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Out of the Plane: Flower vs. Star Glyphs to Support High-Dimensional Exploration in Two-Dimensional Embeddings

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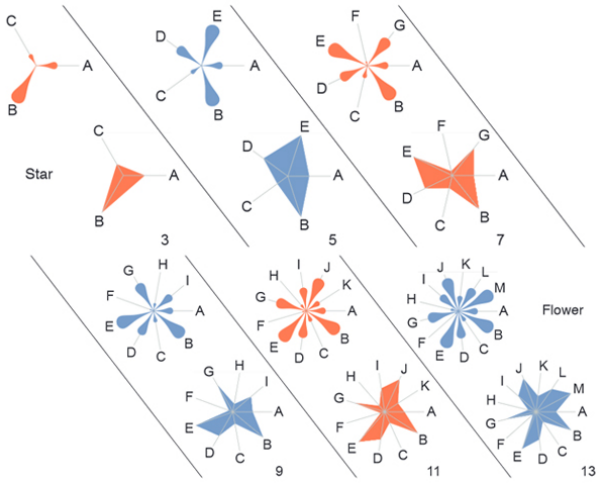

Exploring high-dimensional data is a common task in many scientific disciplines. To address this task, two-dimensional embeddings, such as tSNE and UMAP, are widely used. While these determine the 2D position of data items, effectively encoding the first two dimensions, suitable visual encodings can be employed to communicate higher-dimensional features. To investigate such encodings, we have evaluated two commonly used glyph types, namely flower glyphs and star glyphs. To evaluate their capabilities for communicating higher-dimensional features in two-dimensional embeddings, we ran a large set of crowd-sourced user studies using real-world data obtained from data.gov. During these studies, participants completed a broad set of relevant tasks derived from related research. This paper describes the evaluated glyph designs, details our tasks, and the quantitative study setup before discussing the results. Finally, we will present insights and provide guidance on the choice of glyph encodings when exploring high-dimensional data.

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