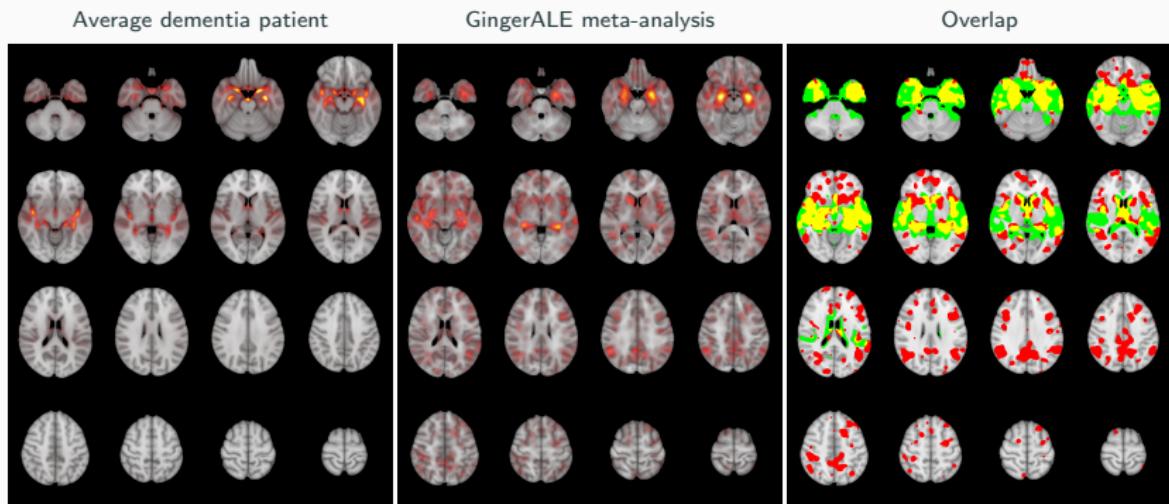
Average dementia patient



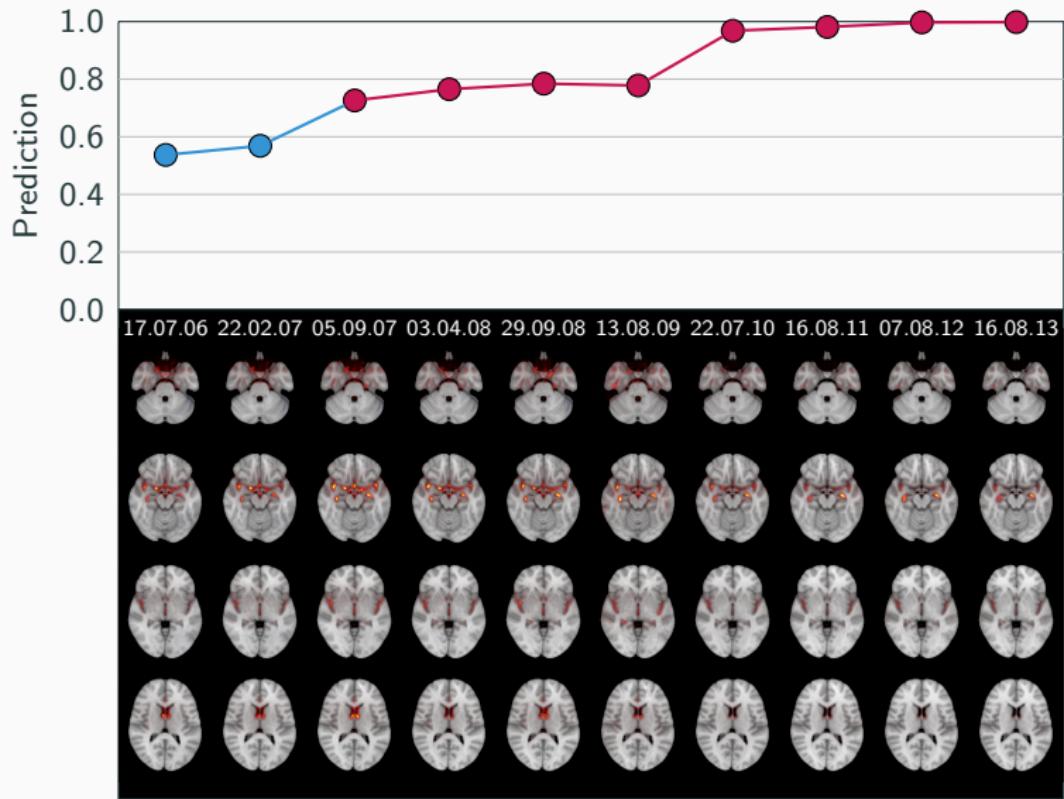
GingerALE meta-analysis



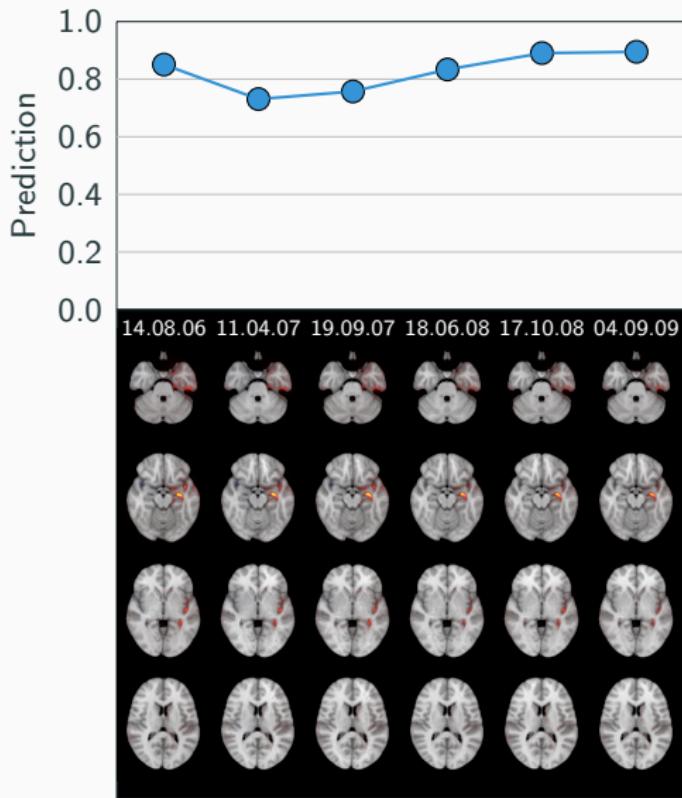
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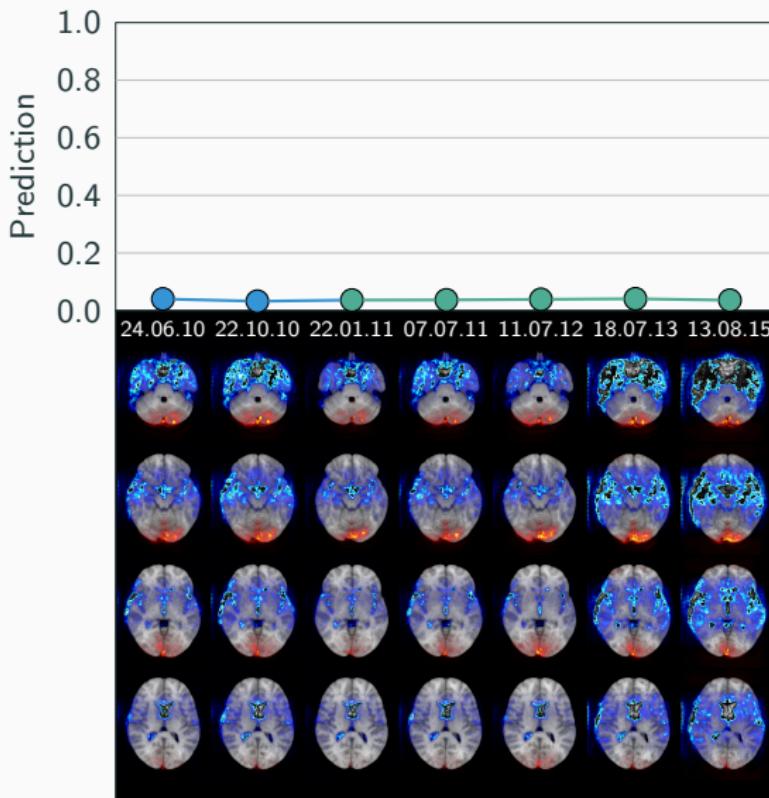
