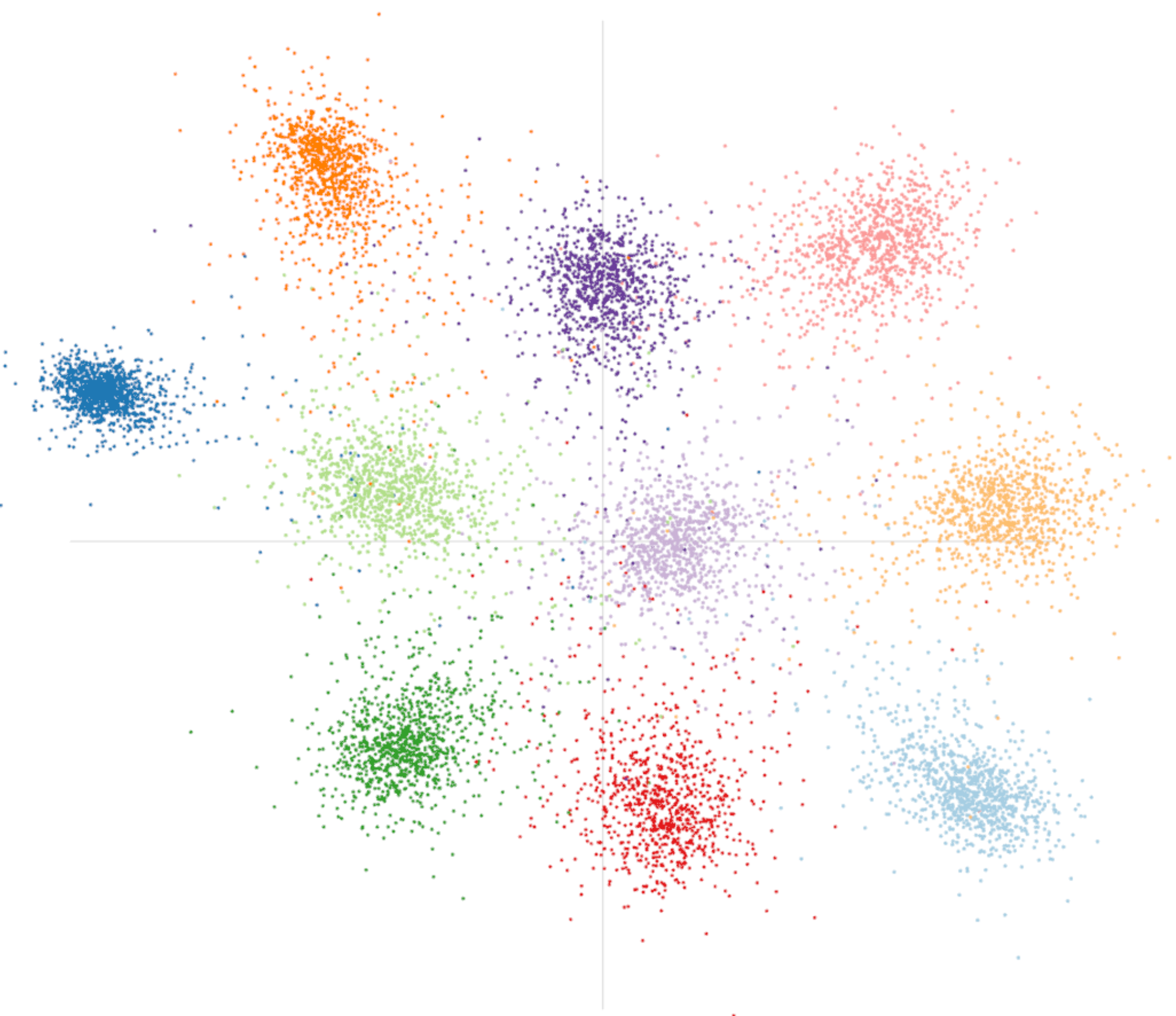


Peering into the depths of the convolutional neural network

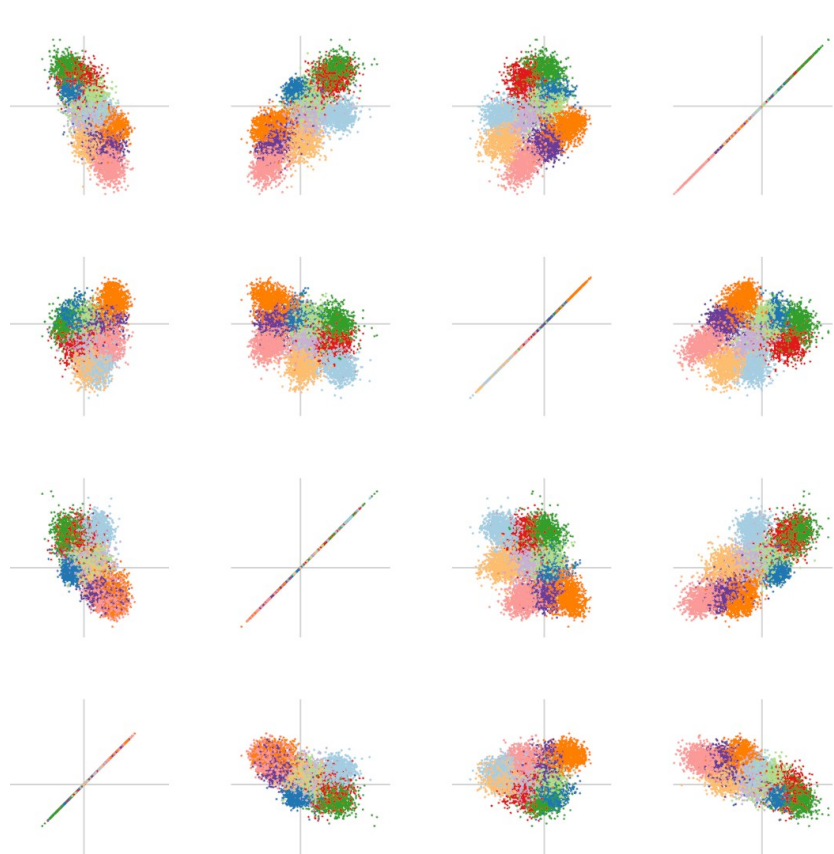


Introduction

Seein' In is an interactive tool designed to help deep learning practitioners gain valuable intuition about the operation of convolutional neural networks. It focuses on:

- **Density:** showing concise visual summaries of massive quantities of high-dimensional data
- **Depth:** allowing the user to view data as it lives at any layer of the network
- **Speed:** fast rendering allows for interactivity, enabling faster analysis and iterative network design

