

Explainable AI and dementia

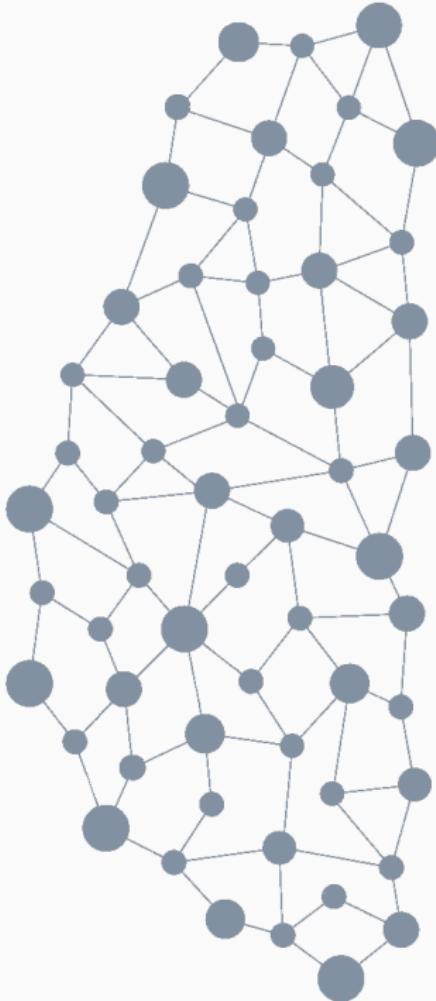
Enabling personalized dementia care with cutting-edge technology



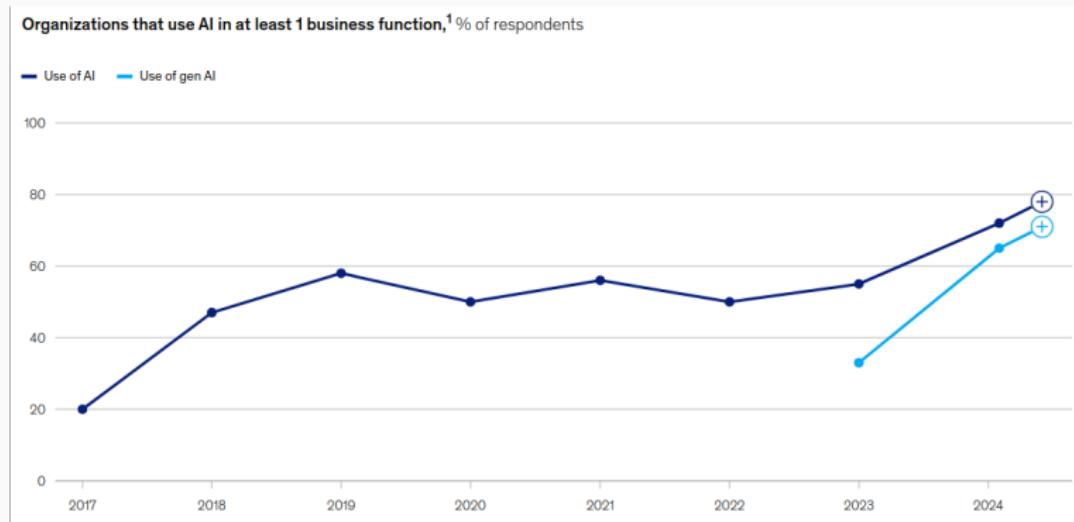
Esten H. Leonardsen

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Post-doc at the Department of
Psychology, University of Oslo

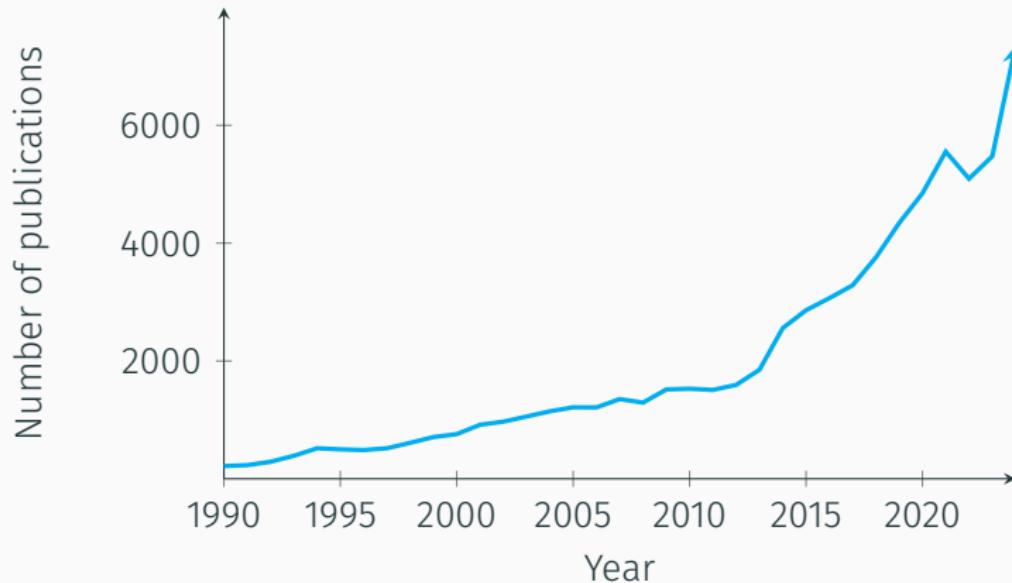


Do we need explainable AI?



McKinsey & Company, *The state of AI: How organizations are rewiring to capture value* (2025),
<https://www.mckinsey.com/capabilities/quantumblack/our-insights/the-state-of-ai>

Do we need explainable AI?



Publications from <https://pubmed.ncbi.nlm.nih.gov/> containing "(neurology OR neuroscience OR neuroimaging)
AND (ai OR artificial intelligence OR deep learning)"

Do we need explainable AI?



Advisor Line Tveiten and project manager Bjørn Anton Graff demonstrating "BoneView" from Vestre Viken Hospital, image from www.vestreviken.no

Do we need explainable AI?

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AI in medicine must be explainable

[Shinjini Kundu](#) 

[Nature Medicine](#) 27, 1328 (2021) | [Cite this article](#)

Shinji Kundu (2021). AI in medicine must be explainable. *Nature Medicine*.

Do we need explainable AI?

Table 4. Major AI Adoption Barriers in Iran (Top Three Selected).

Barriers to AI Adoption	Frequency (n)	Percentage (%)
Lack of AI training/education	86	67.2%
AI reliability/trust issues	67	52.3%
Legal and ethical concerns	59	46.1%
Lack of AI integration in hospitals	41	32.0%
High cost and infrastructure deficits	38	29.7%

Soleimantabar, H. et al. (2025). Artificial Intelligence in Radiology: Perceptions, Adoption Barriers, and Trust Among Iranian Radiologists in a Global Context. *InfoScience Trends*.

Do we need explainable AI?

"High-risk AI systems shall be designed and developed in such a way as to ensure that their operation is sufficiently transparent to enable deployers to interpret a system's output and use it appropriately"

- EU AI Act, Article 13

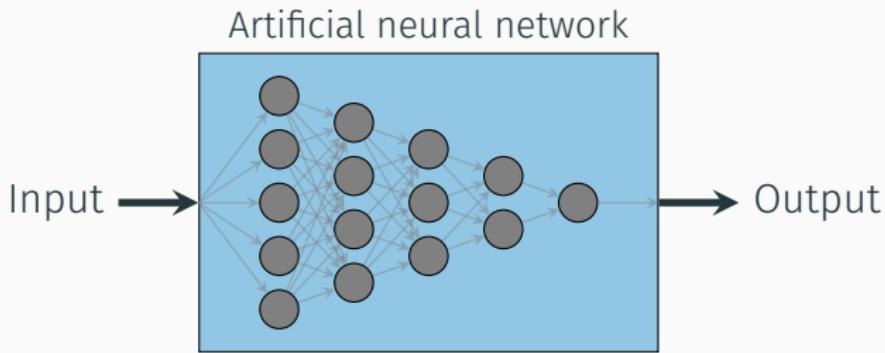
"The instructions for use [of an AI system] shall contain at least the following information: [...], information to enable deployers to interpret the output of the high-risk AI system and use it appropriately"

- EU AI Act, Article 13

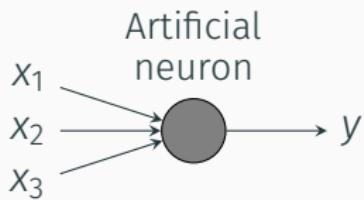
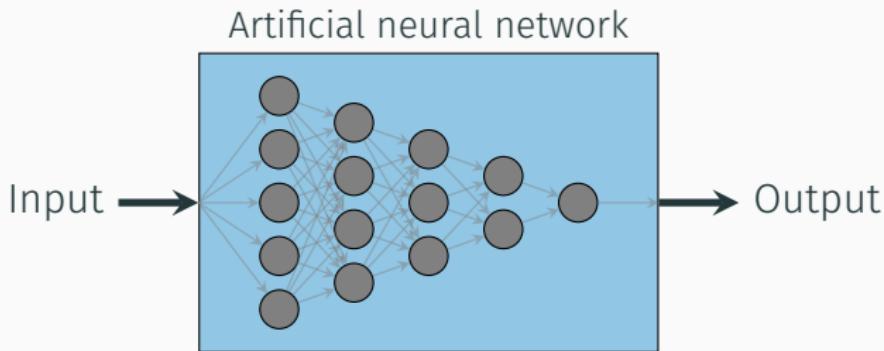
"[The] high-risk AI system shall be provided to the deployer in such a way that natural persons to whom human oversight is assigned are enabled to correctly interpret the high-risk AI system's output"

- EU AI Act, Article 14

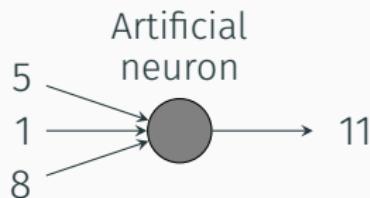
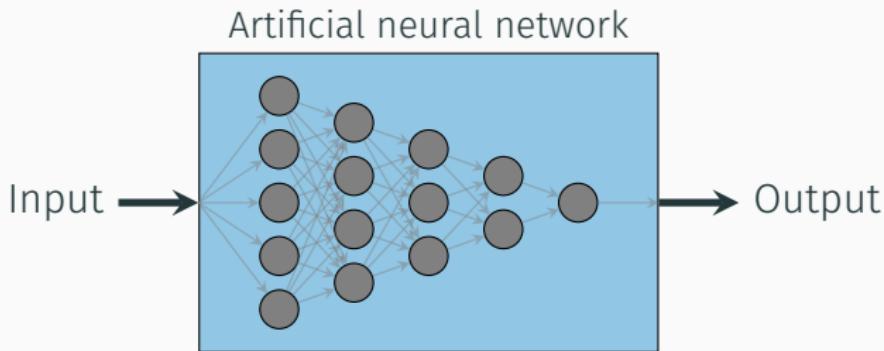
What is explainable AI?