# Relevance maps in MCI patients



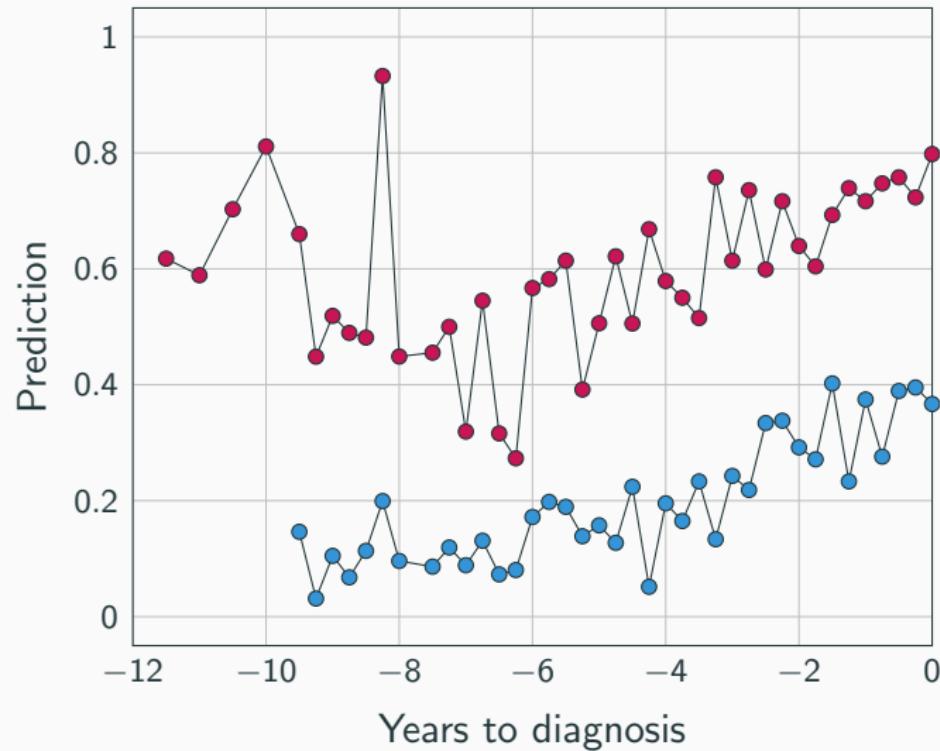
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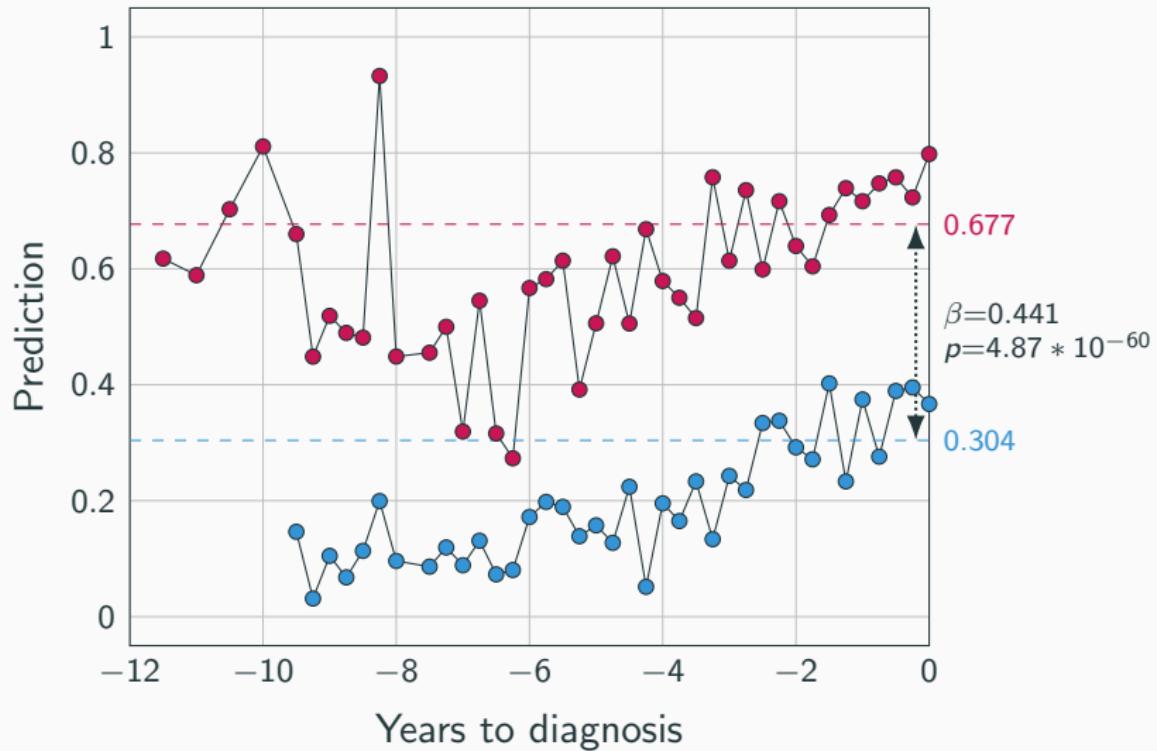
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