High-dimensional Data

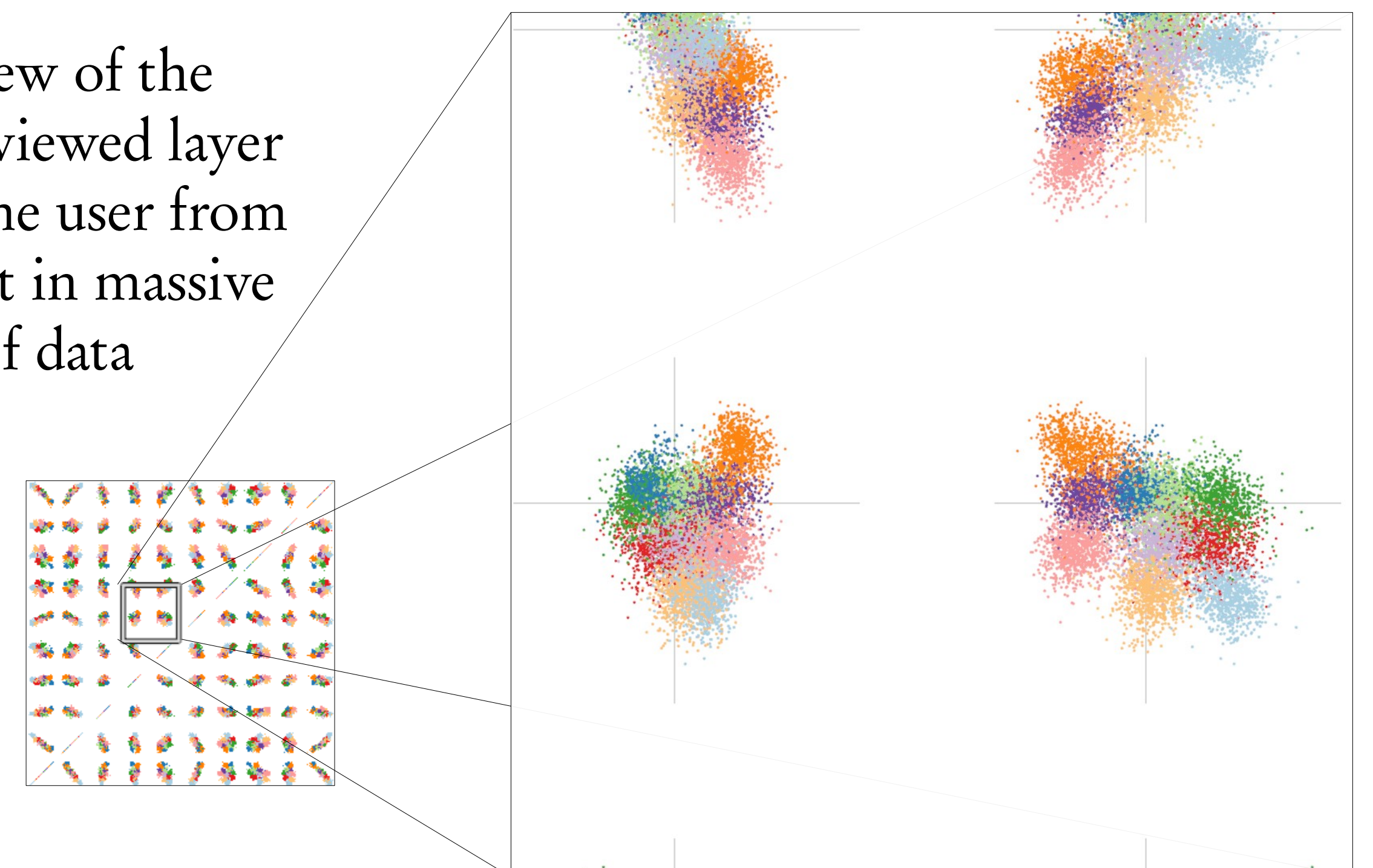


Scatter plot matrices are used to show data with arbitrarily high dimensionality

Every combination of two dimensions is paired to form a scatter plot

Focus + Context

An overview of the currently viewed layer prevents the user from getting lost in massive amounts of data