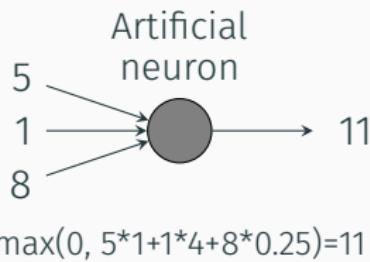
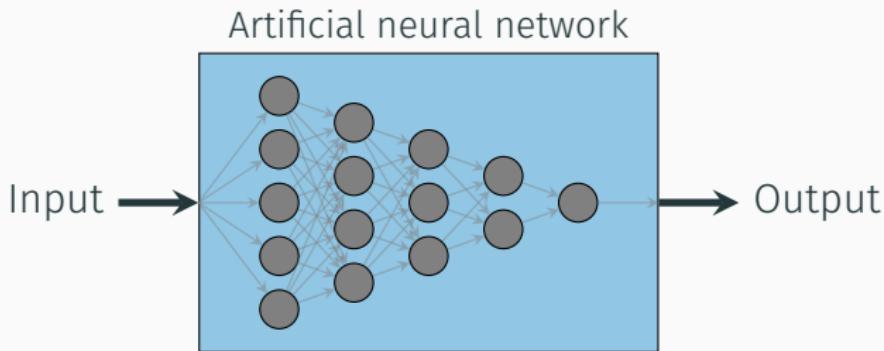
What is explainable AI?



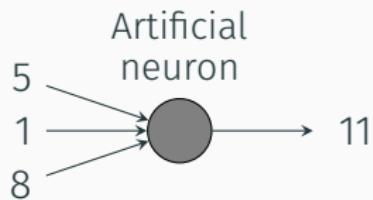
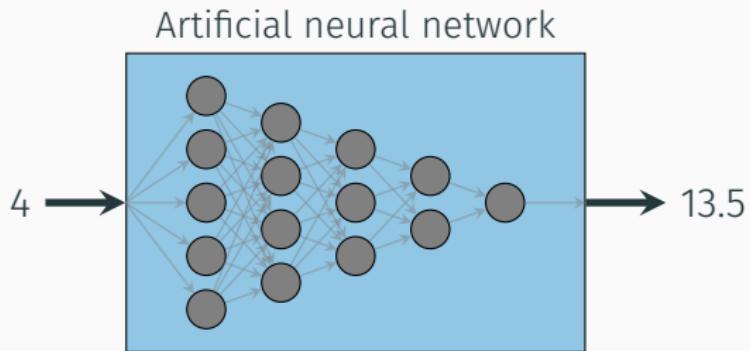
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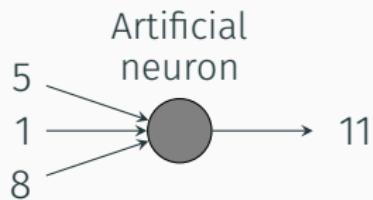
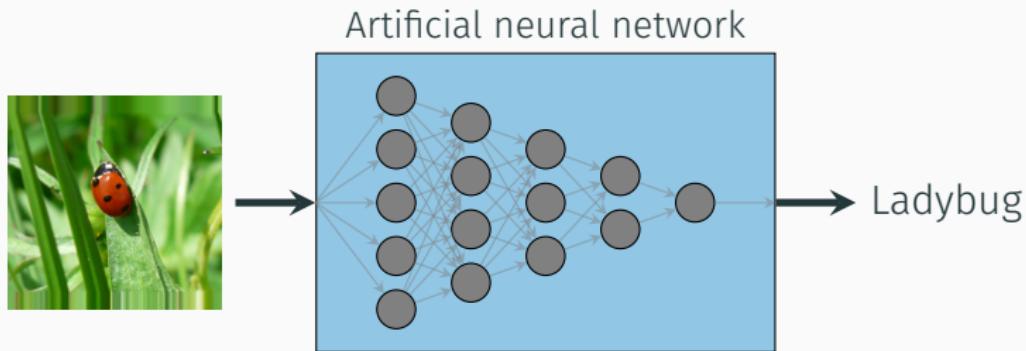
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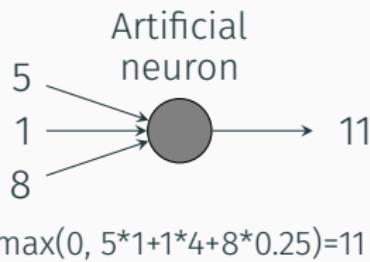
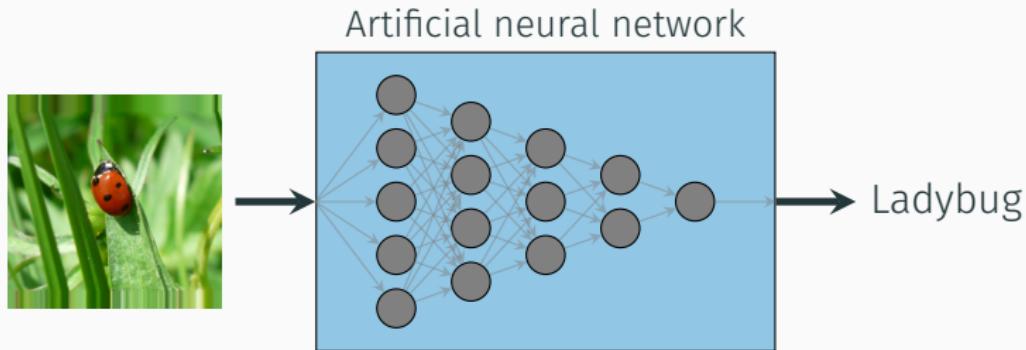
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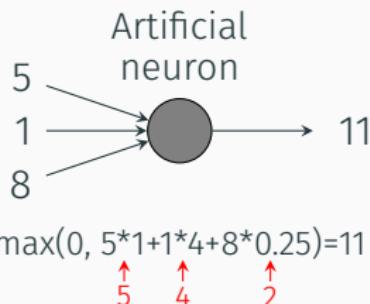
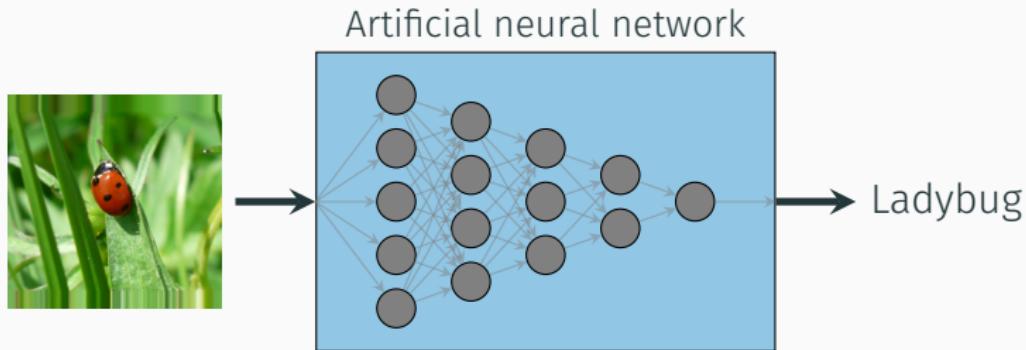
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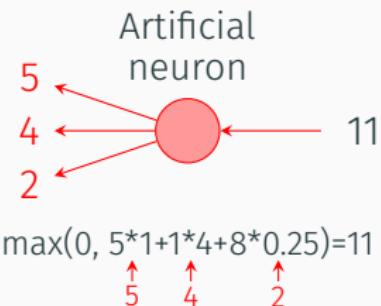
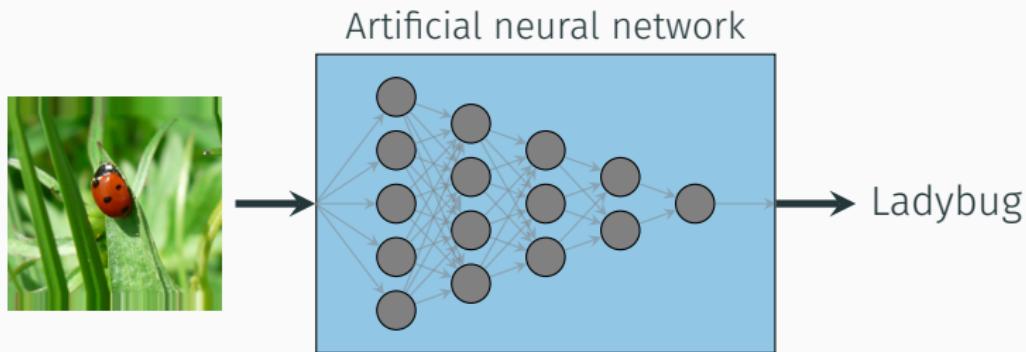
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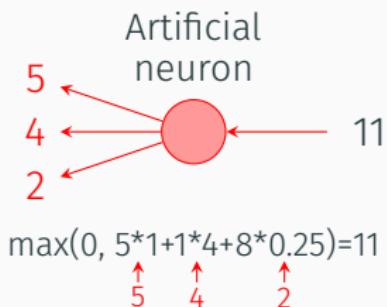
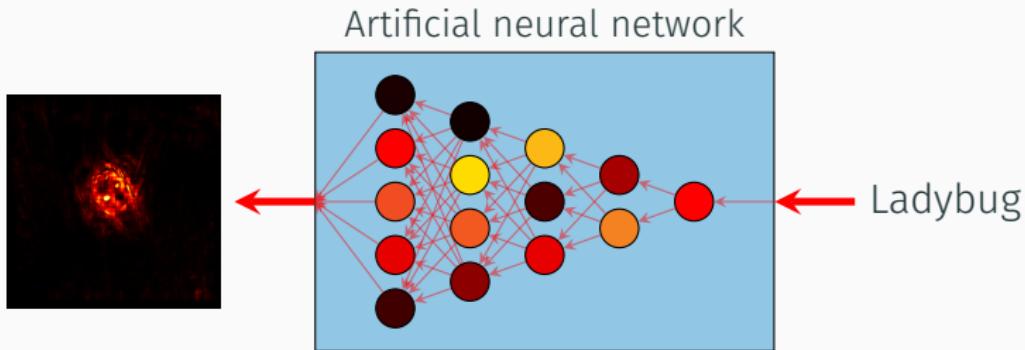
What is explainable AI?