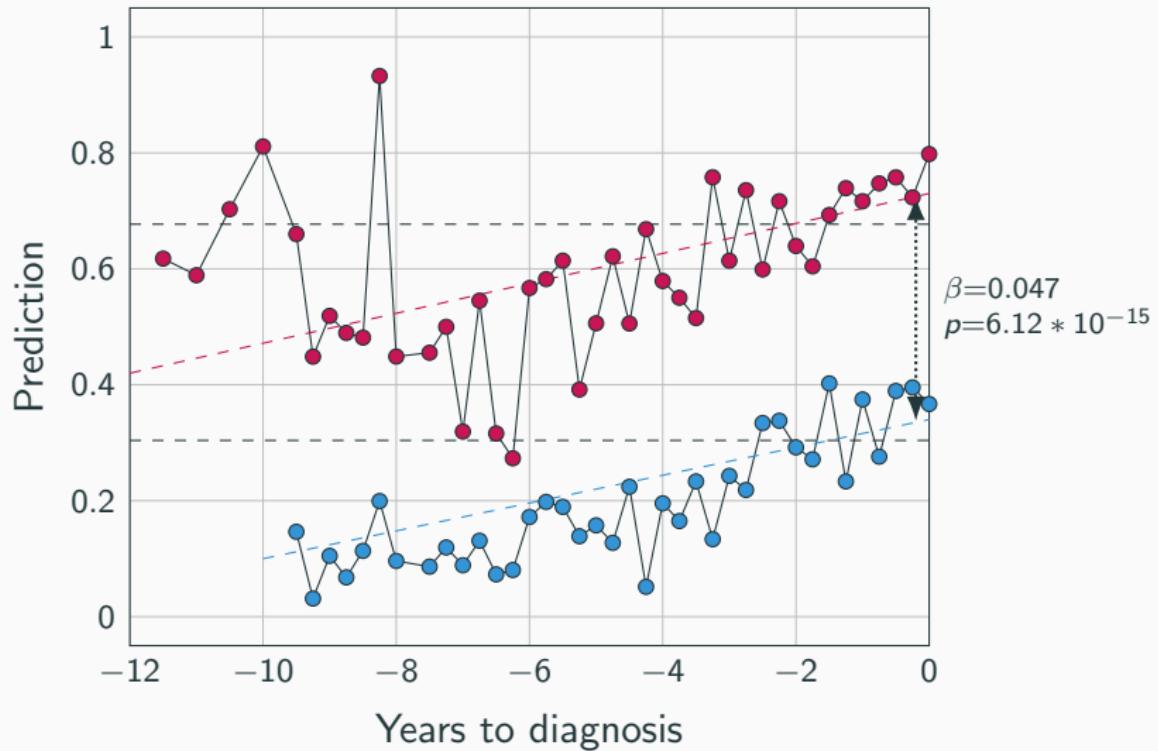
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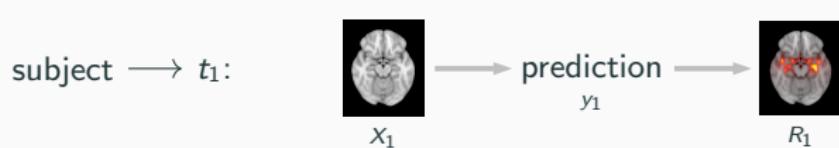
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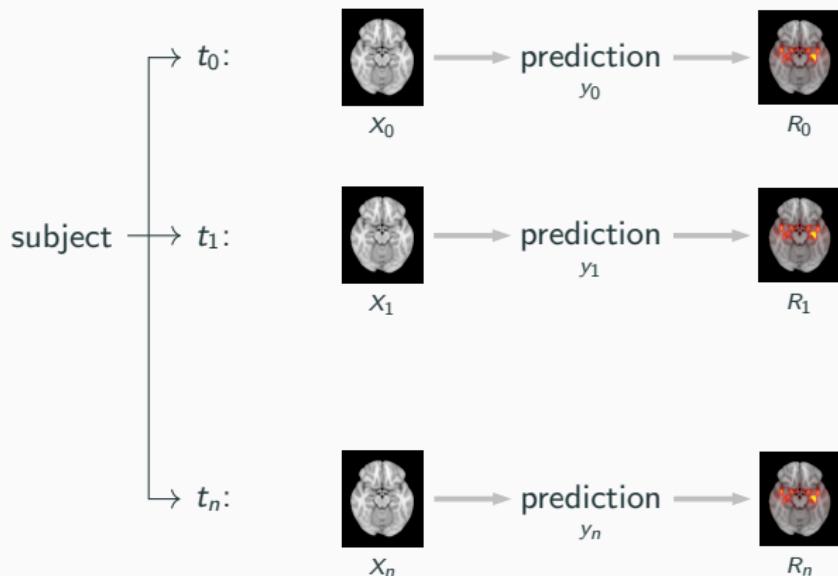