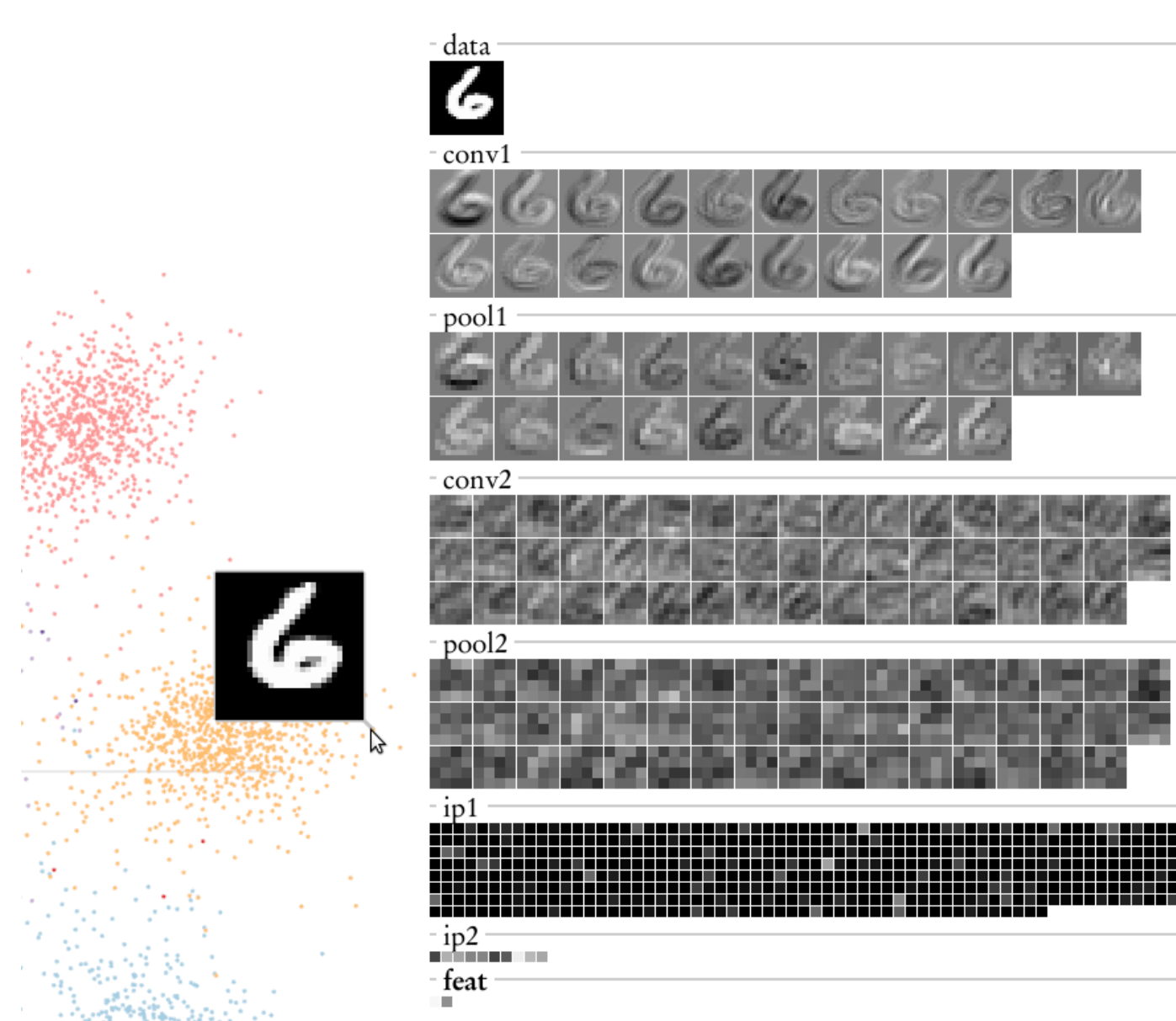


Details on Demand

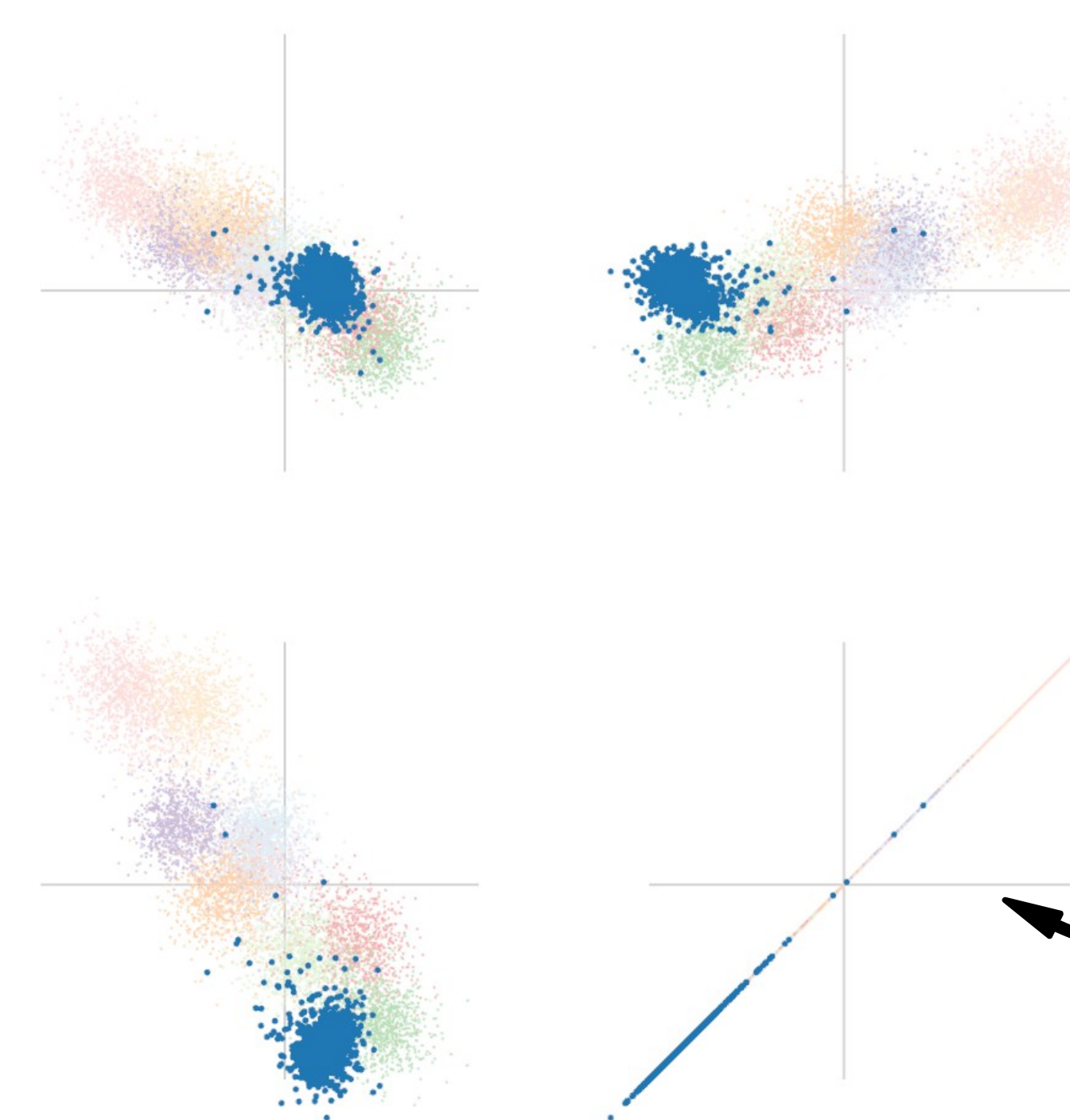
Input images can be seen by hovering the mouse over the corresponding data point

Selecting a (set of) point(s) shows the (aggregate) response of all features in the entire network