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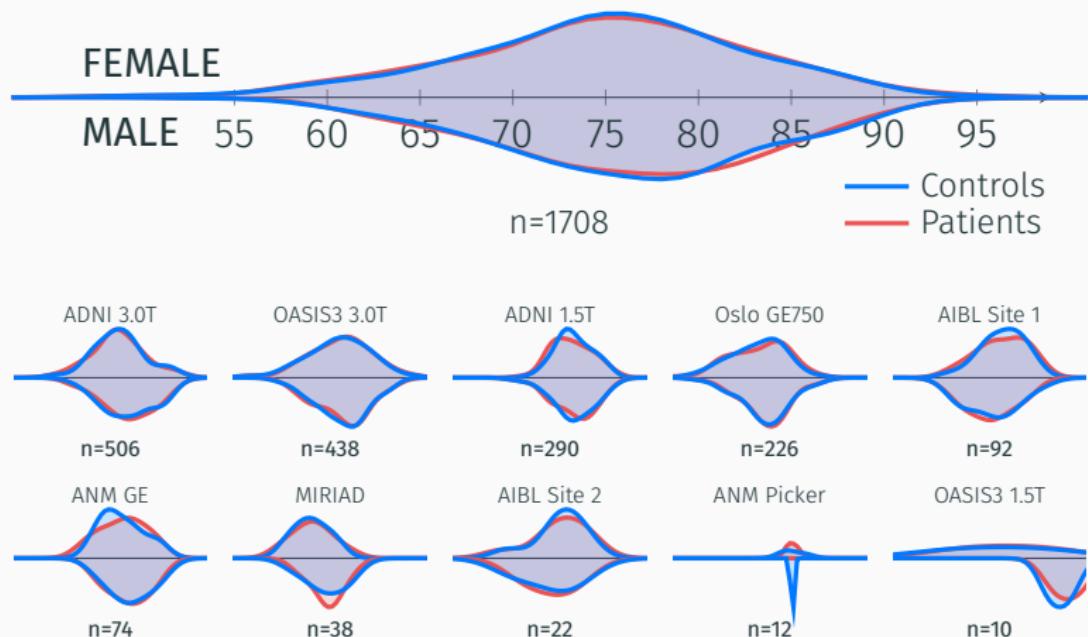


What is explainable AI?



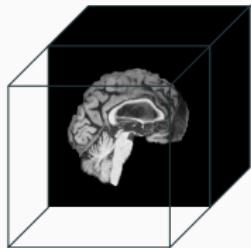
XAI and dementia

XAI and dementia

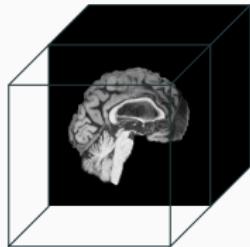


Leonardsen et al., *Constructing personalized characterizations of structural brain aberrations in patients with dementia using explainable artificial intelligence* (2024), <https://www.nature.com/articles/s41746-024-01123-7>

XAI and dementia

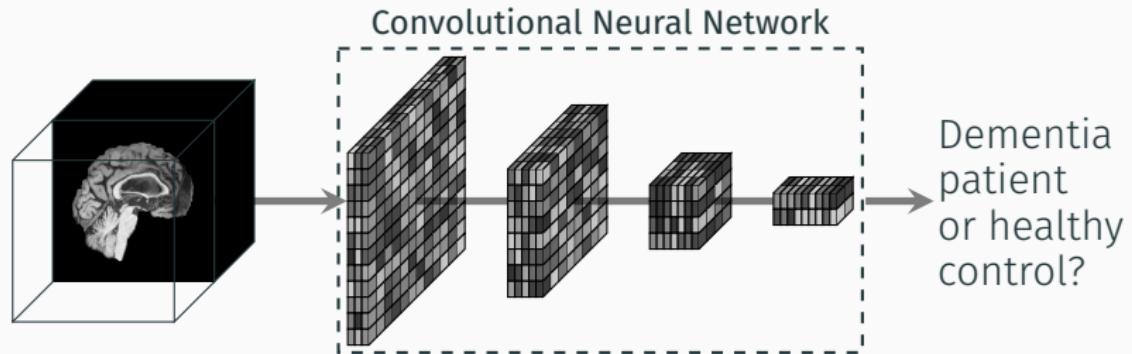


XAI and dementia

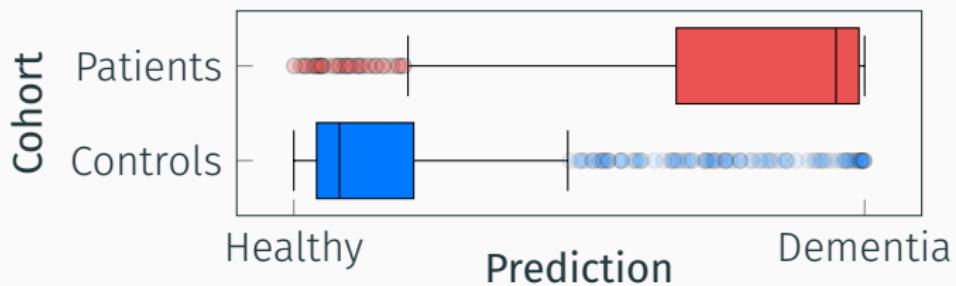
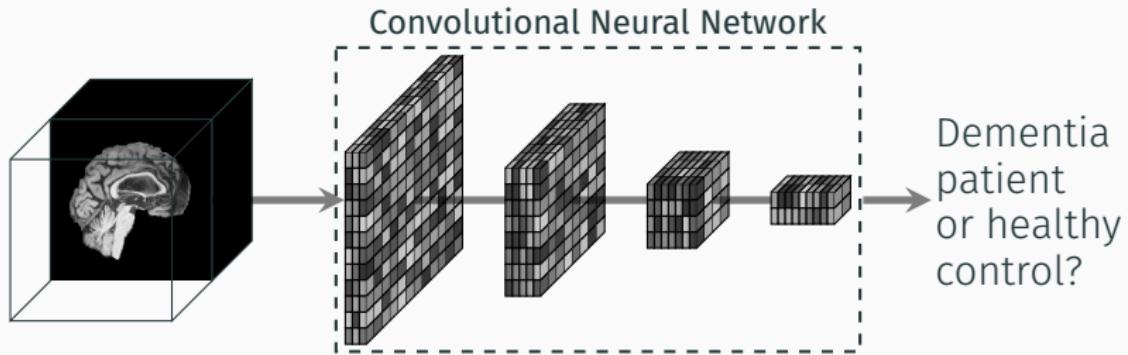


Dementia
patient
or healthy
control?