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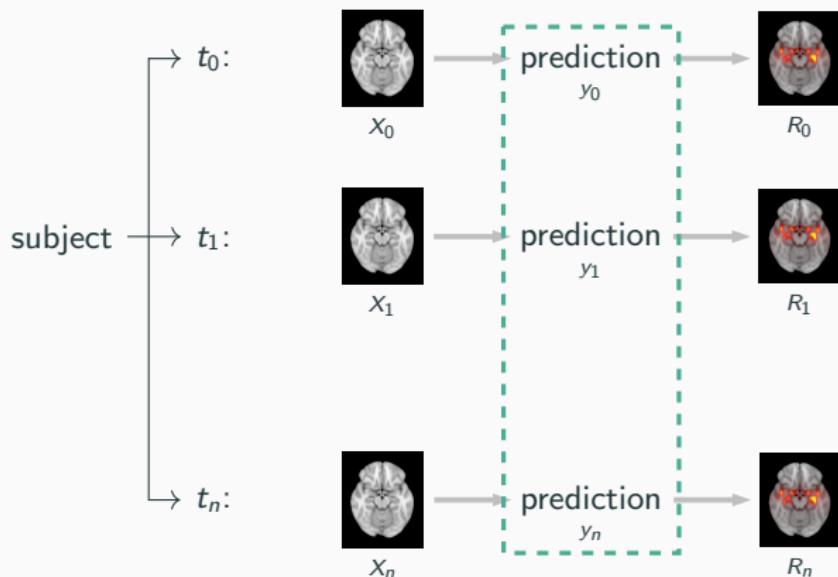
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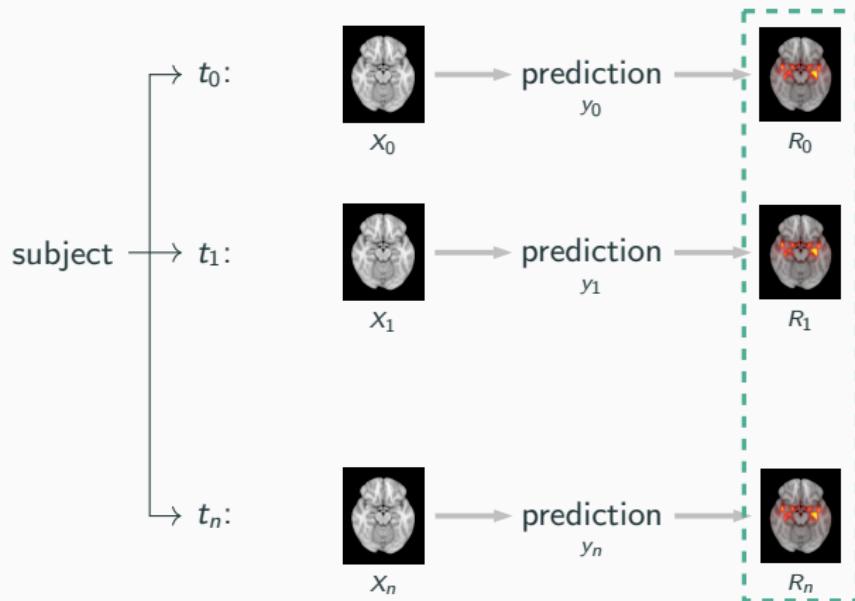
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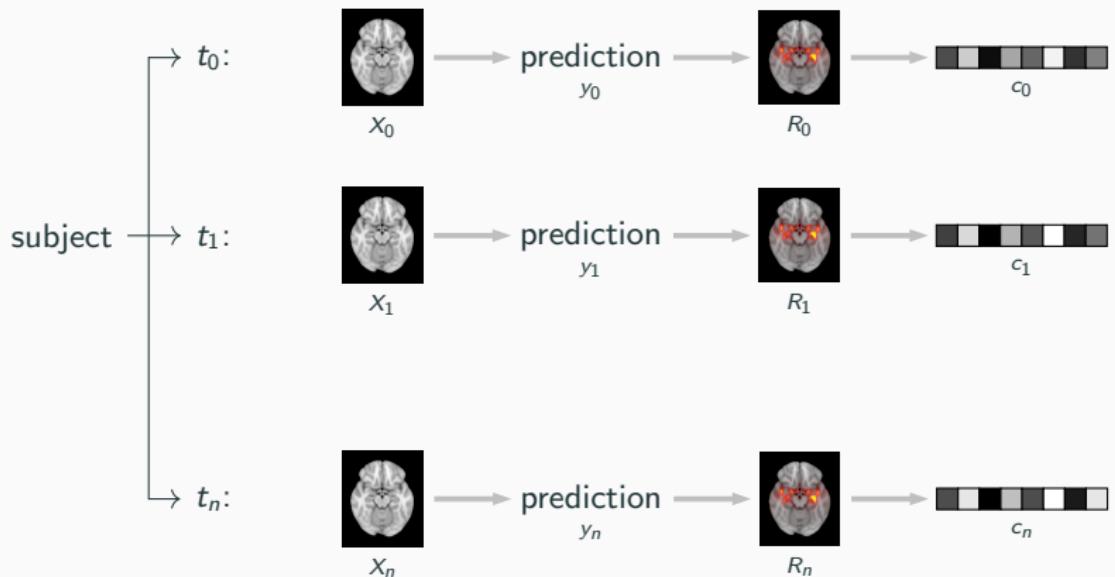
