



VisAnatomy: An SVG Chart Corpus with Fine-Grained Semantic Labels

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Chart Corpus for Various Applications



retrieve charts satisfying criteria



generate code for charts



deconstruct charts into components



classify charts by type



Chart **question & answering**



edit charts through NL

Chart Corpus: Fine-Grained Semantic Labels



retrieve



generate



deconstruct



classify

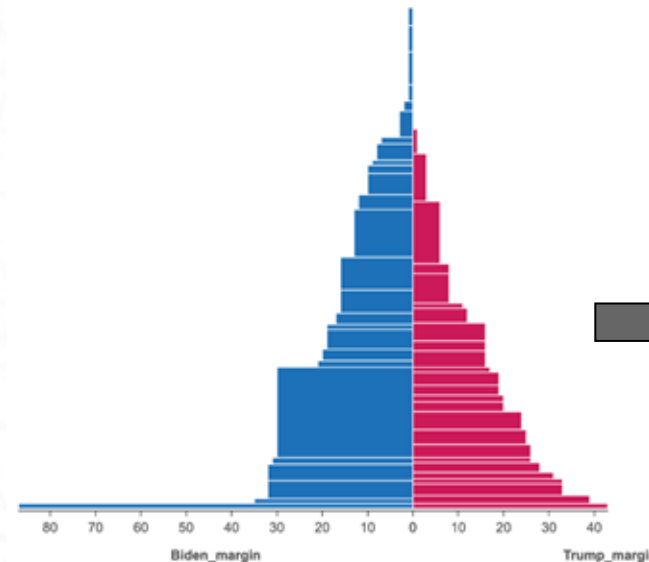


Q & A



edit

evaluate technique performance



{
Grouping: {...},
Relationships: {...},
Encodings: {...},
Constraints: {...}
}

Mystique: Reuse SVG Chart Layout
Chen et al. 2023

Chart Corpus: Fine-Grained Semantic Labels



retrieve



generate



deconstruct



classify

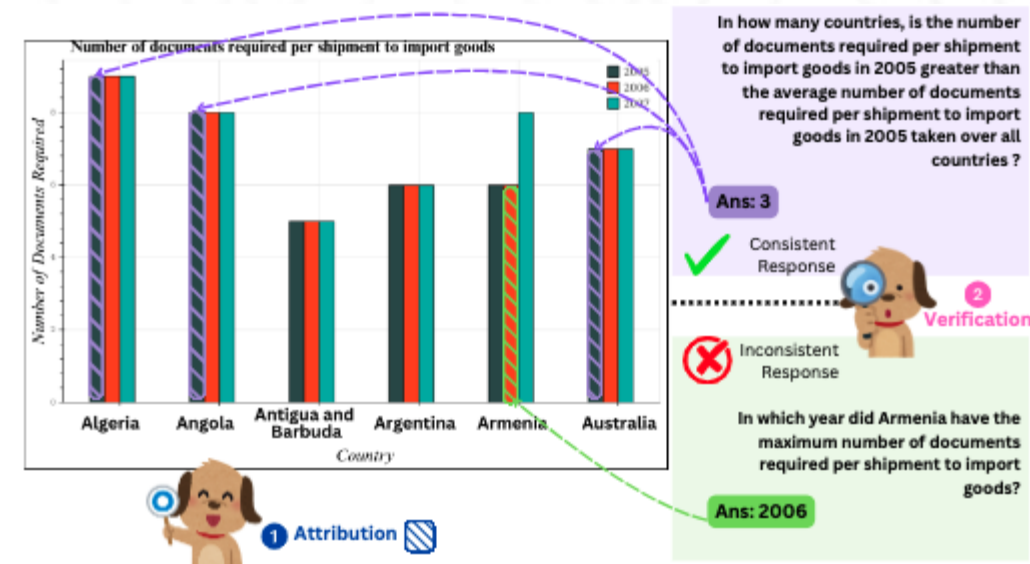


Q & A



edit

improve model performance



ChartLens: Visual Attribution in Charts
Suri et al. 2025

Existing Corpora

Many lack fine-grained labels

chart type, chart bounding box, ...