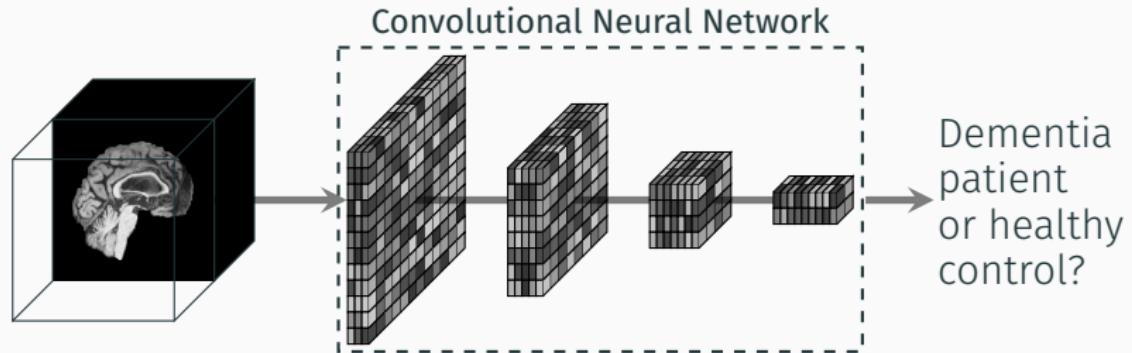
XAI and dementia



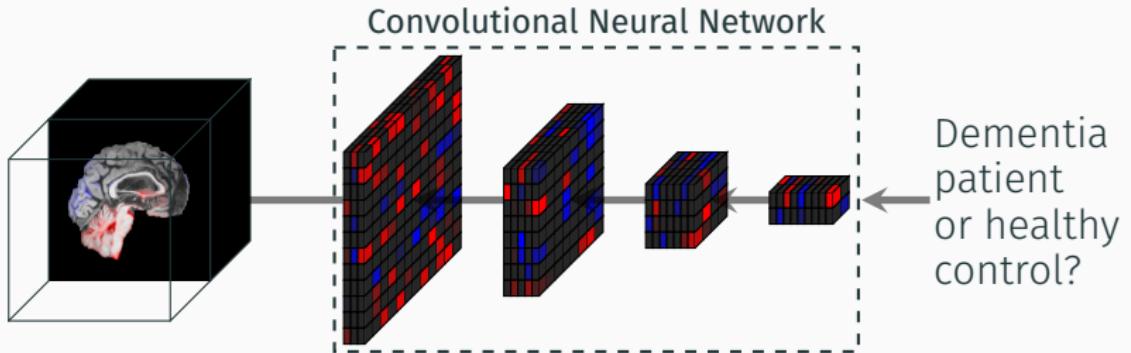
XAI and dementia



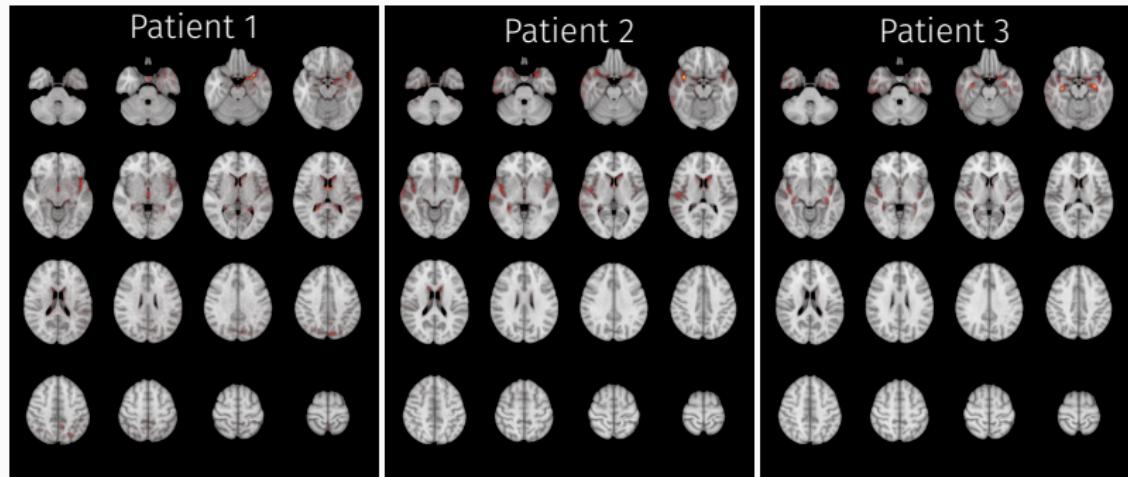
XAI and dementia



XAI and dementia

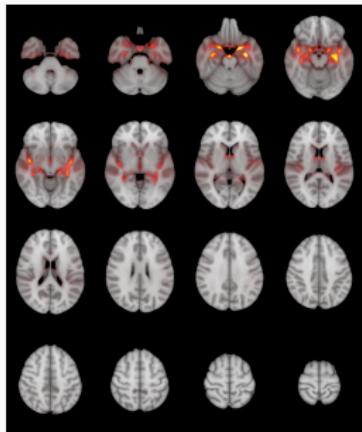


XAI and dementia: Validation



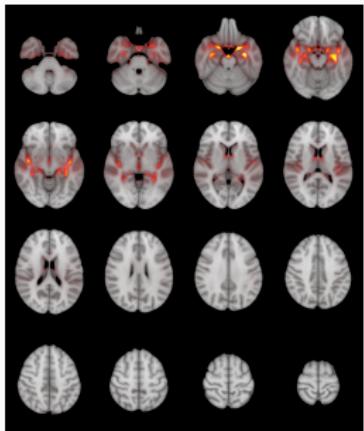
XAI and dementia: Validation

Explainable AI

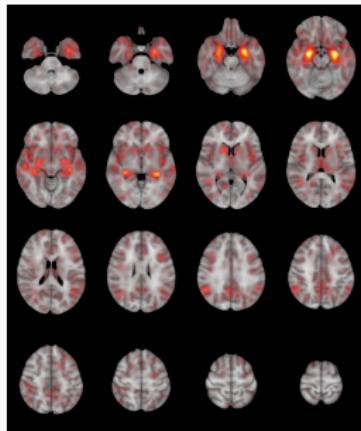


XAI and dementia: Validation

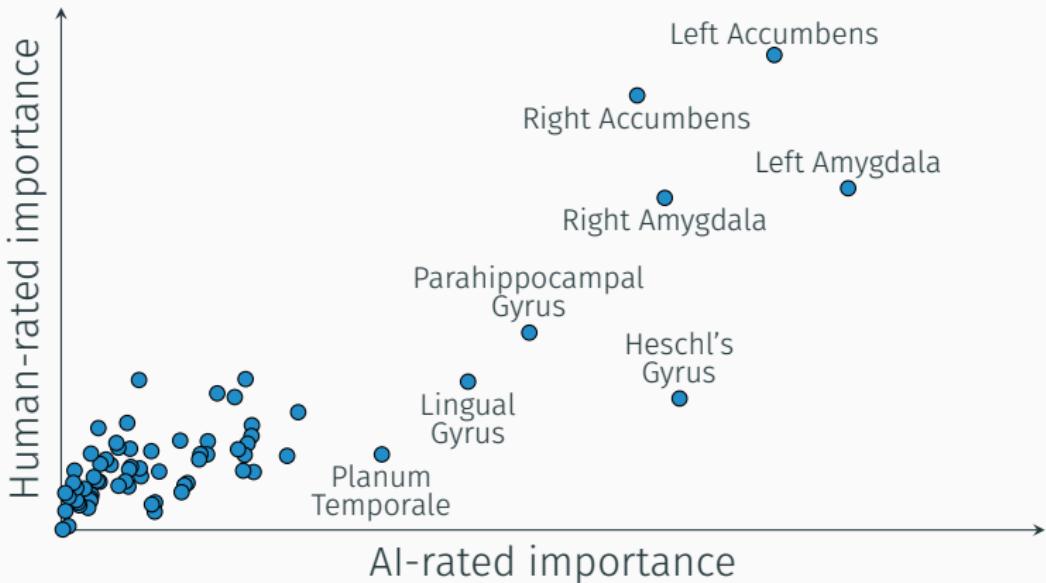
Explainable AI



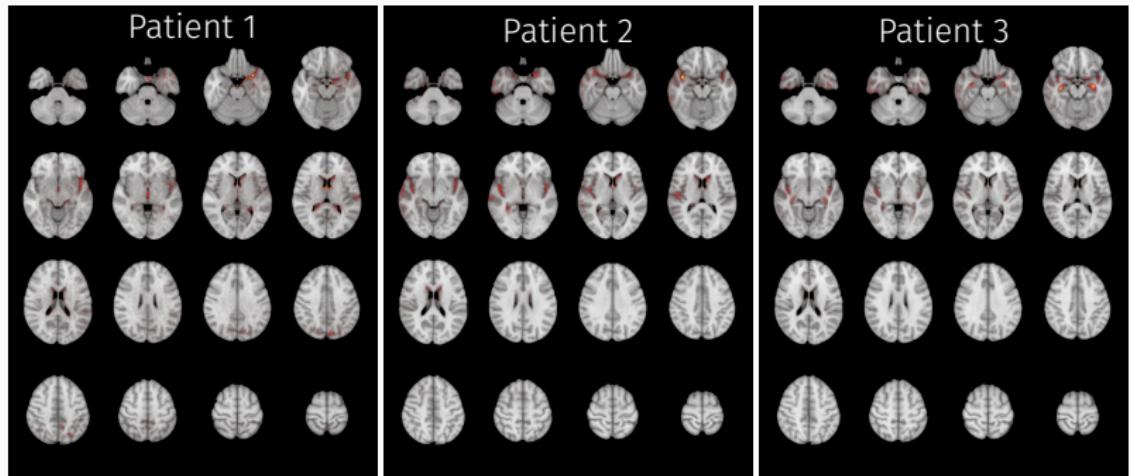
Human researchers



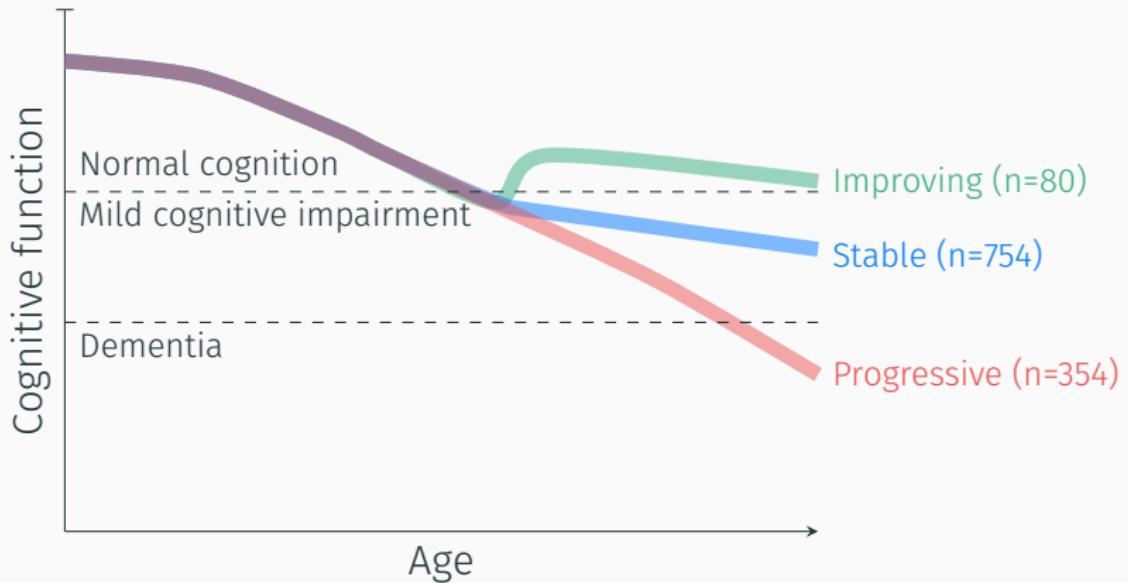
XAI and dementia: Validation



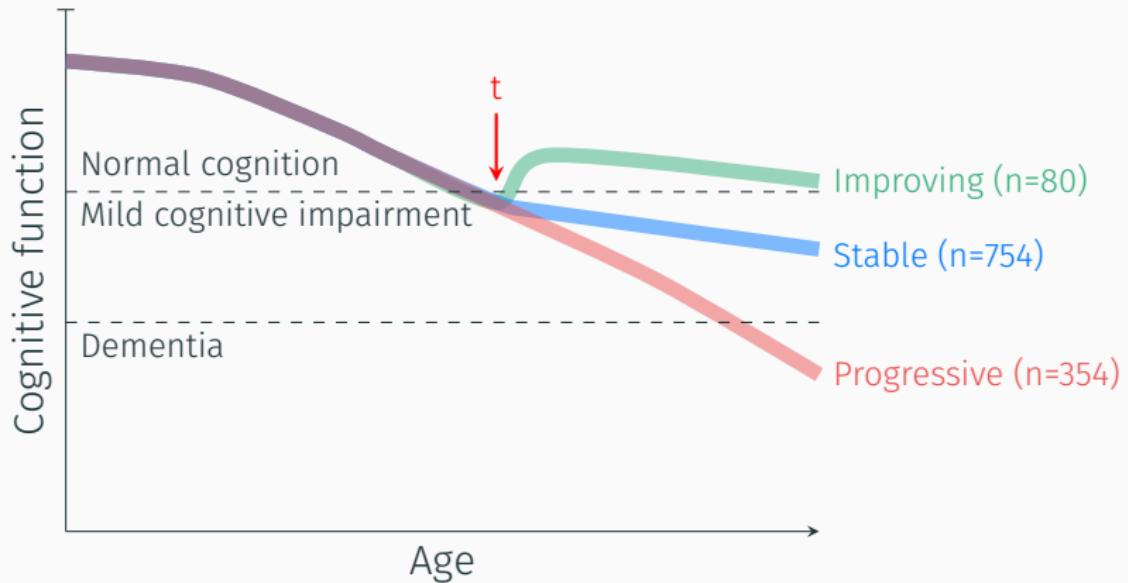
