

HyperTools and Data Visualization in Python

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Slack discussions:
#tutorials and #visualization



029



Properties of many datasets we work with

- High dimensional
- Big
- Complicated
- But hopefully structured in some way
- We want to find that structure

What does finding structure mean?

- Our observations can usually be turned into feature vectors
- Each feature vector is a point
- **Finding structure in a dataset means understanding its geometry**

Three often-useful steps to finding geometric structure in high-dimensional data

1. Dimensionality reduction
2. Aligning data from different spaces
3. Make a plot

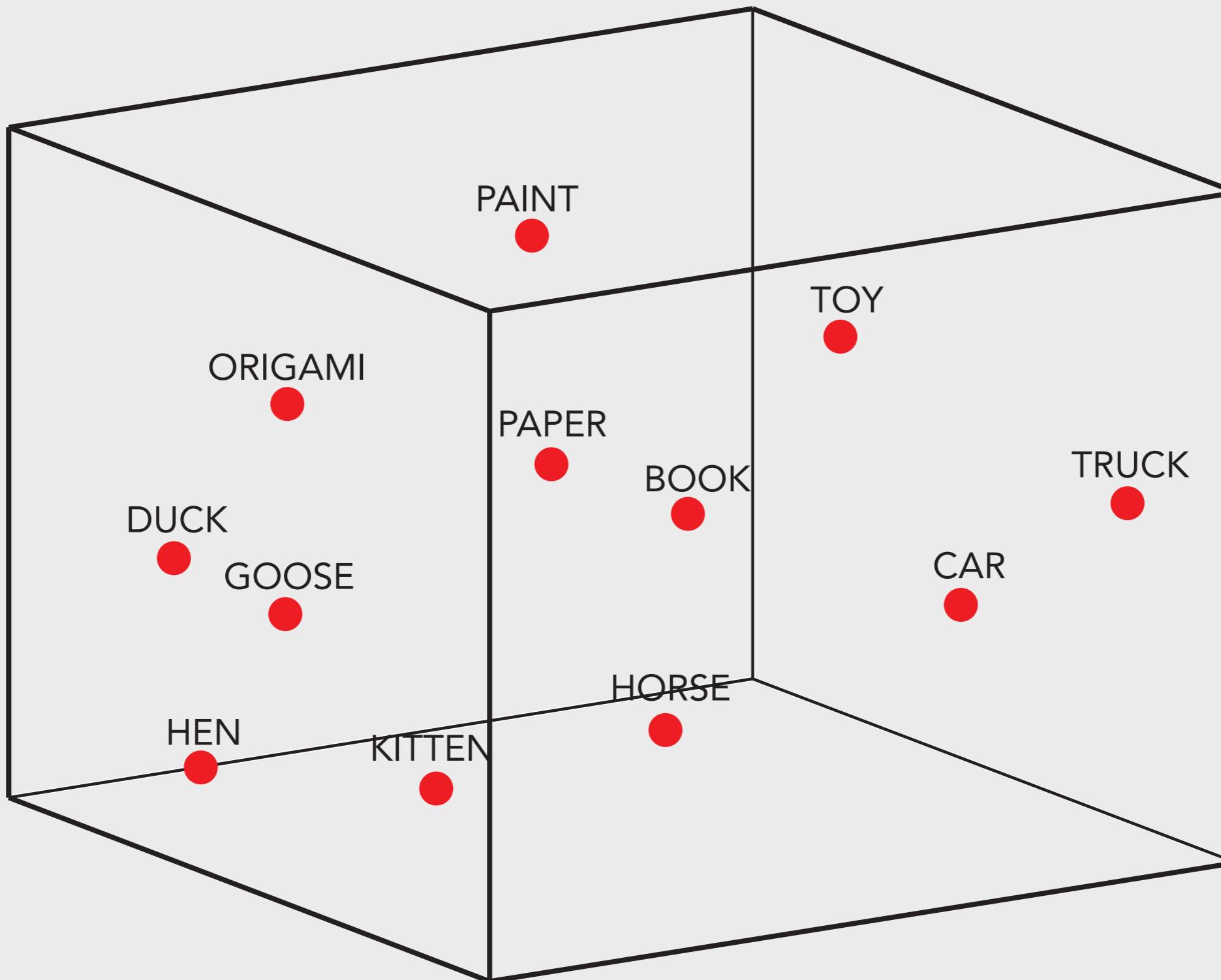
HyperTools casts these three steps as a single operation