Some include fine-grained labels, but lack chart diversity

charts generated computationally using a single *tool*

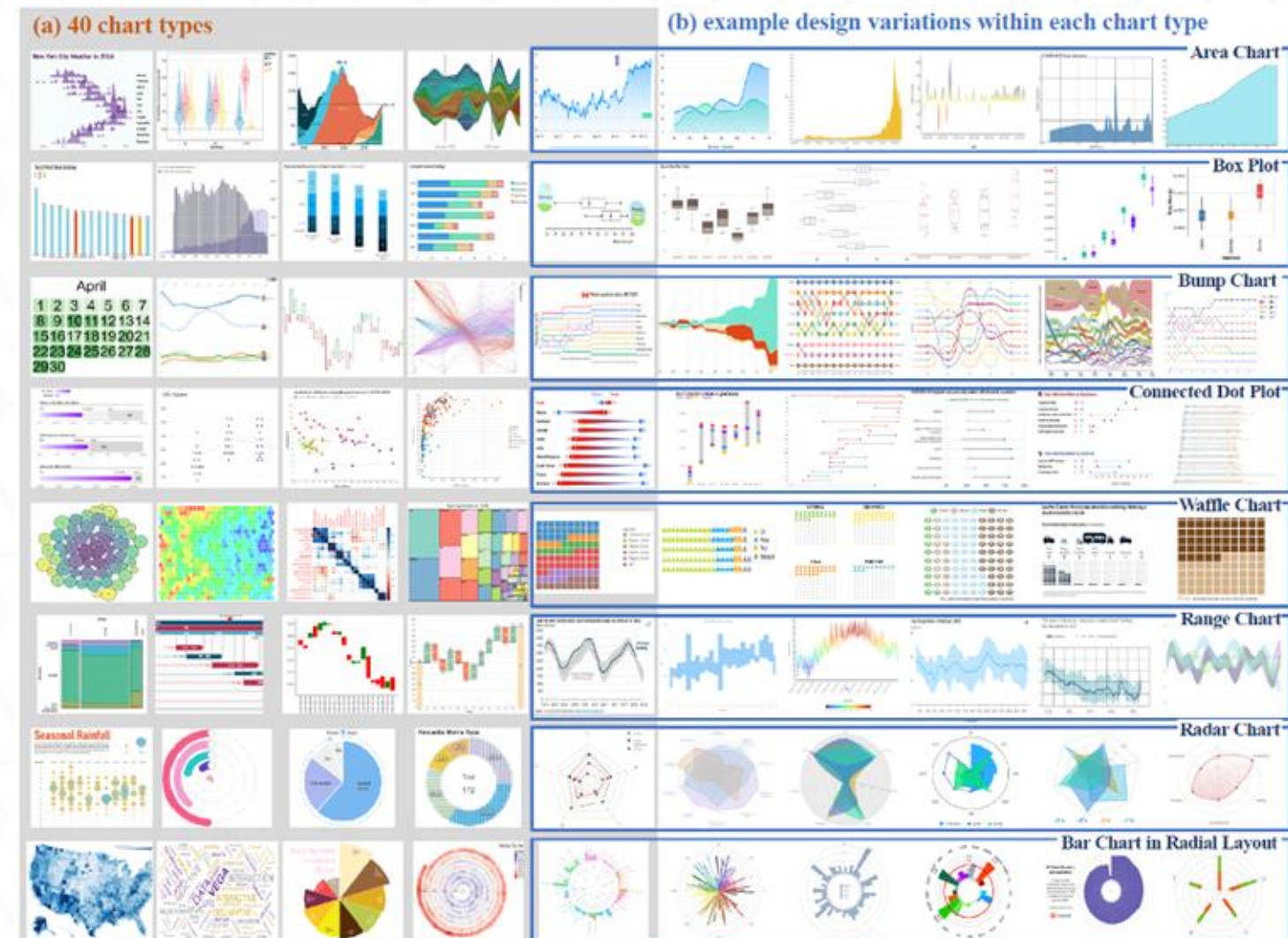
limited variations in *chart types* and *designs*

VisAnatomy

A diverse corpus of real-world charts
bitmap & SVG formats

942 charts, 40 chart types,
50+ tools, 100+ domains

labels on 383K+ graphical elements:
mark type, role, bbox, grouping,
layout, encodings



Goals and Approach

Diverse Charts

Fine-Grained Component Labels

Goals and Approach

Diverse Charts

focus on SVG format

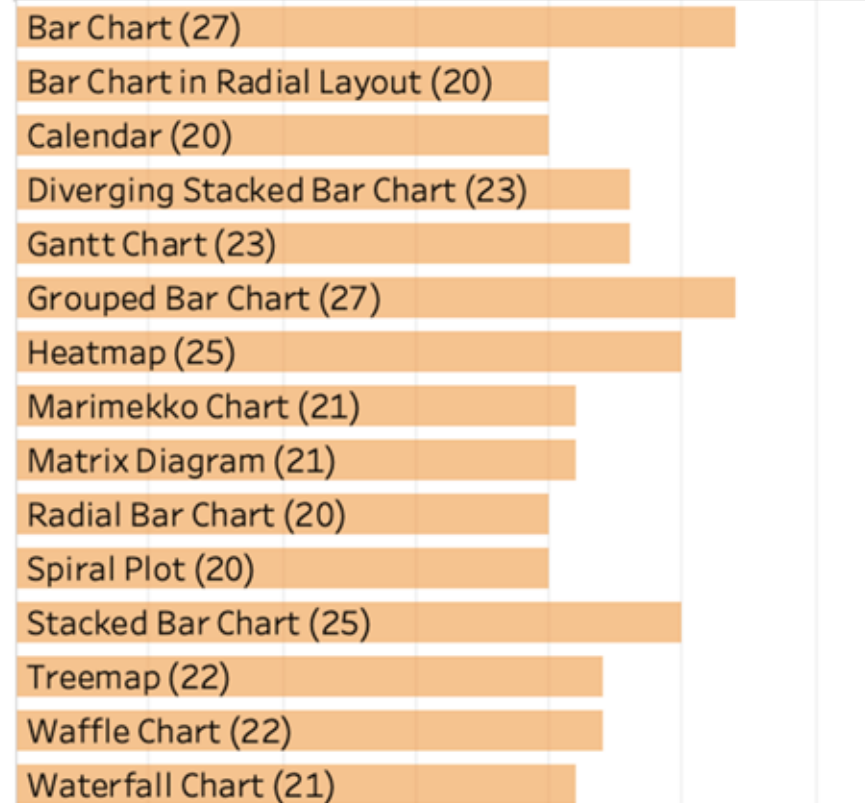
manual curation: tool galleries +
online communities + advanced
image search