XAI and dementia: Clinical applications



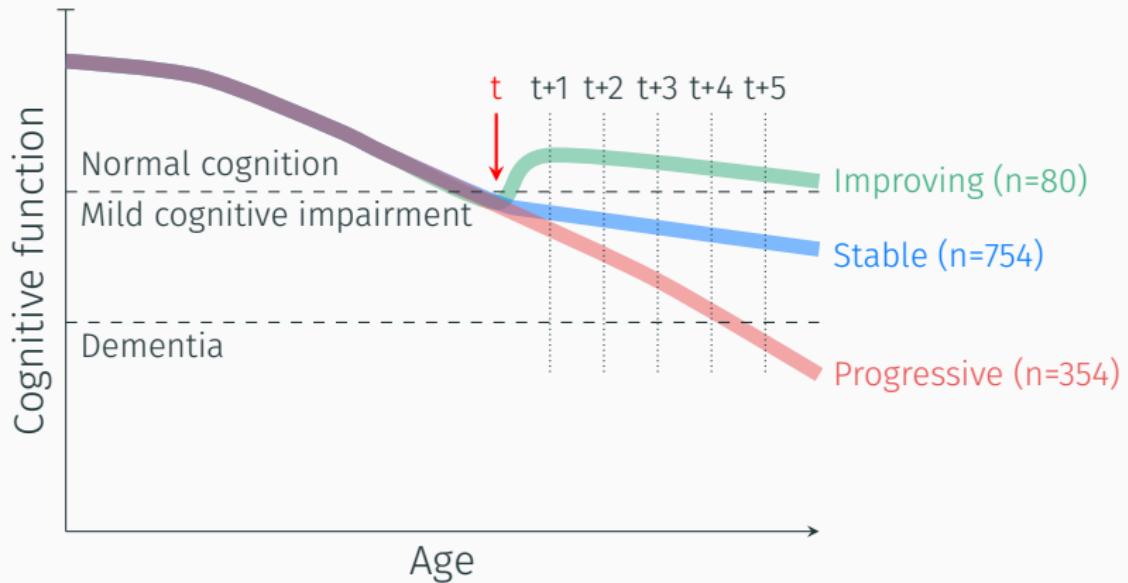
XAI and dementia: Clinical applications



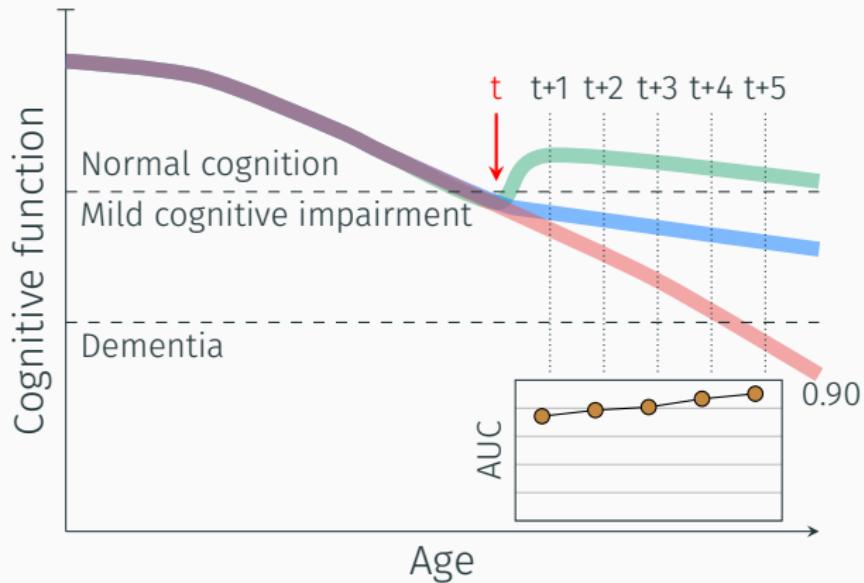
XAI and dementia: Clinical applications



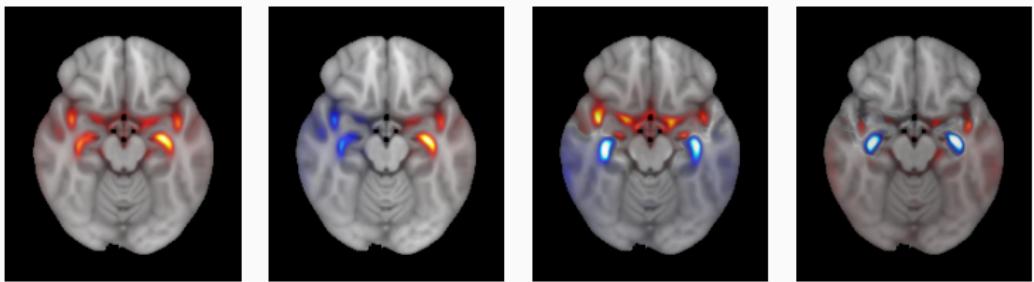
XAI and dementia: Clinical applications



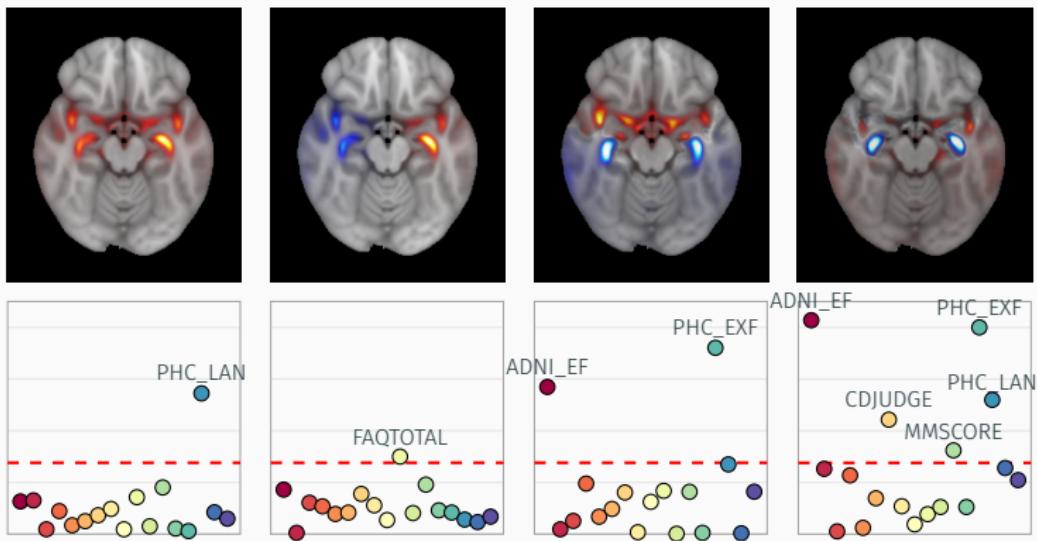
XAI and dementia: Clinical applications



XAI and dementia: Clinical applications

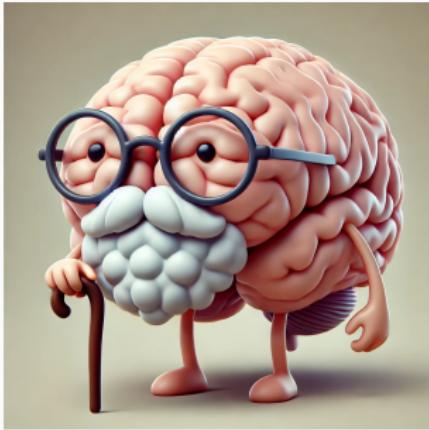


XAI and dementia: Clinical applications



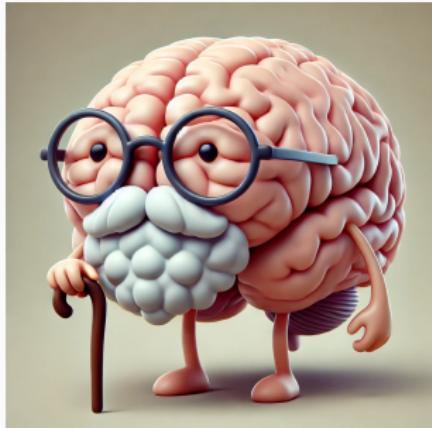
Explainable brain age

Explainable brain age: Motivation

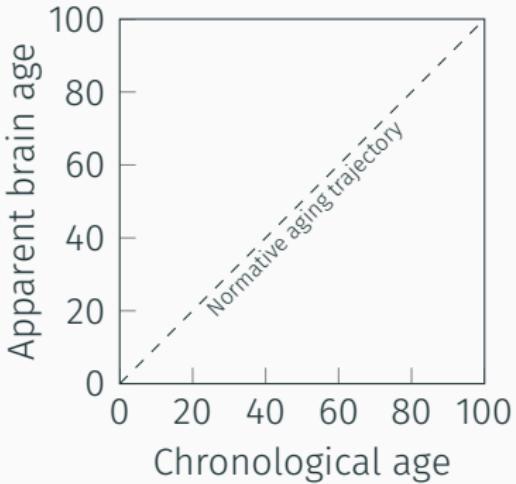