1. Dimensionality reduction
2. Aligning data from different spaces
3. Make a plot

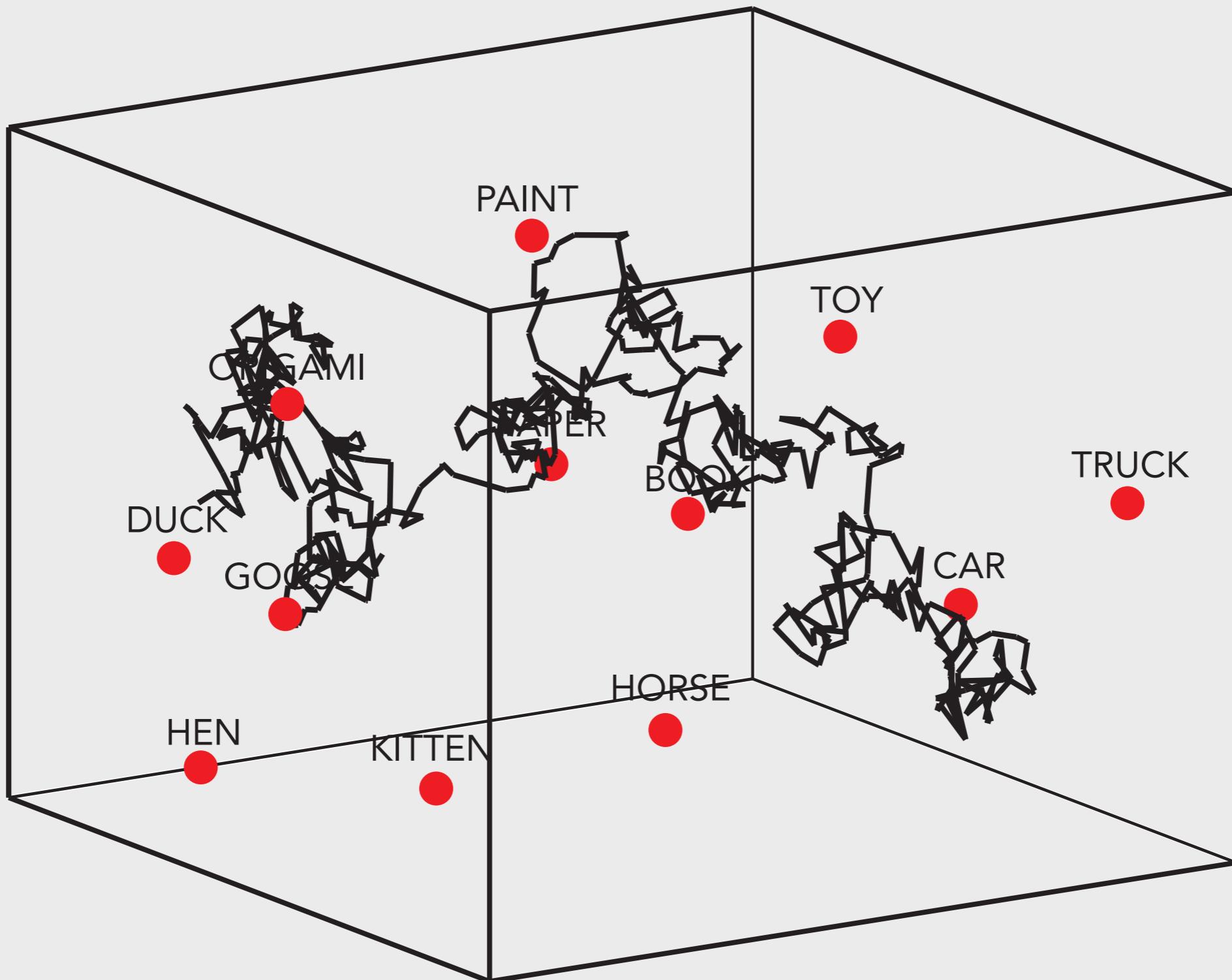
HyperTools casts these three steps as a single operation

- Organize data as number-of-timepoints by number-of-features matrices
- Supports Numpy arrays, Pandas dataframes, or (mixed) lists of arrays and data frames
- Features can be numbers or strings

