SELECTED OPPORTUNITY IN NEUROSCIENCES

A progression model that estimates a normative scenario of the progressive impairments of neurodegenerative diseases (MECA16023)

A PROGRESSION MODEL THAT ESTIMATES A NORMATIVE SCENARIO OF THE PROGRESSIVE IMPAIRMENTS OF NEURODEGENERATIVE DISEASES

Product factsheet

Correlation with genetic, clinical and cognitive variables

- **Product:**
  - The invention relates to age-related brain diseases, such as Parkinson's or Alzheimer's disease. Statistical models based on the regression of measurements with age are inadequate to model the progression of such diseases. As a consequence, the inventors worked on a numerical model to determine a temporal progression for such biological phenomenon, the numerical model being a function in a Riemann manifold. Such model enables to obtain a method for determining the temporal progression of a biological phenomenon which can be implemented on computer and provides better results than statistical models based on the regression of measurements. This determining method may be applied for predicting that a subject is at risk of suffering from such disease, diagnosing a disease, identifying a therapeutic or a biomarker and screening compounds useful as a medicine.
- **Application:**
  - Progression Model - Patient Segmentation
- **Technology:**
  - Software
- **Patent and publication:**
  - Koval I, Schiratti J-B, Routier A, Bacci M, Colliot O, Allassonnière S and Durrleman S (2018) Spatiotemporal Propagation of the Cortical Atrophy: Population and Individual Patterns. Front. Neurol. 9:235. doi: 10.3389/fneur.2018.00235
  - PCT/IB2016/052699, A METHOD FOR DETERMINING THE TEMPORAL PROGRESSION OF A BIOLOGICAL PHENOMENON AND ASSOCIATED METHODS AND DEVICES

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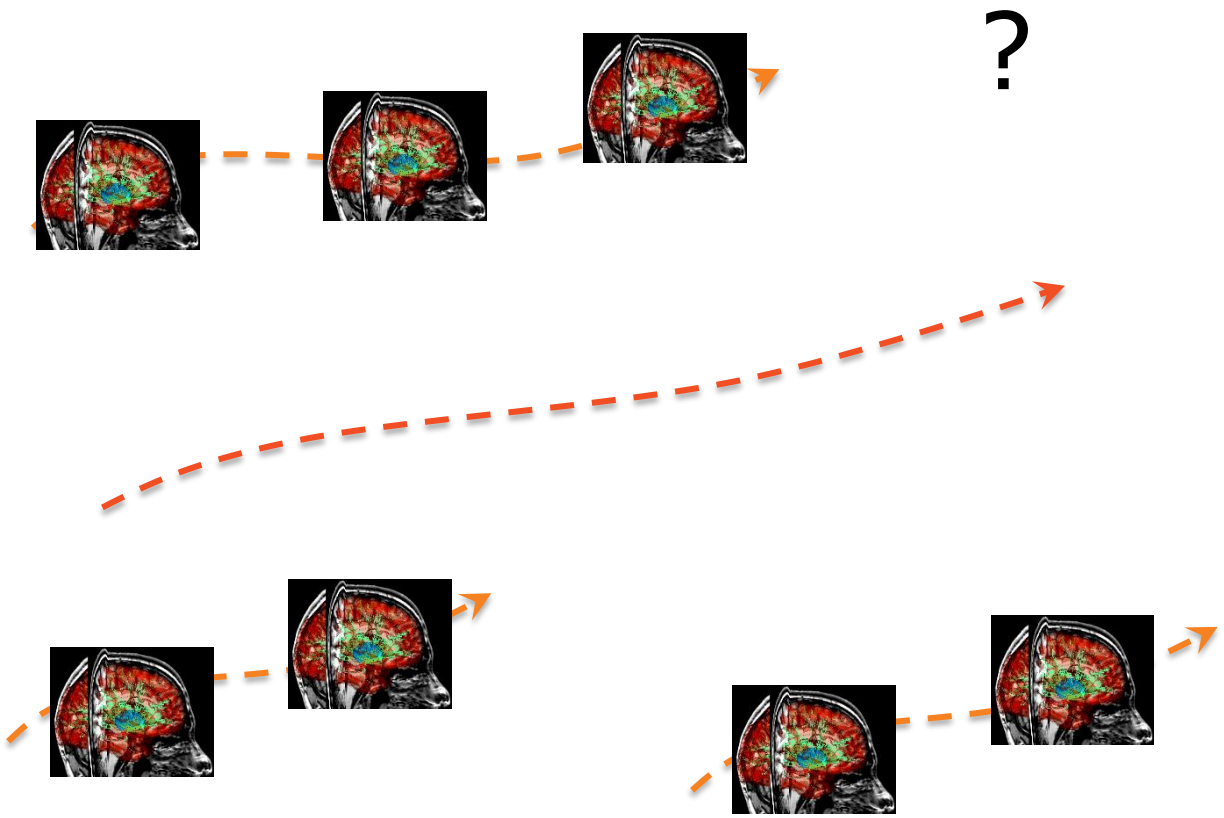
Artificial intelligence and Alzheimer's Disease