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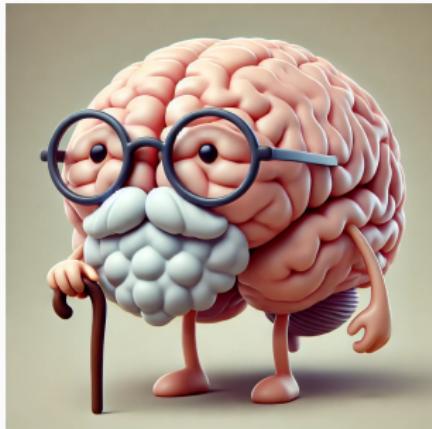
Explainable brain age: Motivation



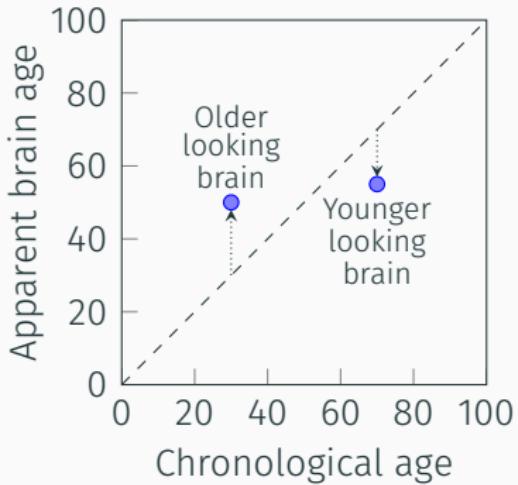
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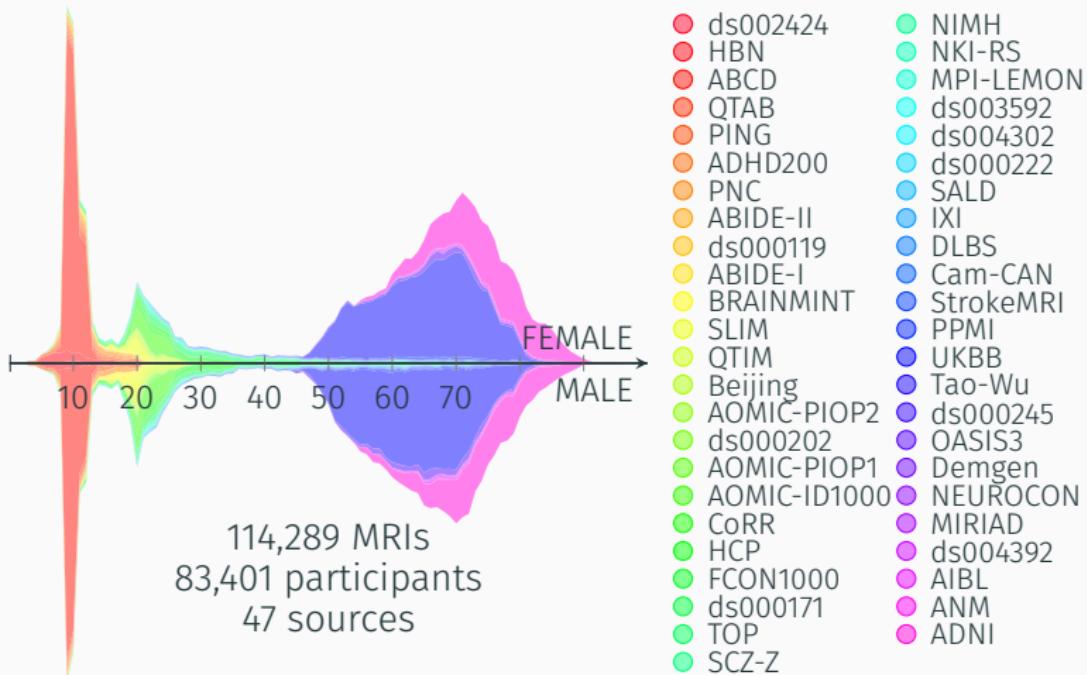
Explainable brain age: Motivation



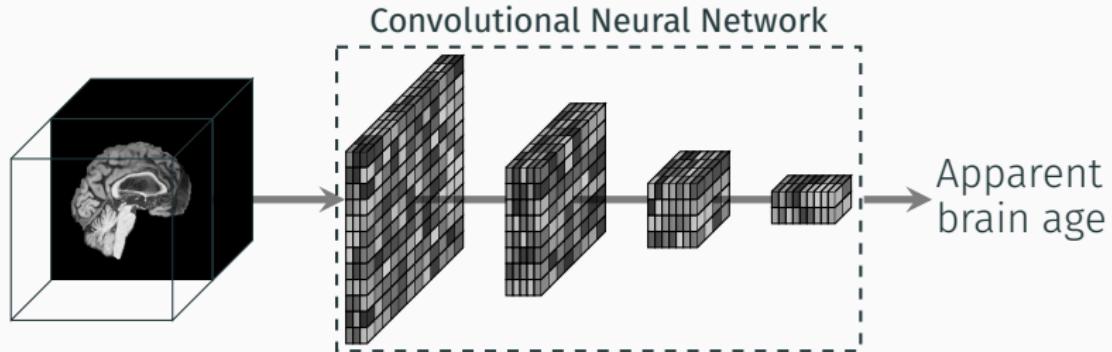
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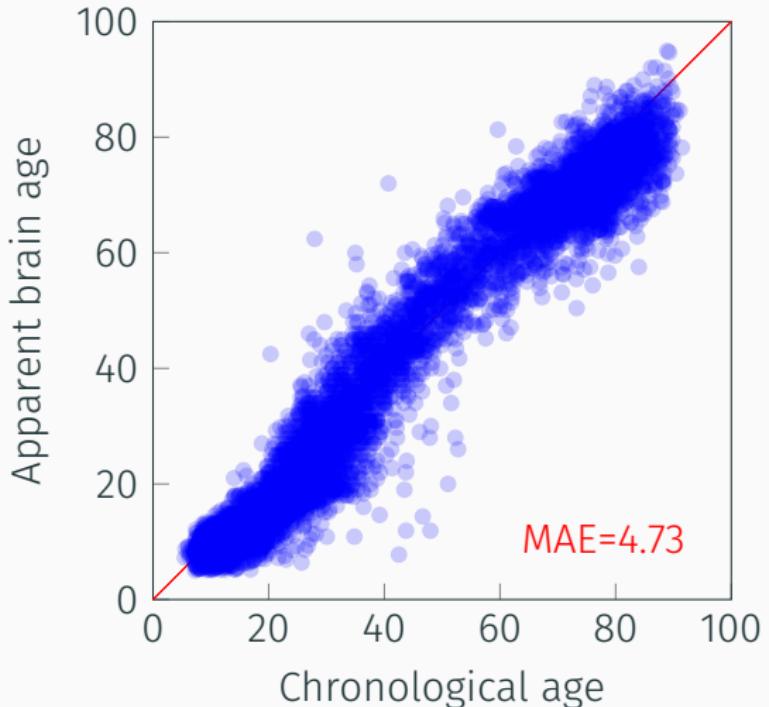
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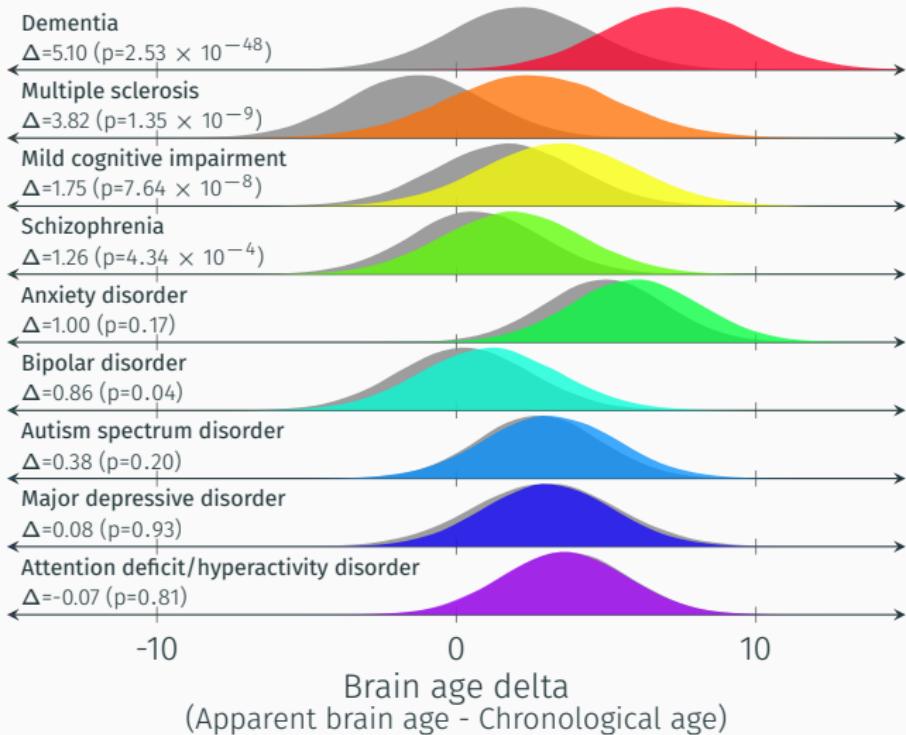
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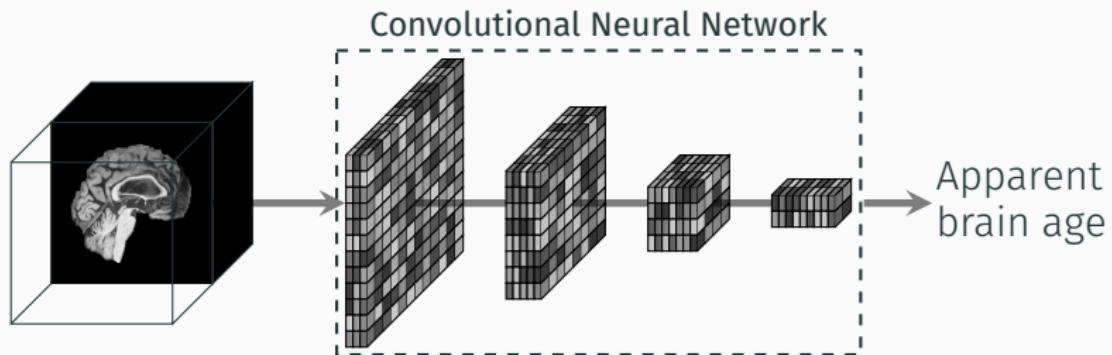
Explainable brain age: Motivation