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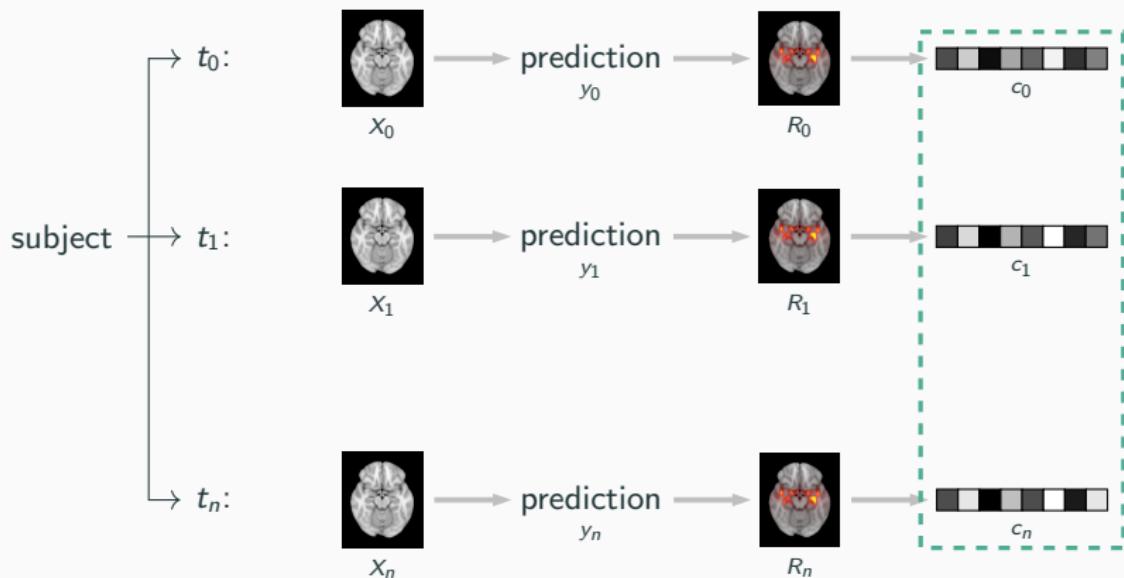
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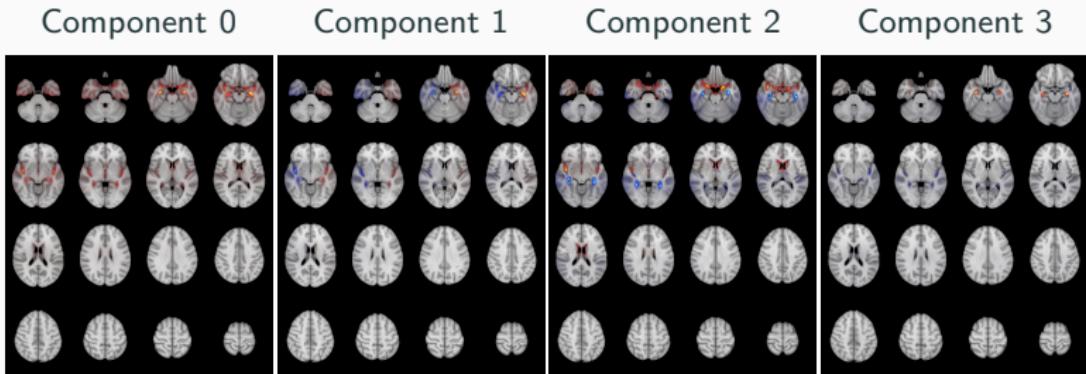