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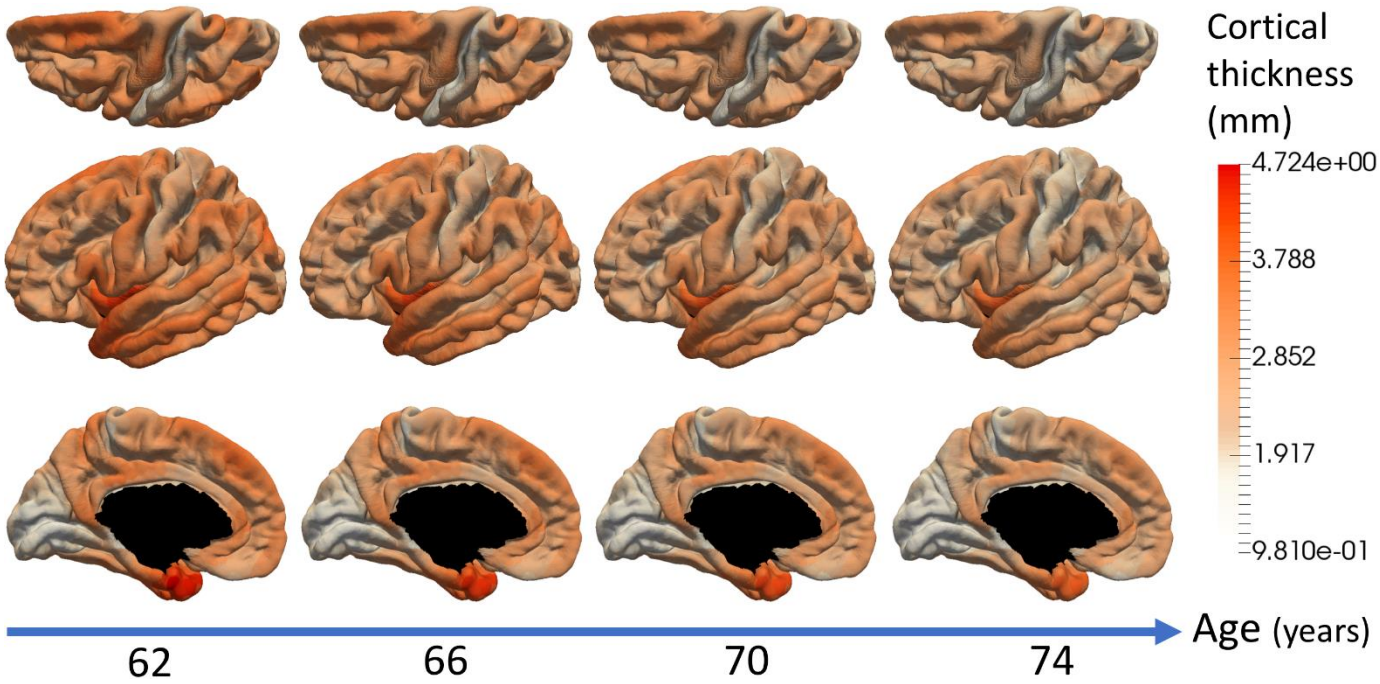
Proof of concept