Clicking a feature takes the user to the corresponding scatter plot

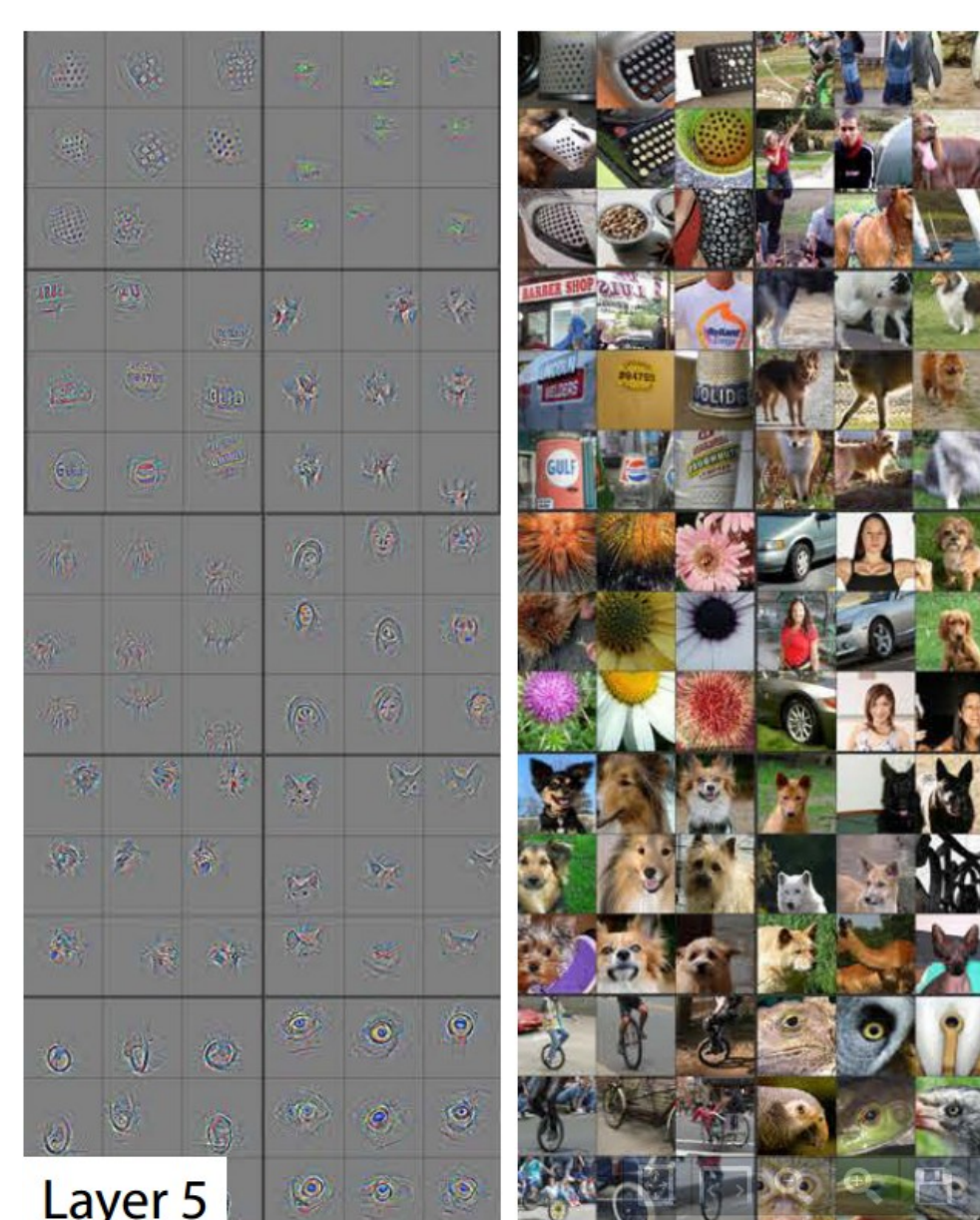
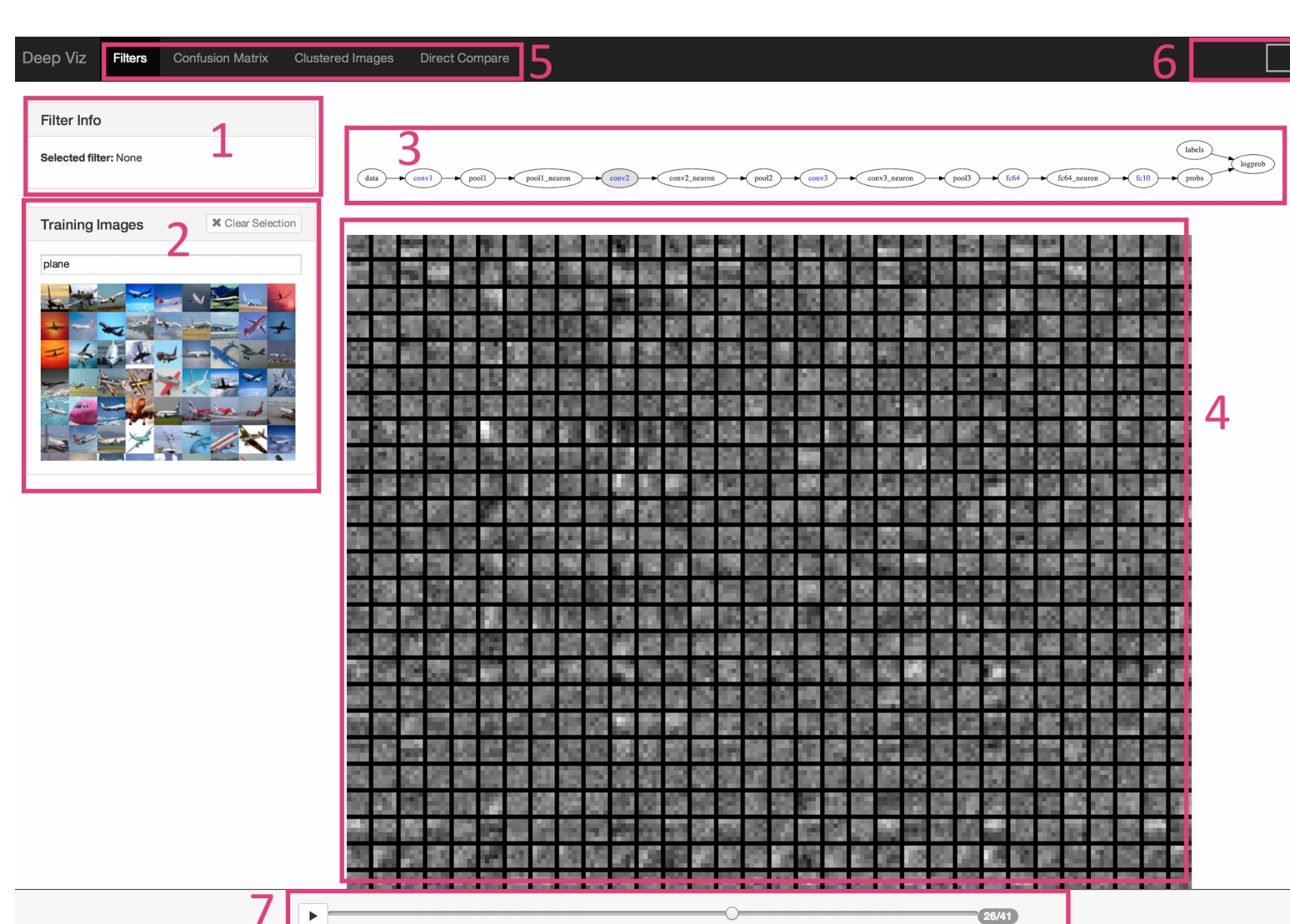


Brushing and Linking



Selections made in any layer are linked across all layers and across plots within a layer

Related Work



Future Work

- **Multiple snapshots:** show the convergence of a network over time
- **Multiple networks:** compare multiple networks in a linked view to evaluate parametric or architectural alternatives
- **Projection back to input space:** incorporate prior work on visualizing 'optimal' stimuli for a selected network unit