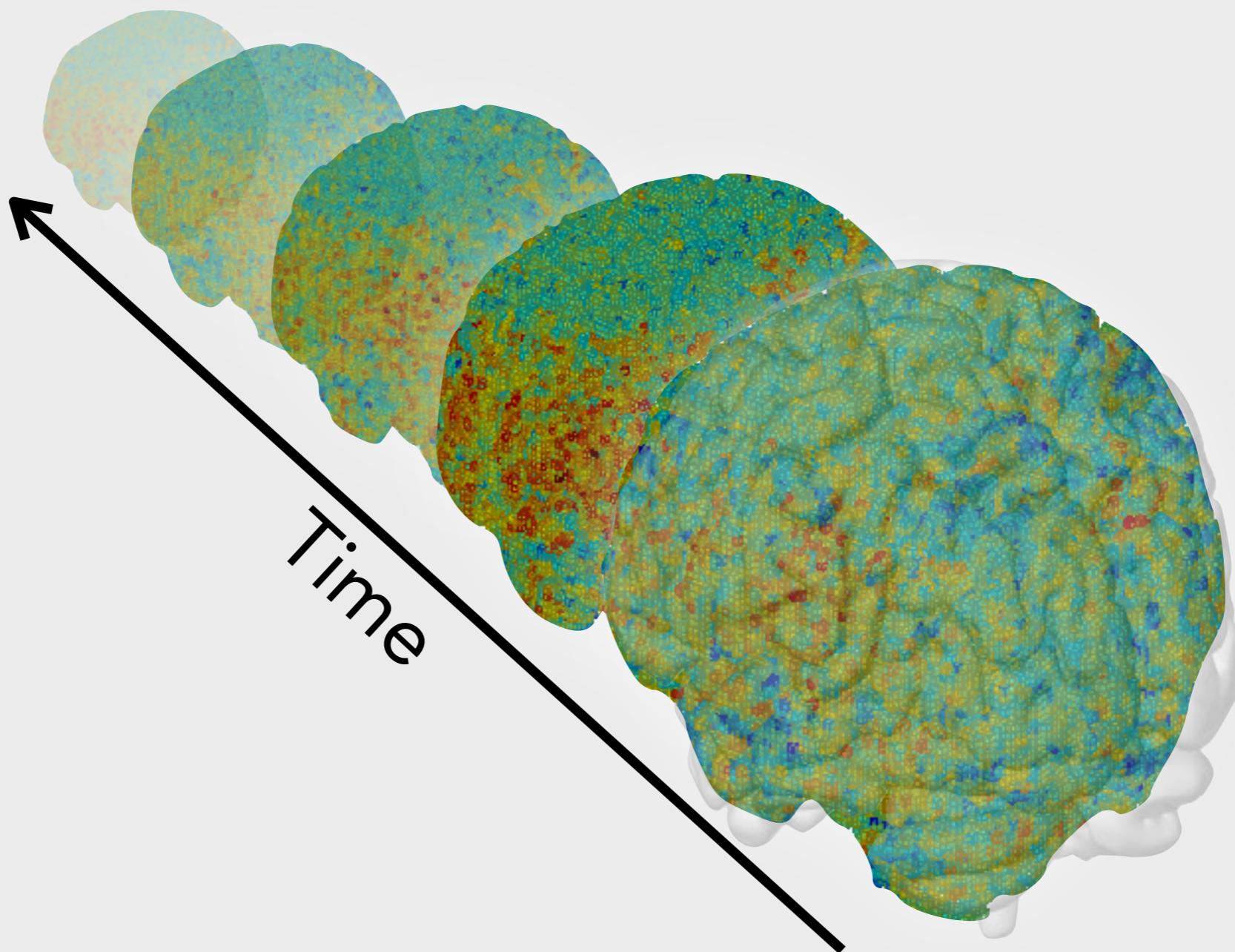
Thought space



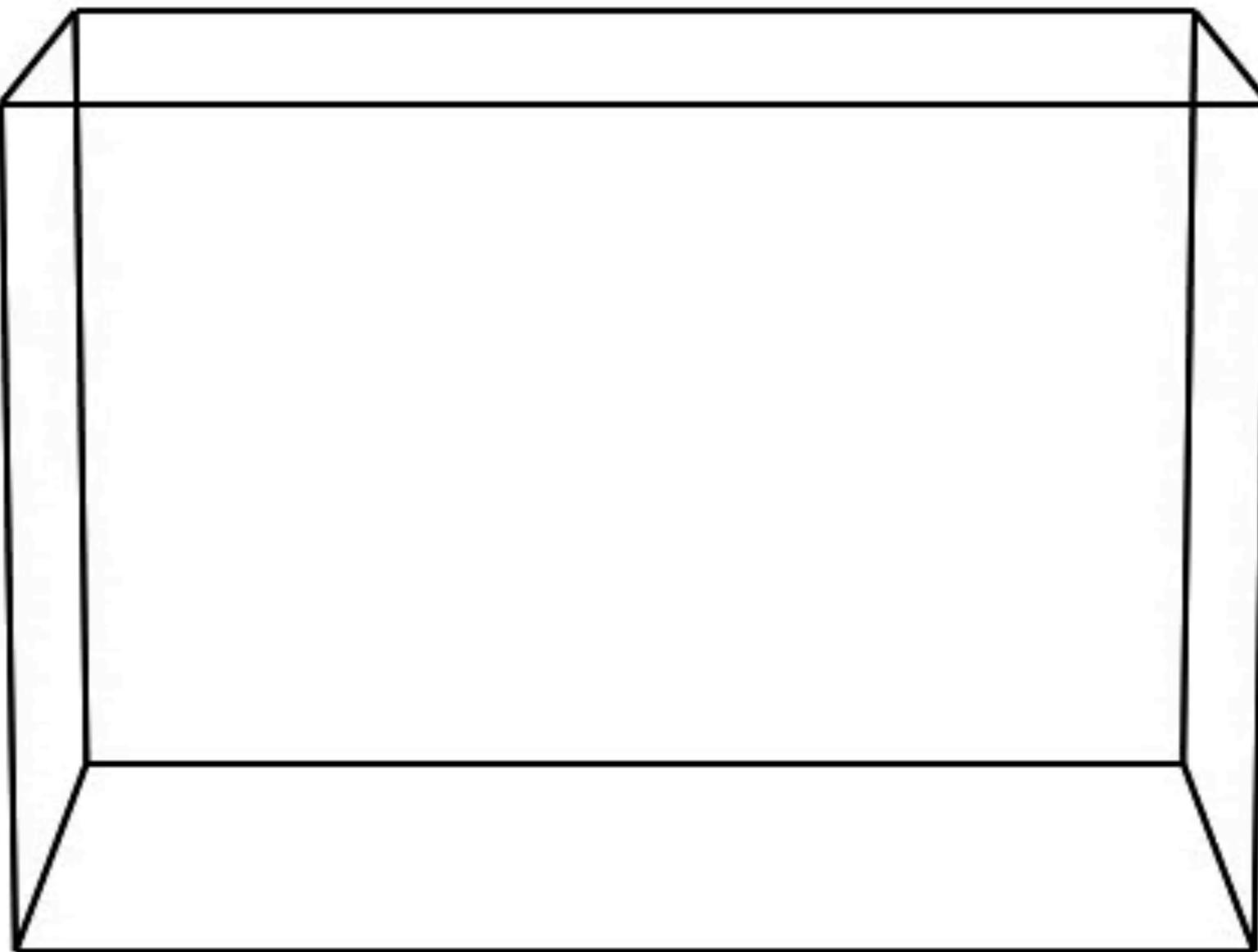