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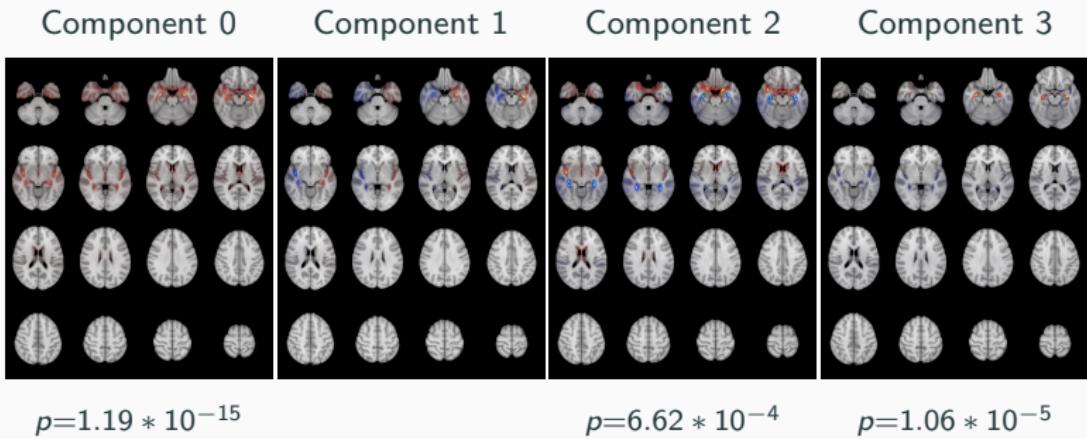
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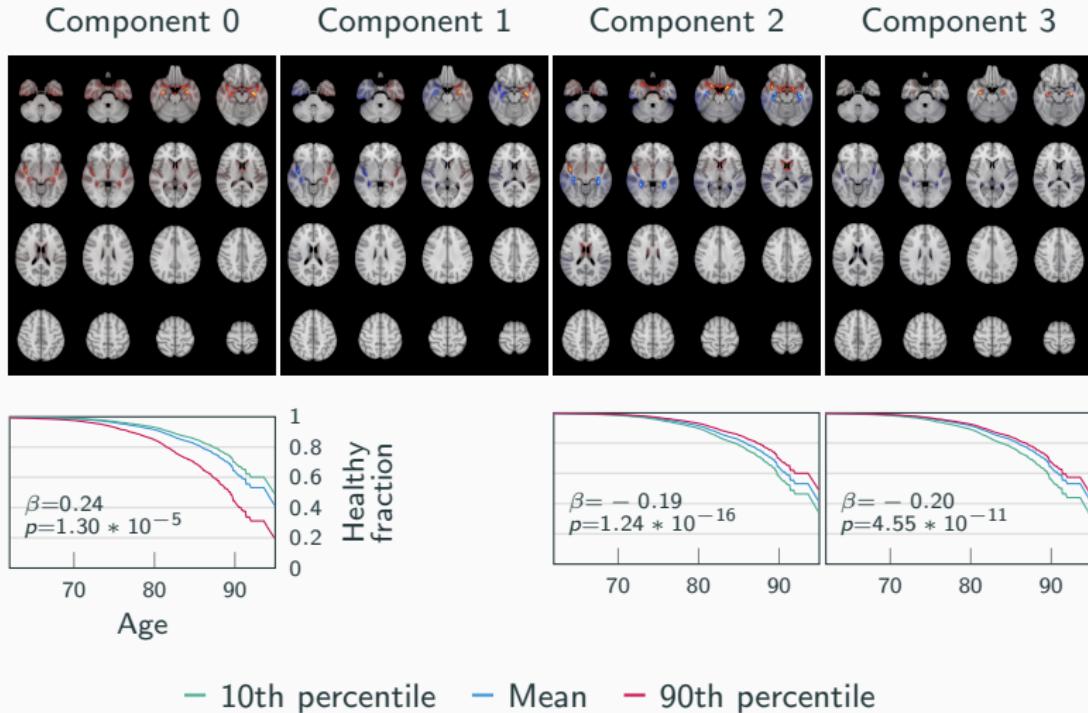
# Relevance maps in MCI patients



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# Summary

- A pipeline for describing individual-level deviations in brain morphology related to dementia<sup>1</sup> using deep learning and explainable AI
  - Corroborates existing knowledge
  - Is predictive of future outcomes
- Use cases?
  - Fully data-driven characterization of the brain which can be used for e.g. subtyping
  - Clinical tool?

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<sup>1</sup>Could be applied to any other neurological condition