Hyperbolic Model Captures Temporal Small Worldness of Brain Dynamics

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Brain activity can be represented as a complex network

- **Small Worldness**: combination of high clustering coefficient (local property) and short temporal path length (global reachability property)
- **Scale Freeness**: small number of nodes have a degree that exceeds the average one

What is the best model that simulates the functional connectivity of the brain and can be used as a null model?

**Pipeline**

- Linear Regression and Bandpass Filtering to remove patient, respiratory and cardiac movements
- Sliding windows method
- Computing correlation coefficient within each window
- Thresholding

**Measures**

- **clustering coefficient**: average over all the nodes of the local clustering coefficient, measures the tendency of the neighbors of a node to form a clique
  - $c = 0$
  - $c = \frac{1}{3}$
  - $c = 1$

- **temporal path length**: average of the fastest paths between all pairs of nodes

- Fastest path length from the green to the orange nodes = 3

**Results**

- The Hyperbolic model not only is close to real data but it has the same behaviour

**REFERENCES**