Thought trajectory



Neural trajectories

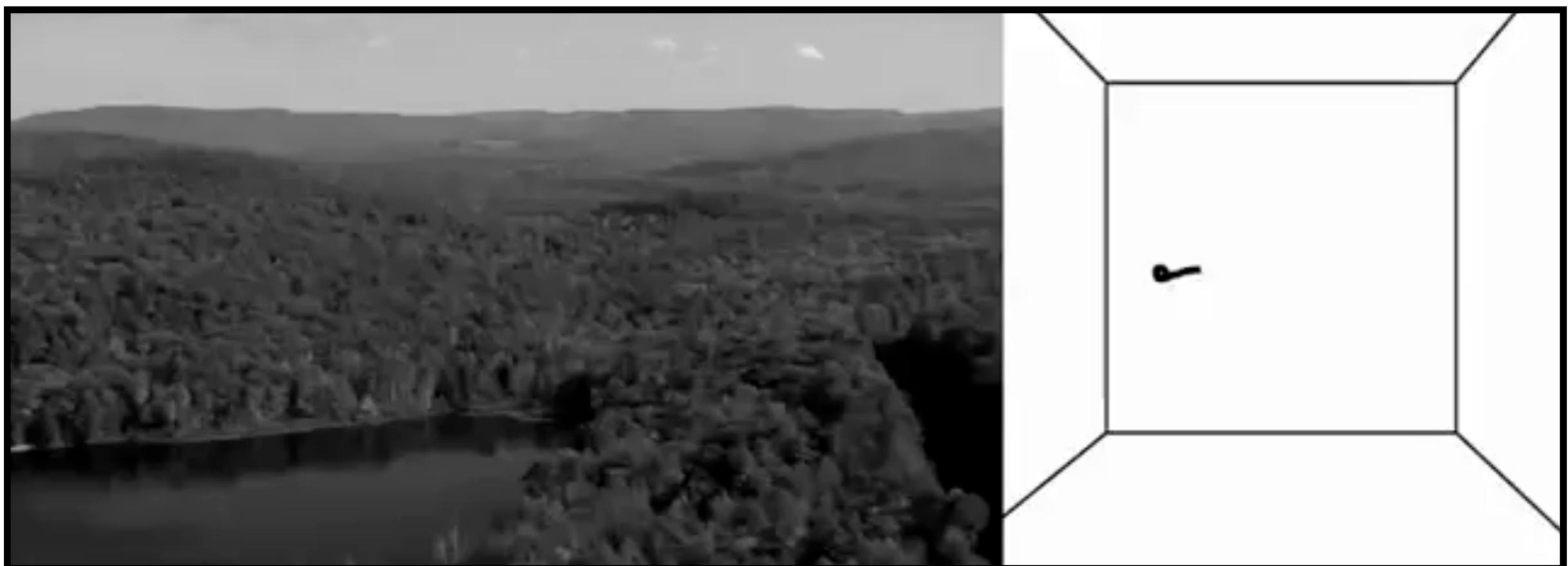


Neural trajectories while watching a movie