handle missing styles

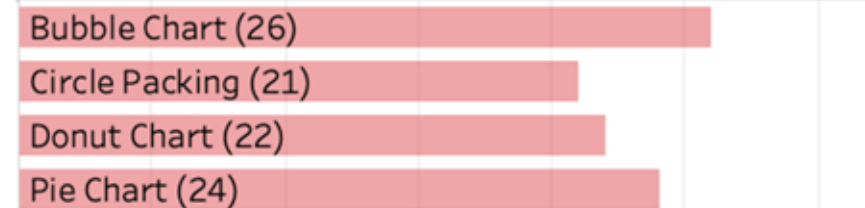
Fine-Grained Component Labels

Chart Type Distribution

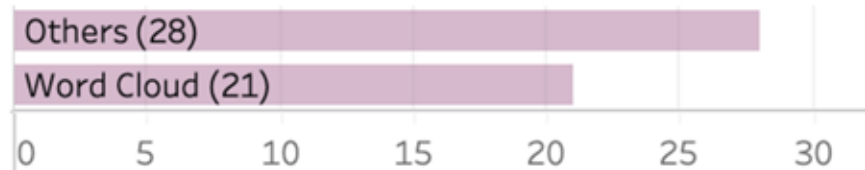
Bar/Rectangle



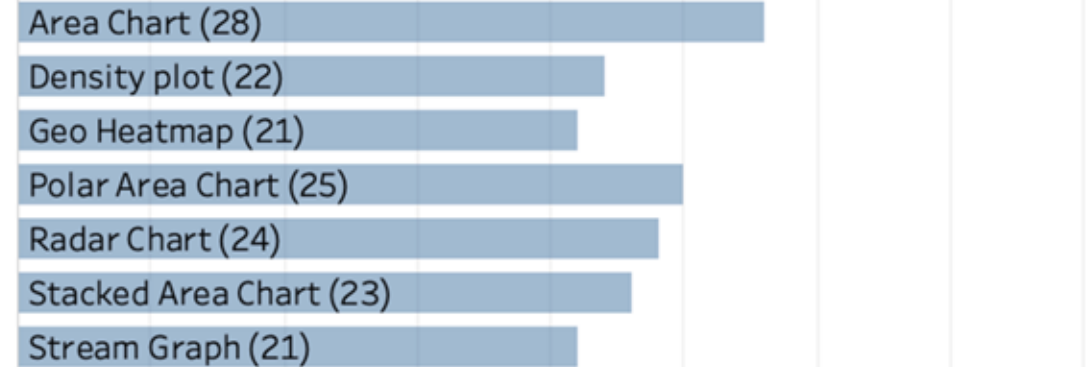
Circle/Arc/Pie



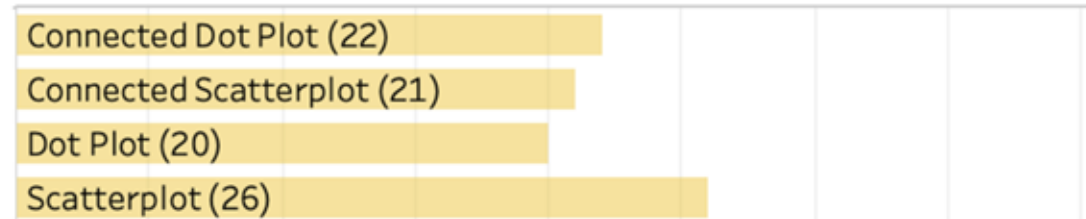
Text/Others



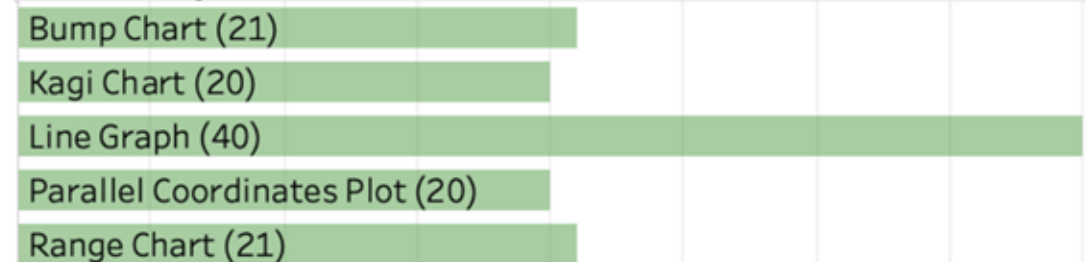
Area/Polygon



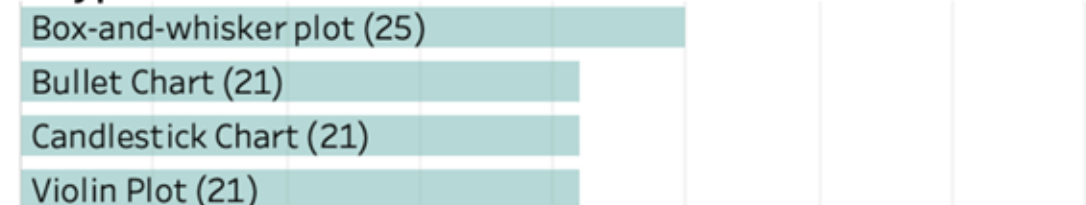
