

# Towards a new approach to reveal dynamical organization of the brain using topological data analysis

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- The approach of this paper is able to probe within and between task transitions of about ( 4-9 seconds)
- They observe that the revealed individual differences in the dynamical organization of the subject were predictors of the task performance

- They used multiple fMRI datasets which are scans of individuals over 25 minutes while doing a variety of tasks

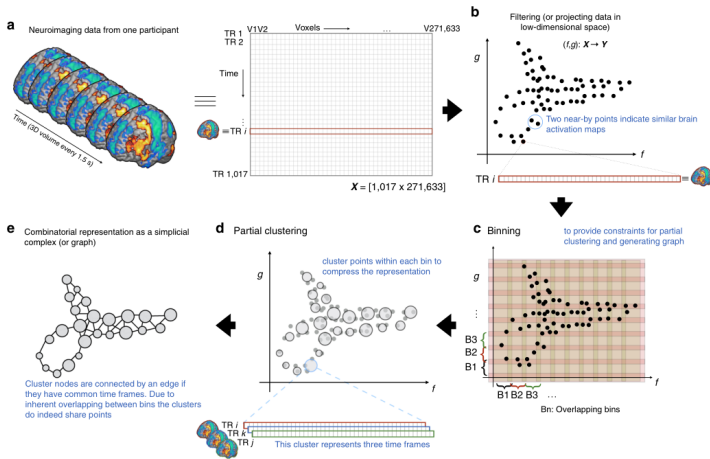


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- Additionally, they are unable to determine if the brain dynamics are best thought of as continuous or discrete or able to tell whether a particular brain activity is healthy or not

# Pipeline



**Figure:** The method used to convert the 4-dimensional fMRI data into a simplicial complex. Steps b-e are a part of Mapper (the TDA-based algorithm/tool the authors used).

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- Step d goes through each bin, and performs single-linkage clustering in order to form clusters of nearby points
- Step e treats each cluster as a vertex of a graph and adds an edge between two vertices if they shared a point [1]

- [1] Gurjeet Kaur Chatar Singh, Facundo Mémoli, and Gunnar E. Carlsson. “Topological Methods for the Analysis of High Dimensional Data Sets and 3D Object Recognition”. In: (2007).

# The End