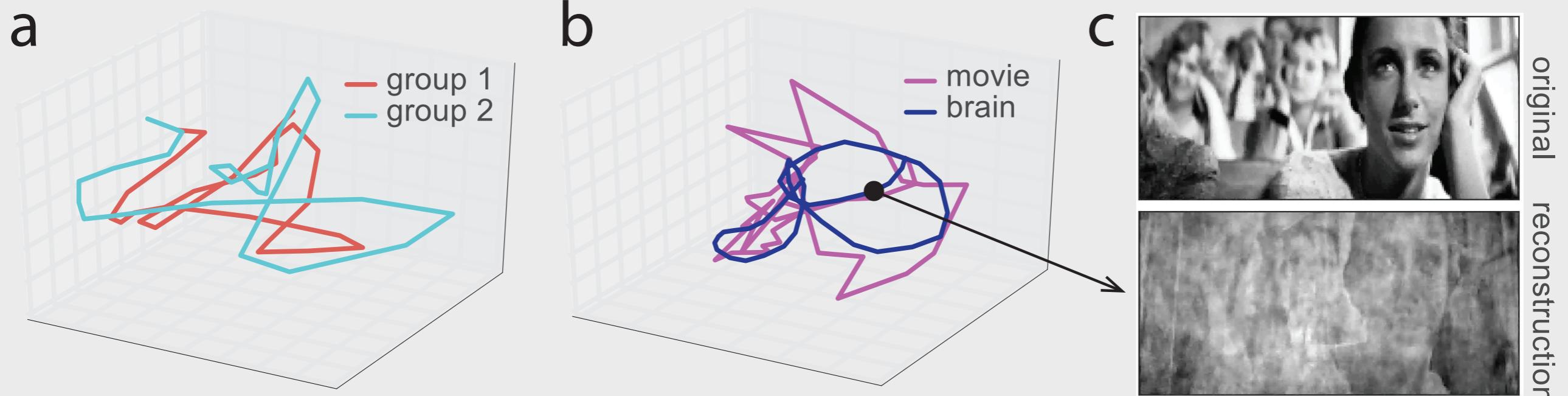
hyp.plot([brain1, brain2], align=True, animate=True)