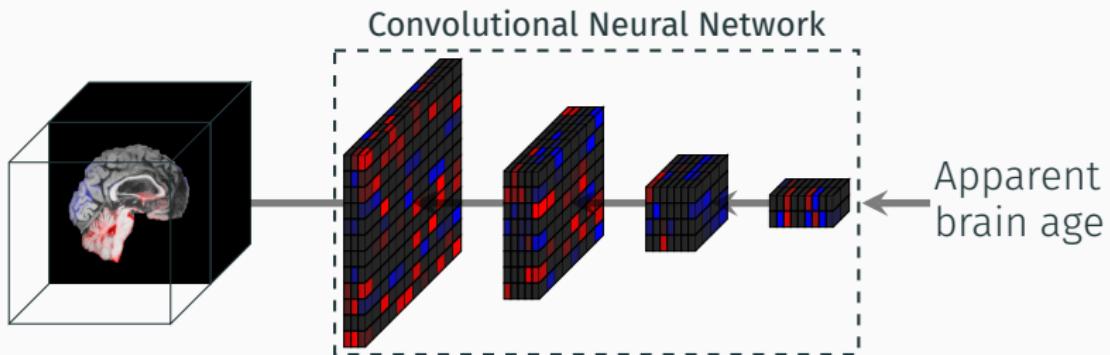
Explainable brain age: Motivation



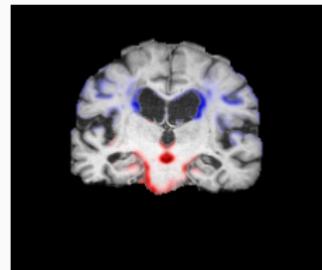
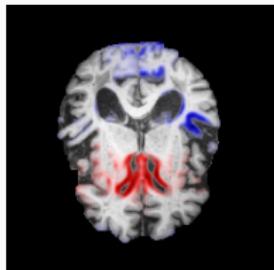
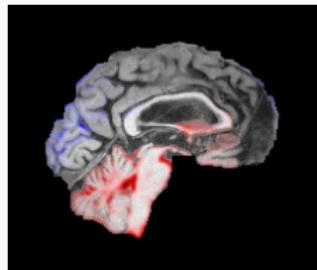
Explainable brain age: Methodology



Explainable brain age: Methodology



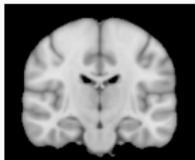
Explainable brain age: Methodology



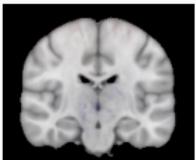
Younger
appearing

Older
appearing

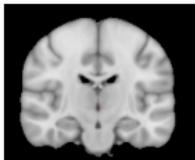
Explainable brain age: Results



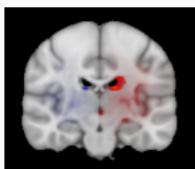
Attention deficit
hyperactivity disorder



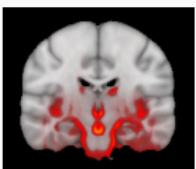
Anxiety
disorder



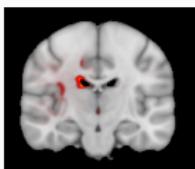
Autism spectrum
disorder



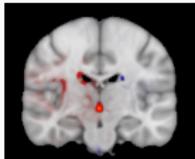
Bipolar
disorder



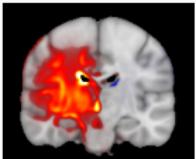
Dementia



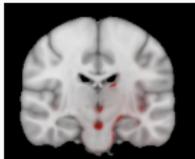
Schizophrenia



Major depressive
disorder

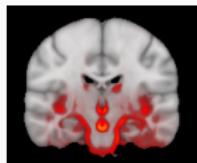


Multiple
sclerosis



Mild cognitive
impairment

Explainable brain age: Results



Dementia

- Temporal pole
- Left amygdala
- Parahippocampal gyrus

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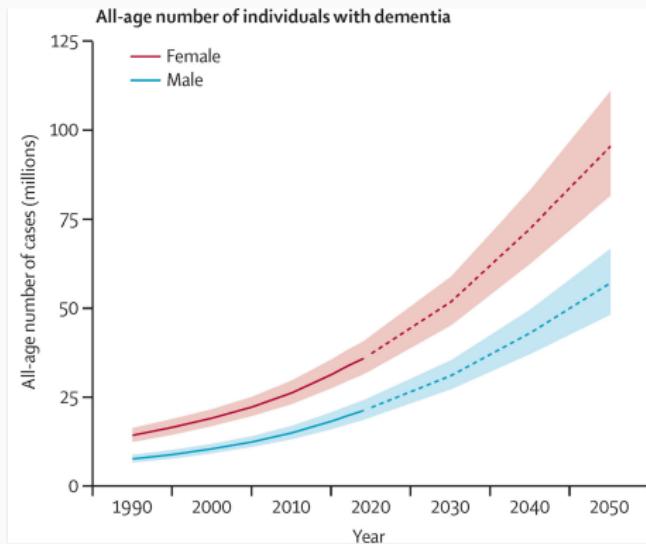


Translating the research frontier

There are several challenges to translating AI models from the research frontier into real-world clinical applications.

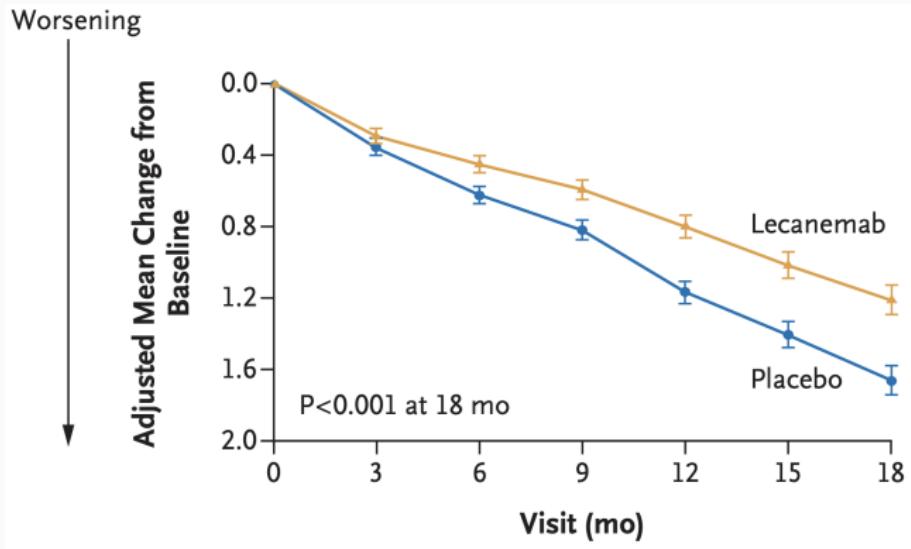
- **Lacking explainability.**
- The models are not tailored for clinical use-cases.
- The models are trained using data collected for research purposes.

Translating the research frontier



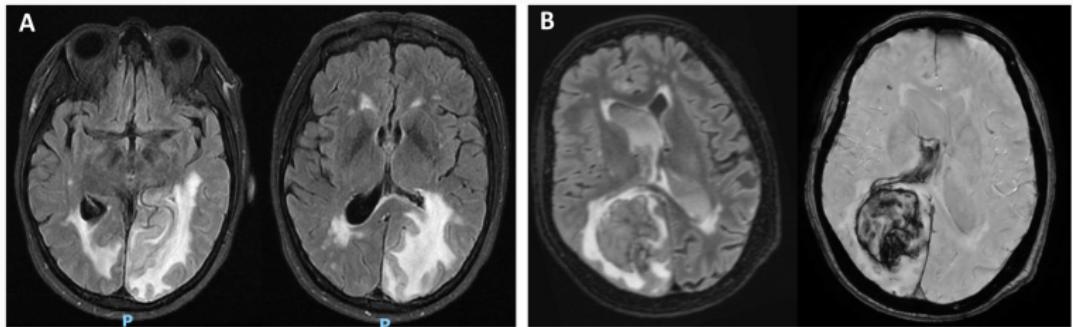
Global Burden of Disease Dementia Forecasting Collaborators (2022). Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. *The Lancet Public Health*.

