Lyra: An Interface for Designing Interactive Visualizations

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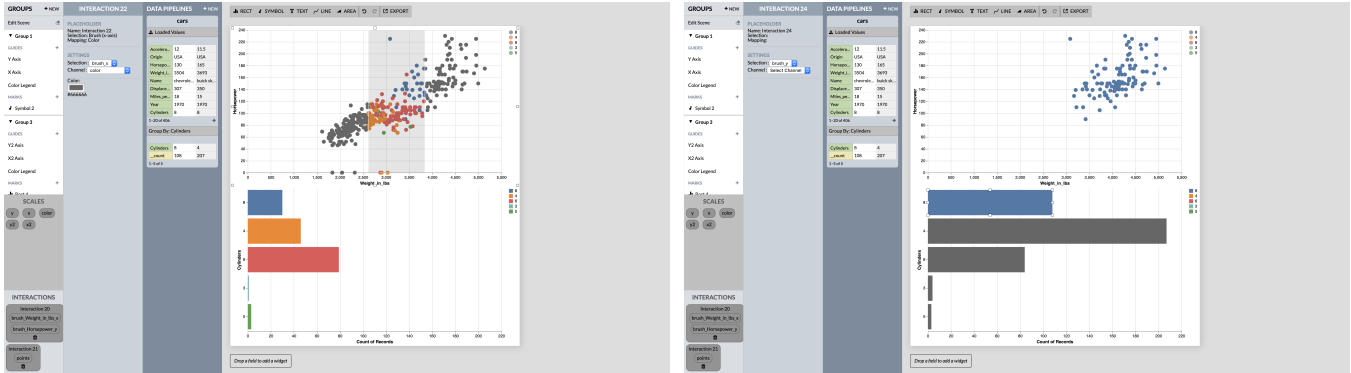Massachusetts Institute of Technology
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Figure 1: An example interactive visualization designed in Lyra, a visualization design environment. Users can brush in the scatterplot to re-aggregate the histogram, and click histogram bars to highlight corresponding points in the scatterplot. This visualization was designed by demonstration—users did not have to write any textual code.

CCS CONCEPTS

• **Human-centered computing** → **Visualization systems and tools**; *Interaction paradigms*; Graphical user interfaces.

KEYWORDS

interactive data visualization, design tools

ABSTRACT

We introduce Lyra 2, an update to the visualization authoring environment built on the modern Vega and Vega-Lite software stack. Lyra's drag-and-drop interface previously bridged the Vega and Vega-Lite levels of abstraction for static visualization design. Although users can choose to compile Vega-Lite specifications and edit the output lower-level Vega specification, working in Lyra lowers the complexity of combining features of both languages.

Lyra 2 now bridges the complexity gap for interaction design as well. Most graphical interfaces are restricted to static visualizations. To author interactive visualizations, most users turn to textual specification. Lyra's newest major feature is interaction design by demonstration: a novel method for authoring interaction techniques via direct manipulation.

Consider the example task of creating a rectangular brush for selecting and highlighting points on a scatterplot. To design this technique, users demonstrate it by dragging their mouse cursor directly over the visualization they are currently editing. The system interprets this performance using a set of heuristics, and produces suggestions of possible interaction designs. In our example, the system detects that drag events occur in a space marked by quantitative x- and y-axes and suggests a set of interval-based interactions. These suggestions consist of a selection (e.g., 1D or 2D brushes) and an application (e.g., conditional color, opacity, or size encodings or filtering selected points). Suggestions are displayed as thumbnail previews, which illustrate what the visualization would look like after applying the interaction and facilitate rapid comparison. Users can hover over suggestions to preview them on the main visualization, perform additional demonstrations to refine the suggestions, or click to accept a suggestion and instantiate the interaction technique. Visualizations created in Lyra can be exported as specifications in Vega, a portable JSON-based format which enables easy sharing and embedding online.