Dot/Point



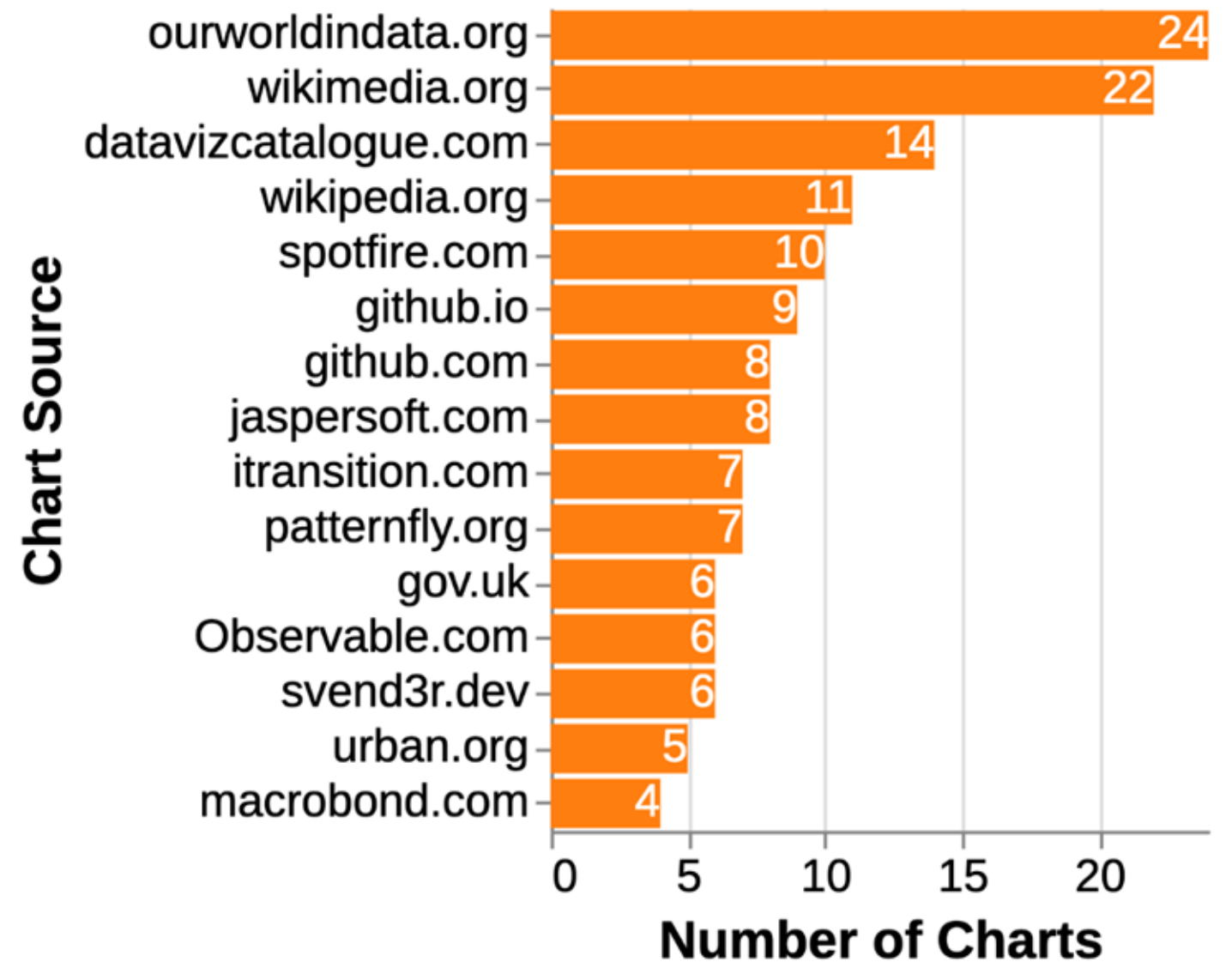
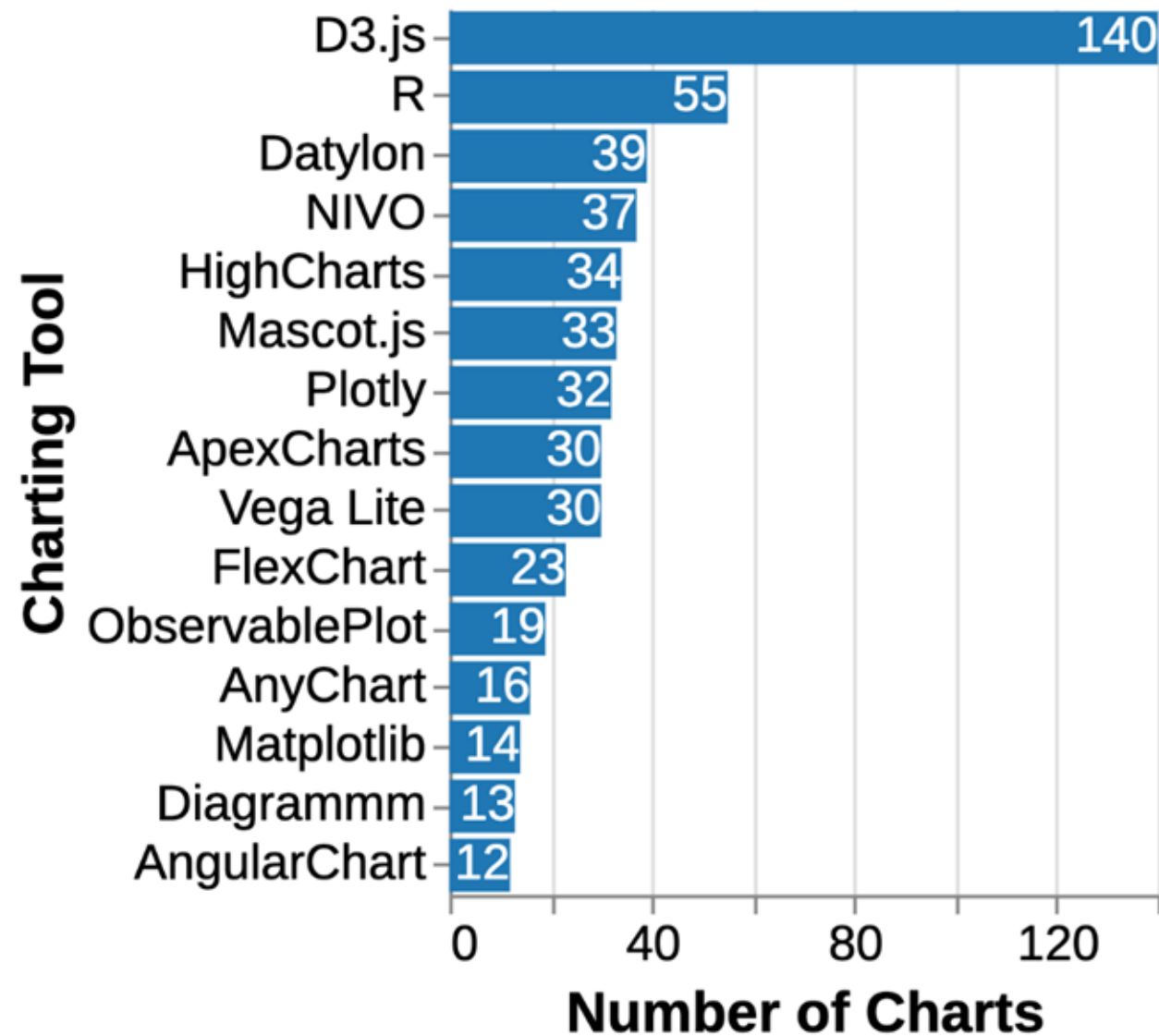
Line/Polyline



Glyph



Tools and Sources



The collage features several data visualizations:

- Top Left:** A horizontal bar chart with four categories (Mar, Stril, Tan, Buc) and a legend. The x-axis ranges from 30 to 120.
- Top Center:** A heatmap with a color gradient from red to green, showing a pattern of data points.
- Top Right:** A stacked bar chart showing data for 2011 Q2, 2011 Q3, 2011 Q4, 2012 Q1, 2012 Q2, 2012 Q3, and 2012 Q4. The y-axis ranges from 15 to 85.
- Bottom Left:** A horizontal bar chart showing data for four days (Mon, 04/20, Tue, 04/21, Wed, 04/22, Thu, 04/23, Fri, 04/24). The x-axis ranges from 0 to 120.
- Bottom Center:** A horizontal bar chart showing data for four categories (Mar, Stril, Tan, Buc) and a legend. The x-axis ranges from 0 to 120.
- Bottom Right:** A bar chart titled "Depressive symptoms across the US population, 2014" showing the frequency of various symptoms (Low energy, Sleep problems, Loss of interest, Appetite change, Depressed mood, Difficulty concentrating, Low self-esteem, Psychomotor agitation, Suicidal ideation) across different frequency levels (Nearly every day, More than half the days, Several days, Not at all).

Goals and Approach

Diverse Charts

focus on SVG format

manual curation: tool galleries +
online communities + advanced
image search

handle missing styles

Fine-Grained Component Labels

chart components

mark elements
reference elements
hierarchical grouping
group layout
visual encodings

Goals and Approach

Diverse Charts

focus on SVG format

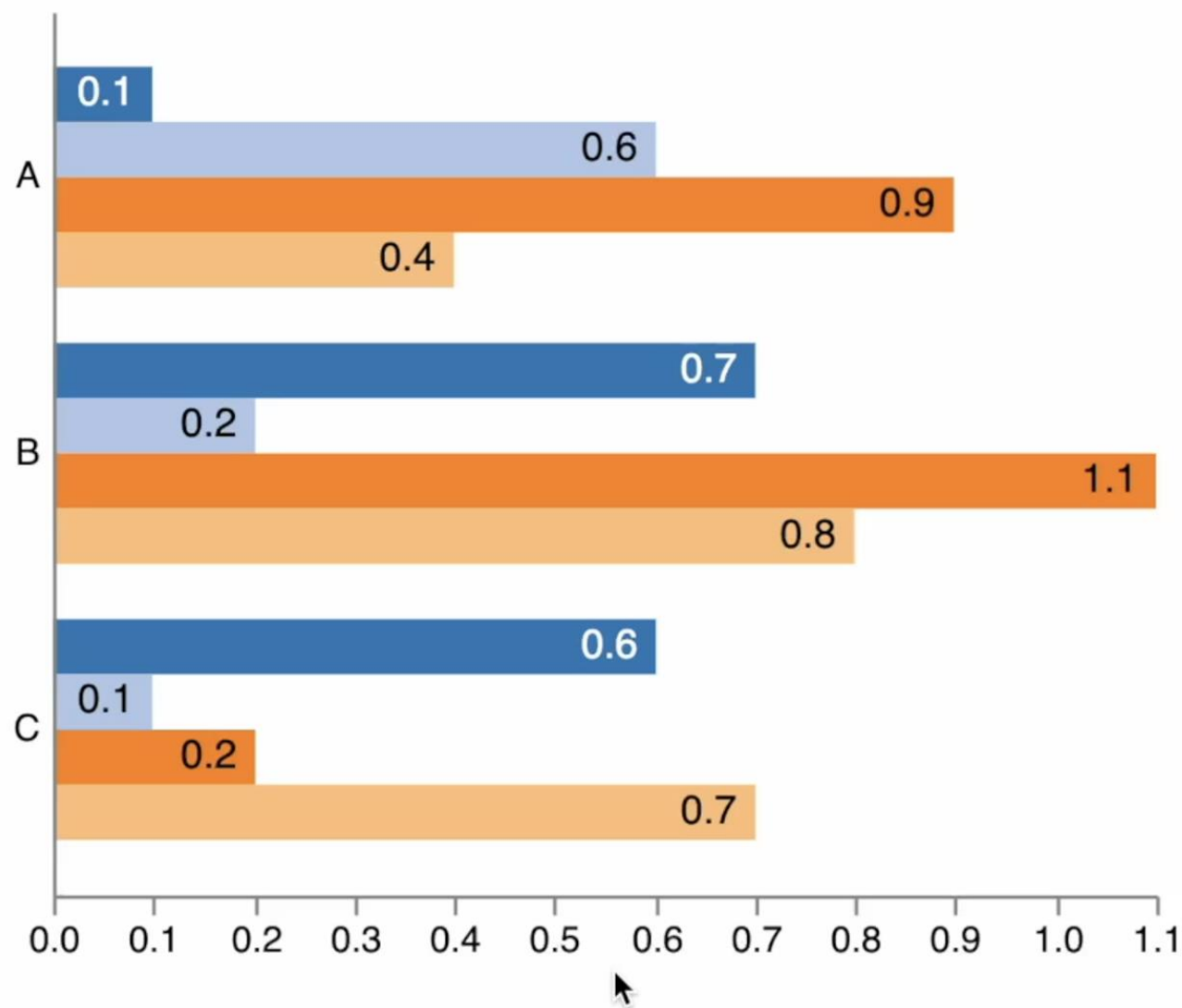
manual curation: tool galleries +
online communities + advanced
image search

handle missing styles

Fine-Grained Component Labels

chart components

semi-automated labeling tool
three visualization experts
at least two annotators per chart