Model of cortical atrophy in Alzheimer's Disease



Estimated modes of evolution of the cortical thickness from 66 to 78 years old. This typical spatiotemporal pattern of atrophy propagation shows an important cortical loss in the superior frontal lobe, the temporal lobe, and the hippocampus region

[Koval et al.MICCAI'17, Frontiers'17 (sub)]

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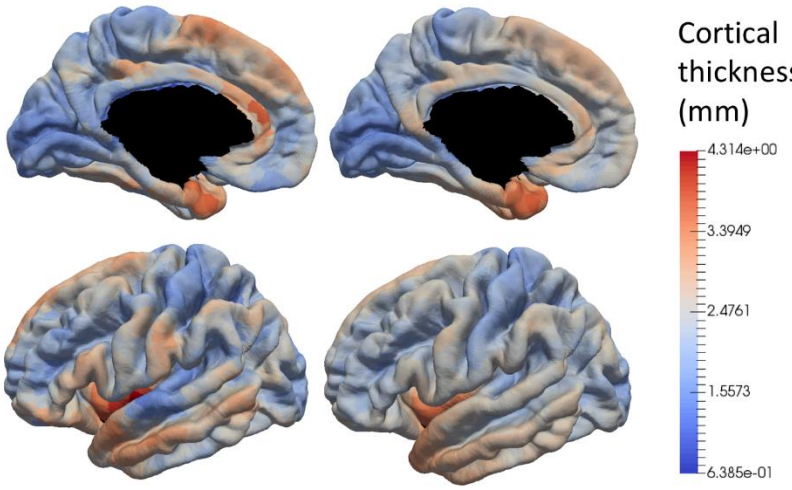
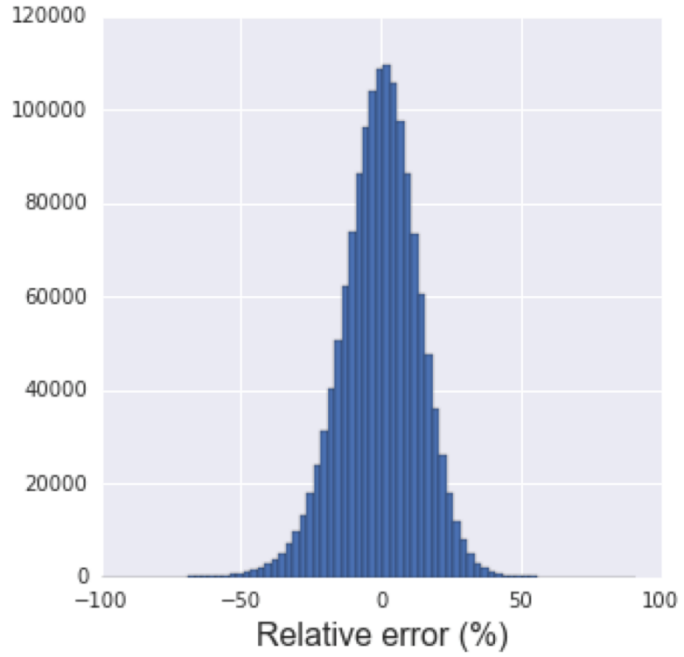
Proof of concept

