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Principal Component Analysis Lab

This lab delves into exploratory analysis of neuroscience data, specifically using principal component analysis (PCA) and feature-based aggregation. We will use a dataset of light-sheet imaging recorded by the Ahrens Lab (http://www.janelia.org/lab/ahrens-lab) at Janelia Research Campus, and hosted on the CodeNeuro data repository (http://datasets.codeneuro.org).

Our dataset is generated by studying the movement of a larval zebrafish (http://en.wikipedia.org/wiki/Zebrafish), an animal that is especially useful in neuroscience because it is transparent, making it possible to record activity over its entire brain using a technique called light-sheet microscopy (http://en.wikipedia.org/wiki/Light_sheet_fluorescence_microscopy). Specifically, we'll work with time-varying images containing patterns of the zebrafish's neural activity as it is presented with a moving visual pattern. Different stimuli induce different patterns across the brain, and we can use exploratory analyses to identify these patterns. Read "Mapping brain activity at scale with cluster computing" (http://thefreemanlab.com/work/papers/freeman-2014-nature-methods.pdf) for more information about these kinds of analyses.

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