Movie trajectory



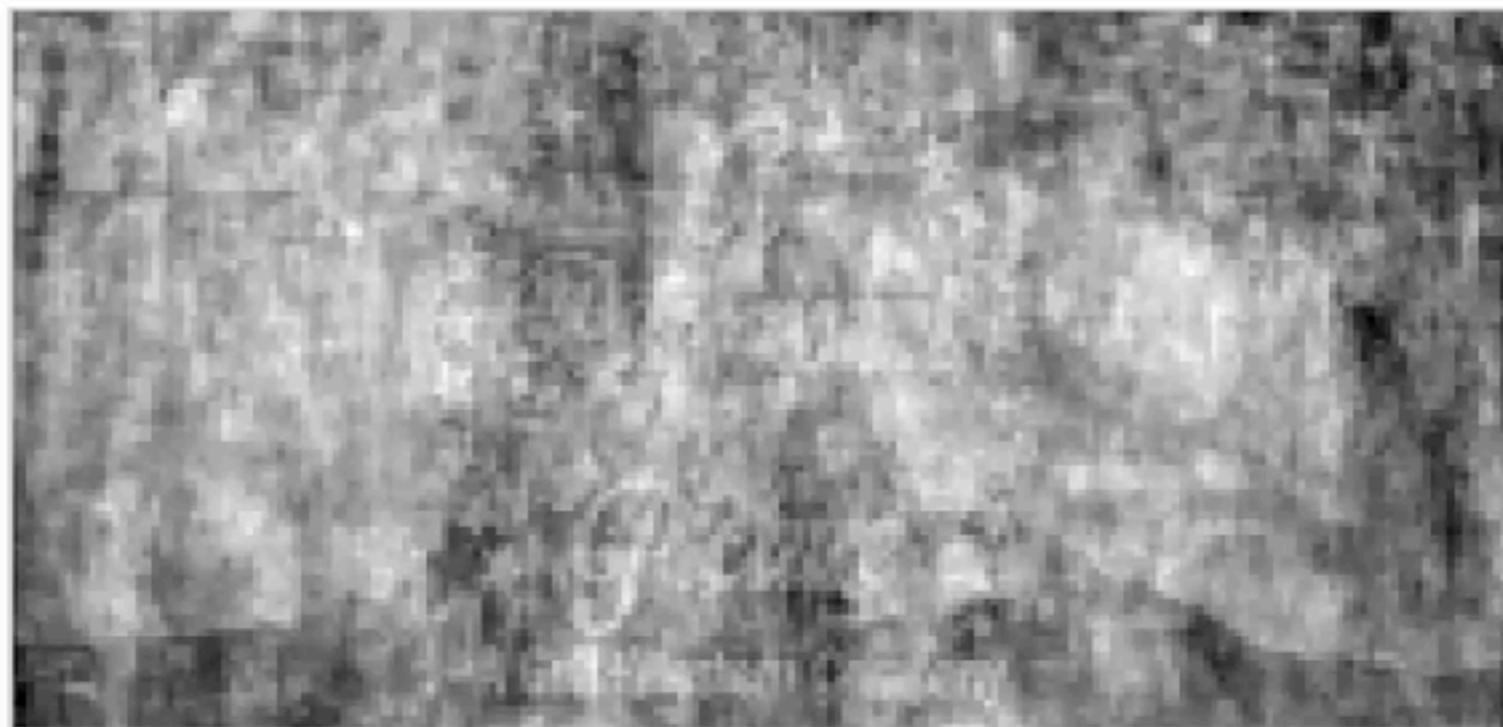
hyp.plot(movieframes, animate=True)

Movie decoding



```
hyp.plot([brain1, brain2], align=True)  
hyp.plot([brain_data, movie_data], align=True)
```