[Back](#)[Axis & Legend](#) | [Marks](#) | [Groups](#) | [Layout](#) | [Encodings](#) | [Constraints](#)[Next](#)

Axis & Legend Detection Results

**X axis**

numbers



Text element(s) for the X-axis title

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1

**Y axis**

categories

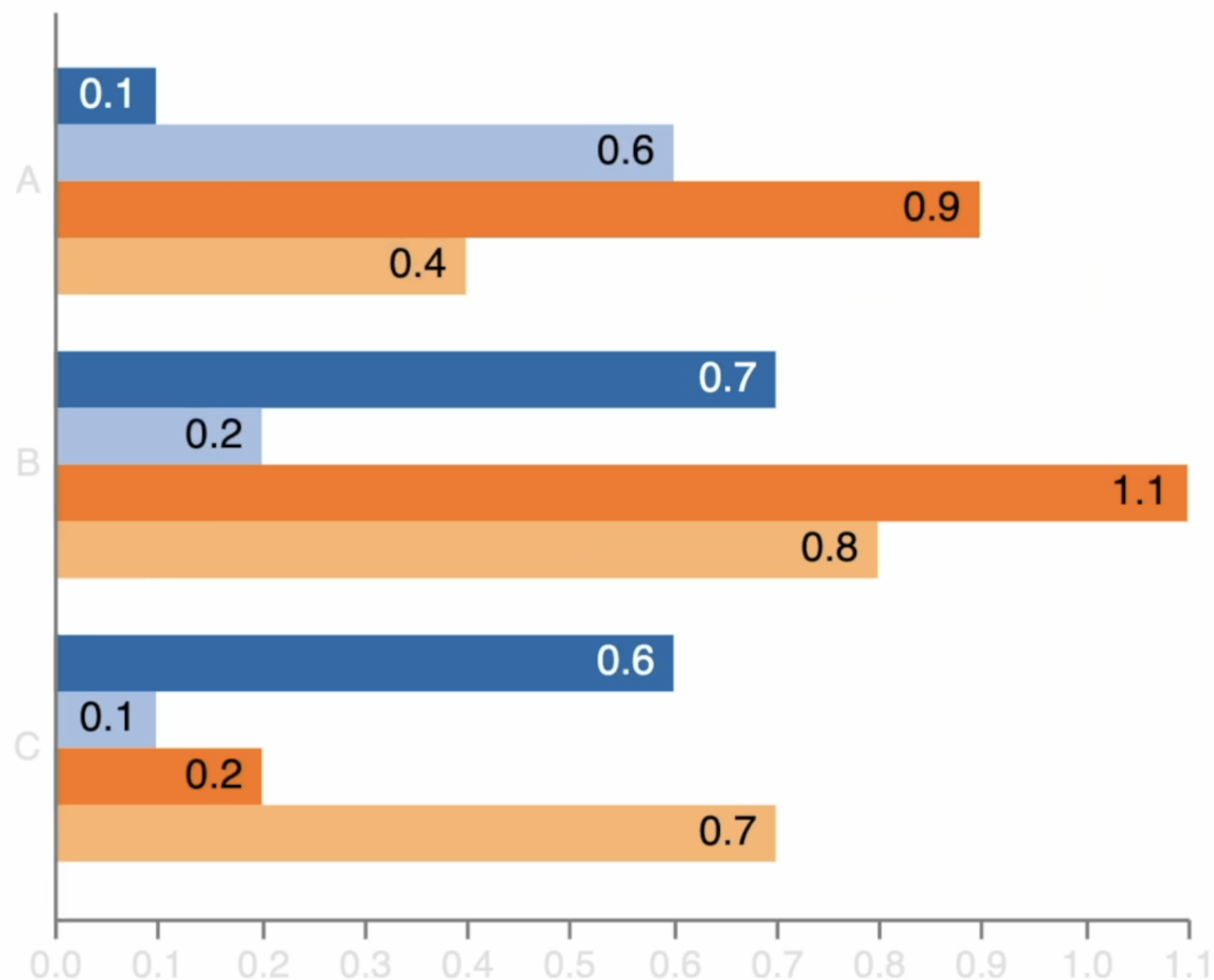


Text element(s) for the Y-axis title

A B C



Text element(s) for the chart title

[Back](#)[Axis & Legend](#) | **[Marks](#)** | [Groups](#) | [Layout](#) | [Encodings](#) | [Constraints](#)[Next](#)