Translating the research frontier



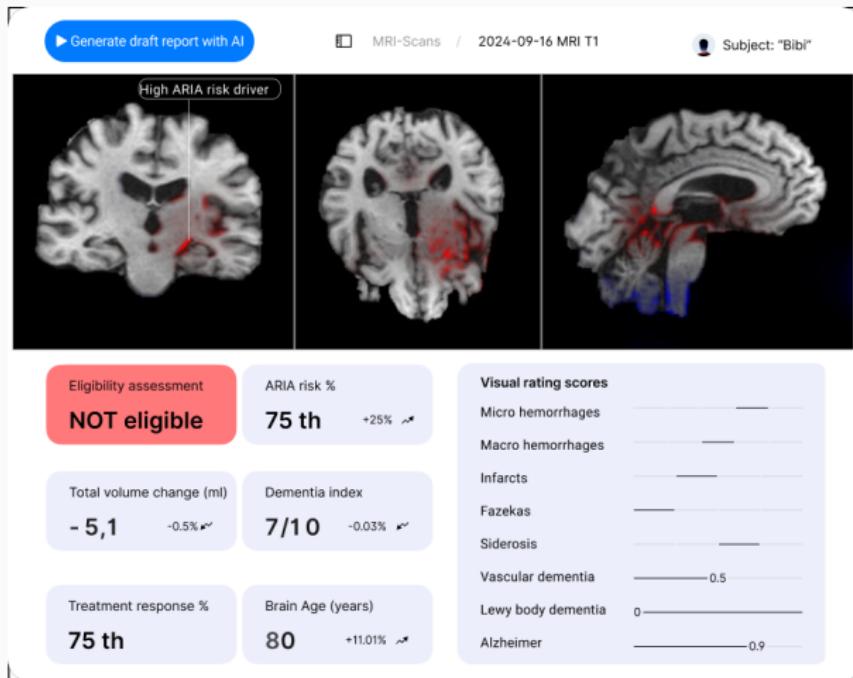
Van Dyck, C. H., Swanson, C. J., Aisen, P., Bateman, R. J., Chen, C., Gee, M., ... & Iwatsubo, T. (2023). Lecanemab in early Alzheimer's disease. *New England Journal of Medicine*.

Translating the research frontier

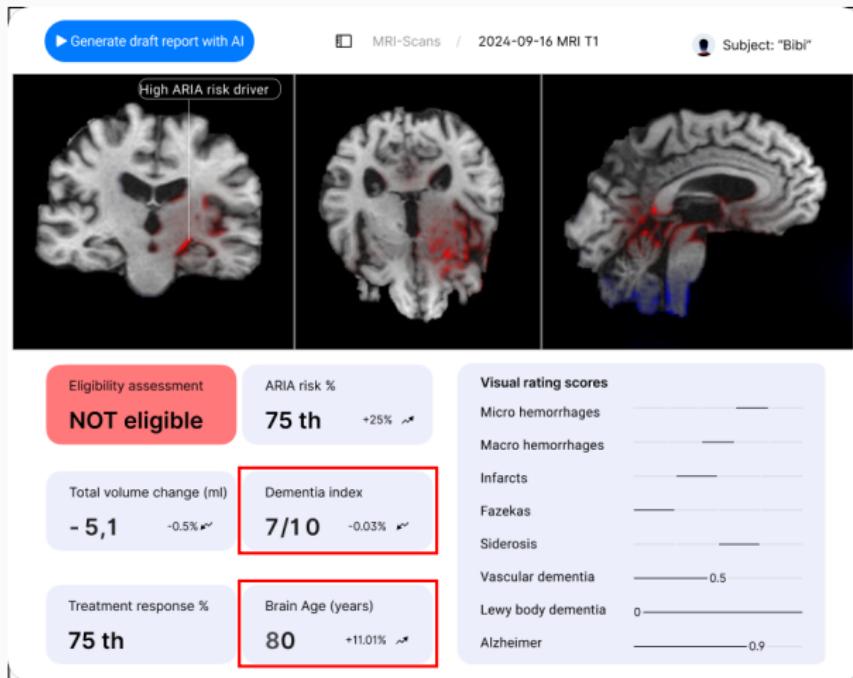


Villain, N., Planche, V., & Levy, R. (2022). High-clearance anti-amyloid immunotherapies in Alzheimer's disease. Part 1: Meta-analysis and review of efficacy and safety data, and medico-economical aspects.
Revue neurologique.

baba.vision's treatment support suite



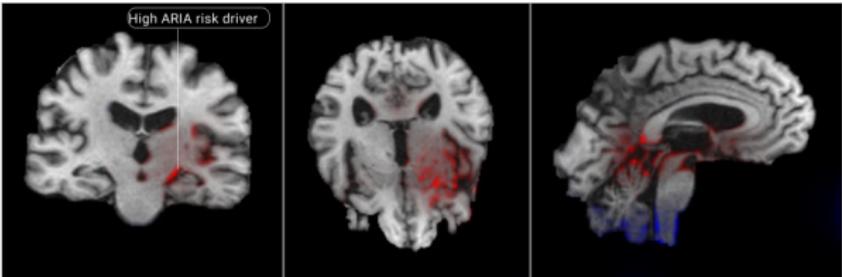
baba.vision's treatment support suite



baba.vision's treatment support suite

Generate draft report with AI

MRI-Scans / 2024-09-16 MRI T1 Subject: "Bibi"



Eligibility assessment

NOT eligible

ARIAs risk %

75 th +25% ↗

Total volume change (ml)

- 5,1 -0.5% ↘

Dementia index

7/10 -0.03% ↗

Treatment response %

75 th

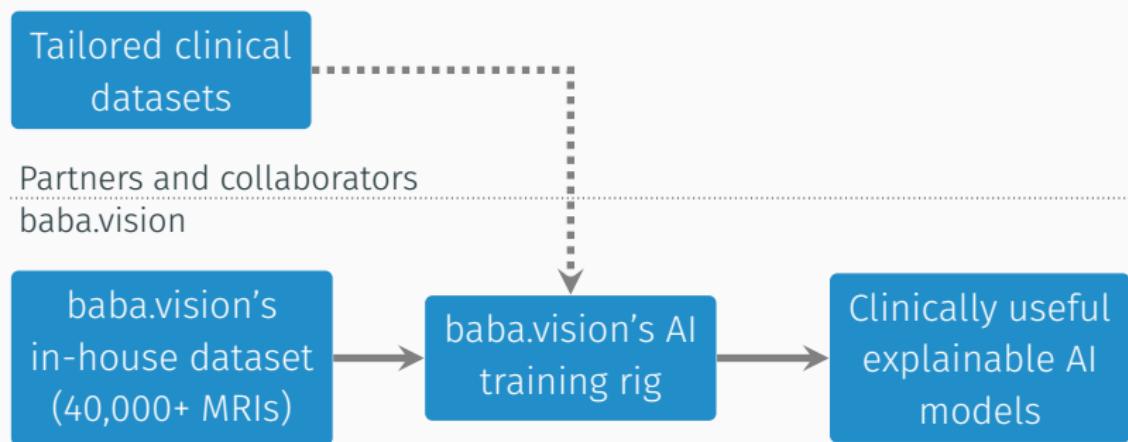
Brain Age (years)

80 +11.01% ↗

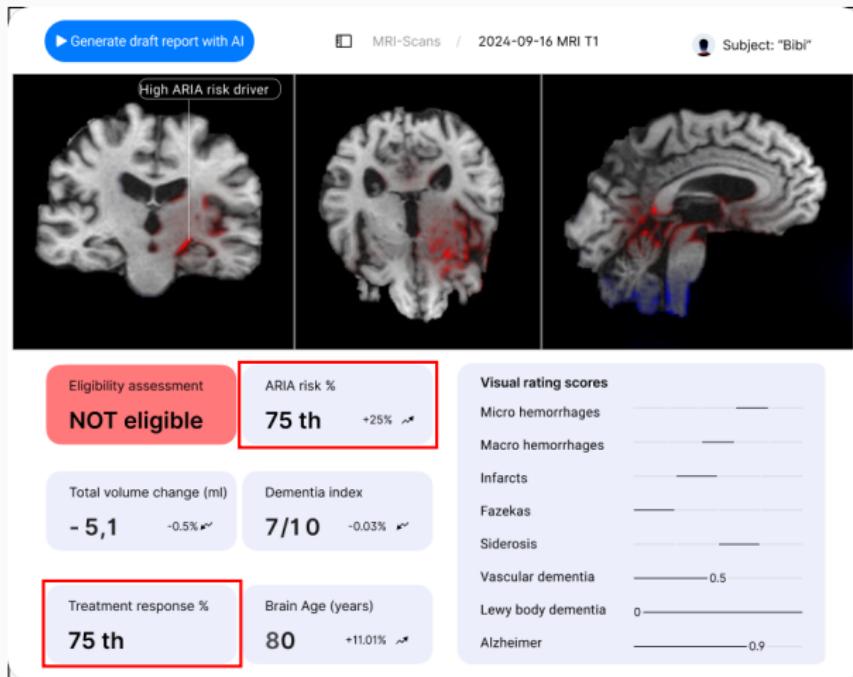
Visual rating scores

Micro hemorrhages	—
Macro hemorrhages	—
Infarcts	—
Fazekas	—
Siderosis	—
Vascular dementia	— 0.5
Lewy body dementia	— 0
Alzheimer	— 0.9

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Thank you for your attention!
esten@baba-vision.com