Movie decoding

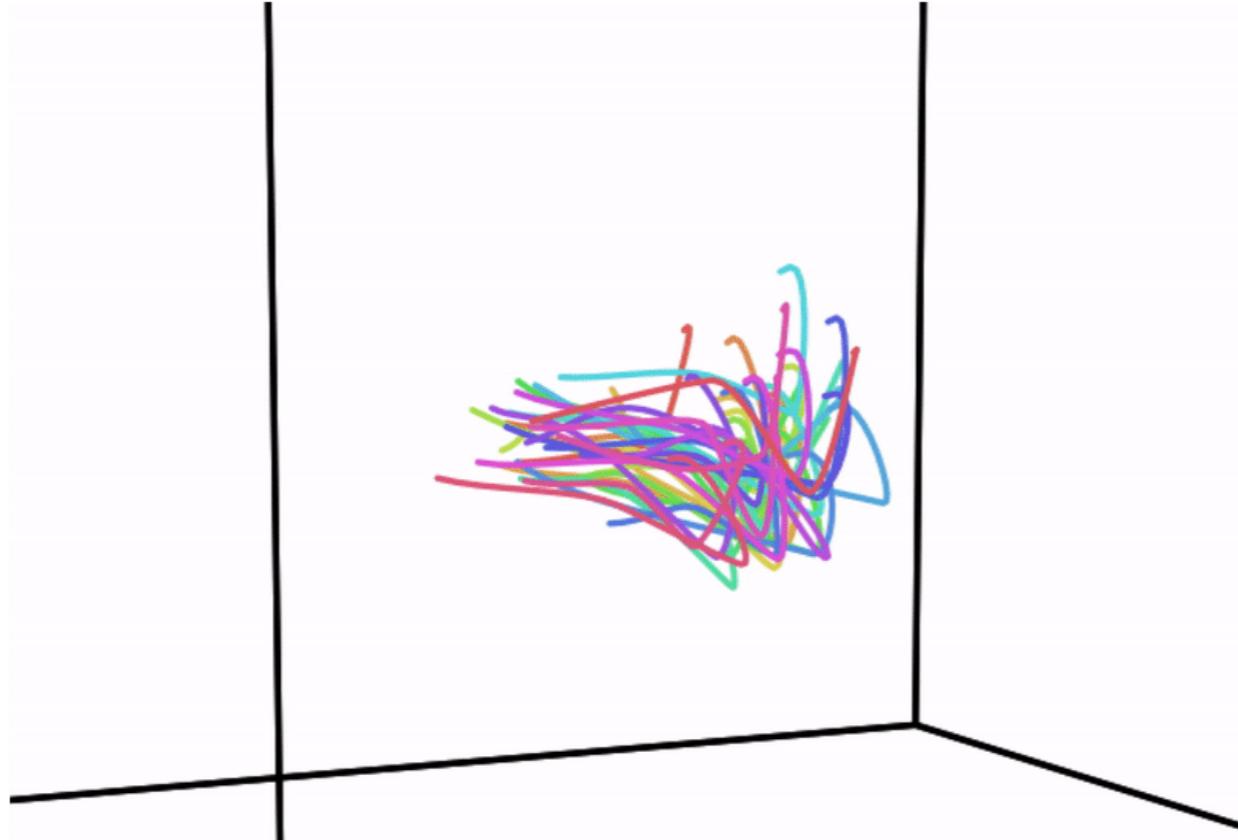


Have fun!

<http://hypertools.readthedocs.io/en/latest/>

hypertools 0.3 API Gallery Download Page ▾ Search

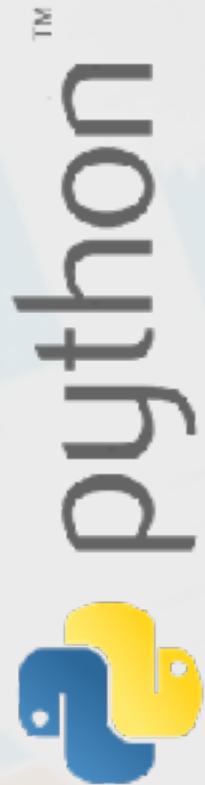
HyperTools: A python toolbox for visualizing and manipulating high-dimensional data



HyperTools is a library for visualizing and manipulating high-dimensional data in Python. It is built on top of matplotlib (for plotting), seaborn (for plot styling), and scikit-learn (for data manipulation). For sample Jupyter notebooks, click [here](#) and to read the paper, click [here](#).

Some key features of HyperTools are:

1. Functions for plotting high-dimensional datasets in 2/3D.



Other nice tools

- Matplotlib (<http://matplotlib.org/>)
- Seaborn (<https://seaborn.pydata.org/>)
- Bokeh (<http://bokeh.pydata.org/en/latest/>)
- Plotly (<https://plot.ly/>)
- Altair (<https://github.com/altair-viz/altair>)
- Nilearn (<http://nilearn.github.io/>)
- MATLAB HyperTools (<https://www.mathworks.com/matlabcentral/fileexchange/56623-hyperplot-tools>)