Reconstruction of individual observations by model personalization

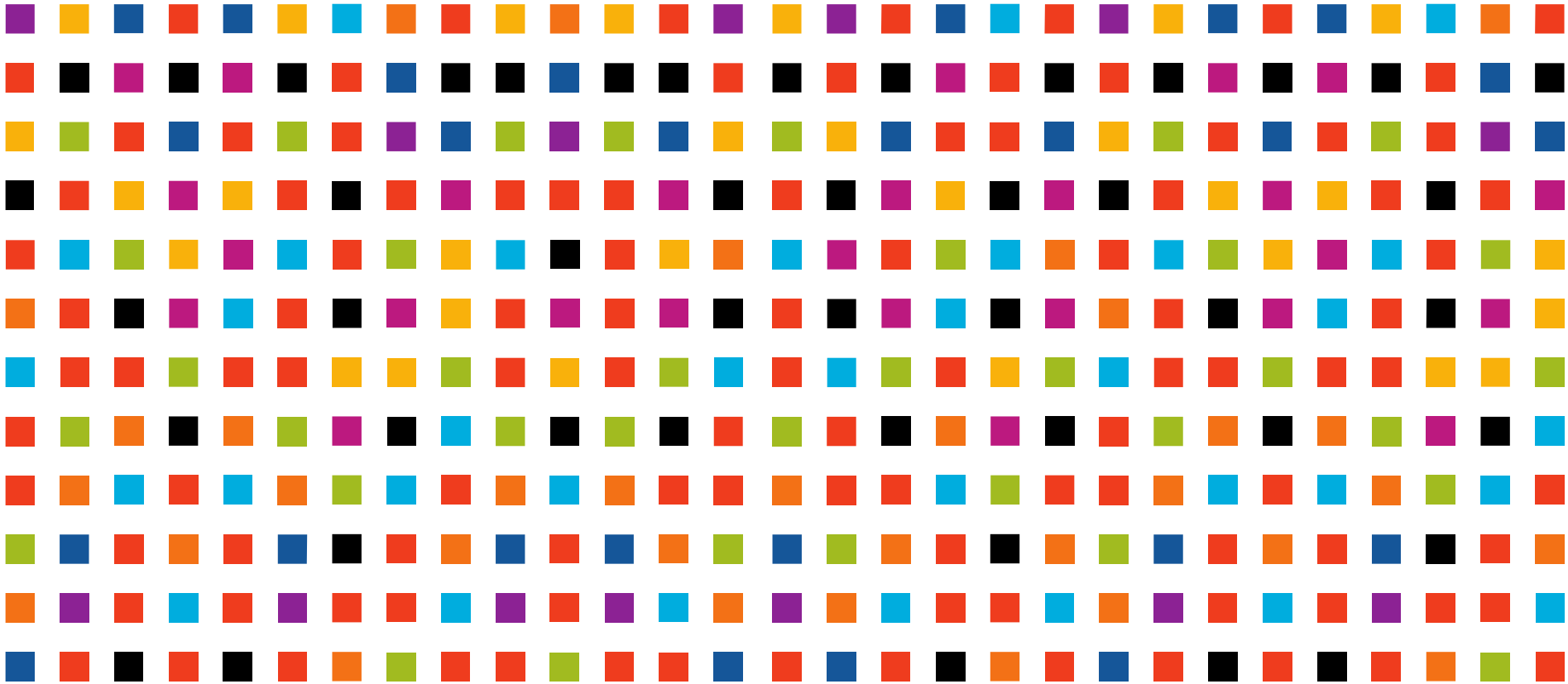


Average relative error of reconstruction over each patch, distributed on the graph.



Histogram of the relative error of reconstruction of all individuals across all nodes.

The model is able to reconstruct the data at the individual level, while smoothing the signal over the brain surface, with a relative error randomly distributed.



ANNE.COCHI@INSERM-TRANSFERT.FR

Inserm Transfert - Paris Biopark
7 Rue Watt - 75013 Paris
Tel: +33 1 55 03 01 00 / Fax: +33 55 03 01 60
www.inserm-transfert.fr