Is Dementia predictable?

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Dataset I

Dataset Dementia and Alzheimer longitudinal

Subject.ID	MRI.ID	Group	Visit	MR.Delay	M.F	Hand	Age	EDUC	SES	MMSE	CDR	eTIV	nWBV	ASF
OAS2_0001	OAS2_0001_MR1	Nondemented	1	0	M	R	87	14	2	27	0.0	1987	0.696	0.883
OAS2_0001	OAS2_0001_MR2	Nondemented	2	457	M	R	88	14	2	30	0.0	2004	0.681	0.876
OAS2_0002	OAS2_0002_MR1	Demented	1	0	M	R	75	12	*NA*	23	0.5	1678	0.736	1.046
OAS2_0002	OAS2_0002_MR2	Demented	2	560	M	R	76	12	*NA*	28	0.5	1738	0.713	1.010
OAS2_0002	OAS2_0002_MR3	Demented	3	1895	M	R	80	12	*NA*	22	0.5	1698	0.701	1.034
OAS2_0004	OAS2_0004_MR1	Nondemented	1	0	F	R	88	18	3	28	0.0	1215	0.710	1.444
OAS2_0004	OAS2_0004_MR2	Nondemented	2	538	F	R	90	18	3	27	0.0	1200	0.718	1.462
OAS2_0005	OAS2_0005_MR1	Nondemented	1	0	M	R	80	12	4	28	0.0	1689	0.712	1.039
OAS2_0005	OAS2_0005_MR2	Nondemented	2	1010	M	R	83	12	4	29	0.5	1701	0.711	1.032

where SES is Socioeconomic Status, MMSE is Mini Mental State Examination, CDR is Clinical Dementia Rating, eTIV is Estimated Total Intracranial Volume, nWBV is Normalize Whole Brain Volume and ASF is Atlas Scaling Factor.

Source: Kaggle

Dataset II

Dataset Dementia and Alzheimer cross-sectional

ID	M.F	Hand	Age	Educ	SES	MMSE	CDR	eTIV	nWBV	ASF	Delay
OAS1_0028_MR1	F	R	86	2	4	27	1.0	1449	0.738	1.211	N/A
OAS1_0029_MR1	M	R	21	*NA*	*NA*	*NA*	*NA*	1653	0.858	1.062	N/A
OAS1_0030_MR1	F	R	65	2	3	29	0.0	1392	0.764	1.261	N/A
OAS1_0031_MR1	M	R	88	1	4	26	1.0	1419	0.674	1.236	N/A
OAS1_0032_MR1	M	R	89	4	1	28	0.0	1631	0.682	1.076	N/A
OAS1_0033_MR1	F	R	80	4	2	29	0.0	1323	0.735	1.326	N/A
OAS1_0034_MR1	M	R	51	5	1	29	0.0	1538	0.831	1.141	N/A
OAS1_0035_MR1	F	R	84	3	2	28	1.0	1402	0.695	1.252	N/A

Source: Kaggle

Dataset explanation

In our main dataset (longitudinal) we have the observation of 150 different patients aged 60 to 96. For each one we have from 2 to 5 visits in which they are classified as Demented, Nondemented, or Converted. In particular, Converted are patients initially classified as Nondemented and in a later visit they are diagnosed as Demented.

Our second dataset (cross-sectional) is composed by 416 patients aged 18 to 96; 100 of the included subjects over the age of 60 have been clinically diagnosed with very mild to moderate Alzheimer's disease.

Research questions

- Study if there are evidences of differences between male and female subjects, and between Demented and Nondemented patients
  $\rightarrow$ Permutation tests
- Identify when the Converted patients became Demented
  $\rightarrow$ Conformal prediction
- Understand if dementia is predictable through our variables
  $\rightarrow$ Nonparametric regression
- Study the survival time of our patients before being diagnosed as Demented
  $\rightarrow$ Survival Analysis