Assign a Mark Type

Not Assigned ▾

Assign a Mark Role

Not Assigned ▾

All Marks (0 Selected)

path0

path1

path2

path3

path4

path5 Main Chart Mark

path6 Main Chart Mark

path7 Main Chart Mark

path8 Main Chart Mark

path9

path10 Main Chart Mark

path11 Main Chart Mark

path12 Main Chart Mark

path13 Main Chart Mark

path14

path15 Main Chart Mark

path16 Main Chart Mark

Batch Selections

Select all paths

Select paths whose fill is none

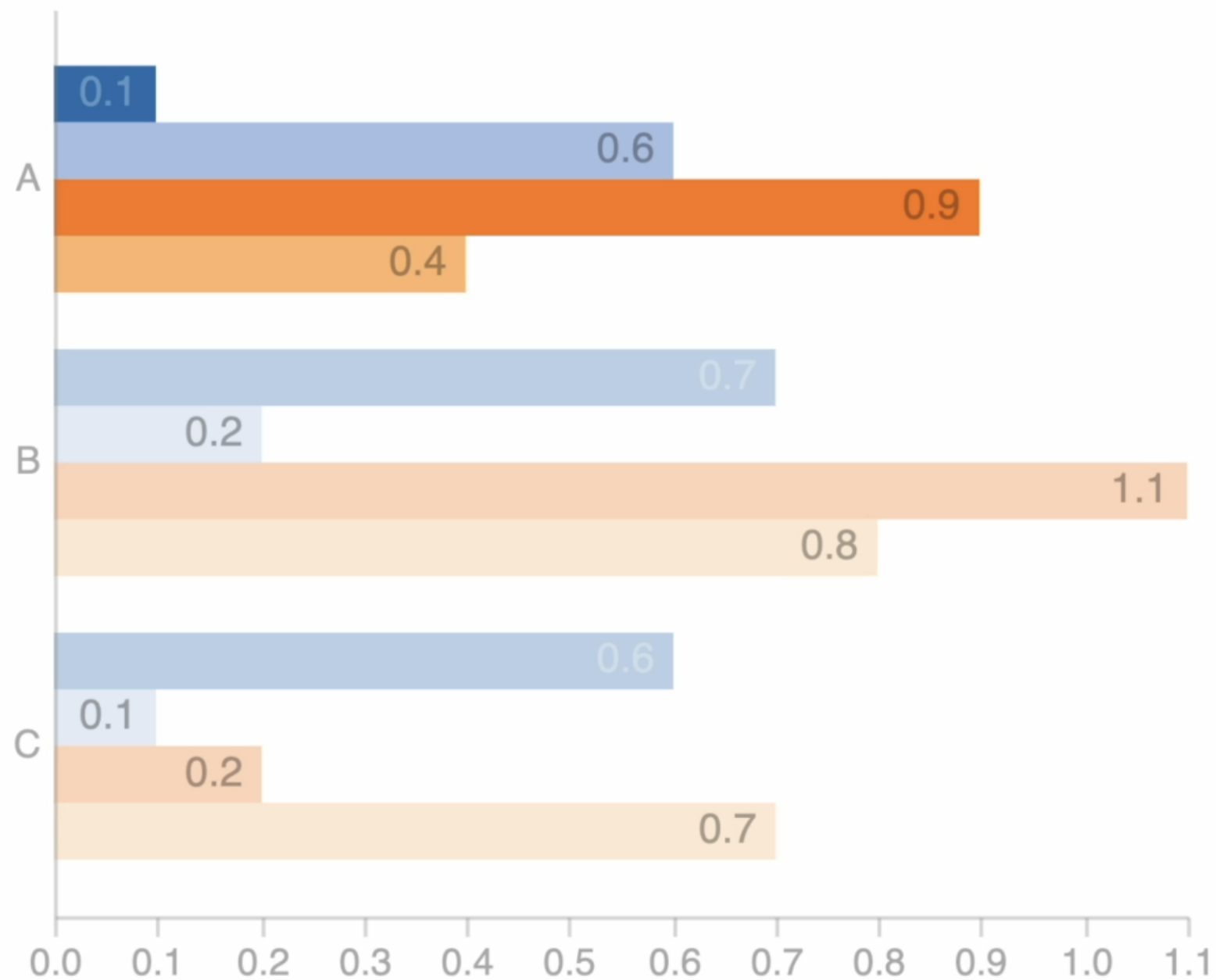
Select paths whose fill is undefined ☐Select paths whose fill is #1f77b4 ☒Select paths whose fill is #aec7e8 ☐Select paths whose fill is #ff7f0e ☐Select paths whose fill is #ffbb78 ☐

Select all texts

Select texts whose fill is #fff ☐

Select texts whose fill is #000

Select texts whose fill is rgb(0, 0, 0) ☐

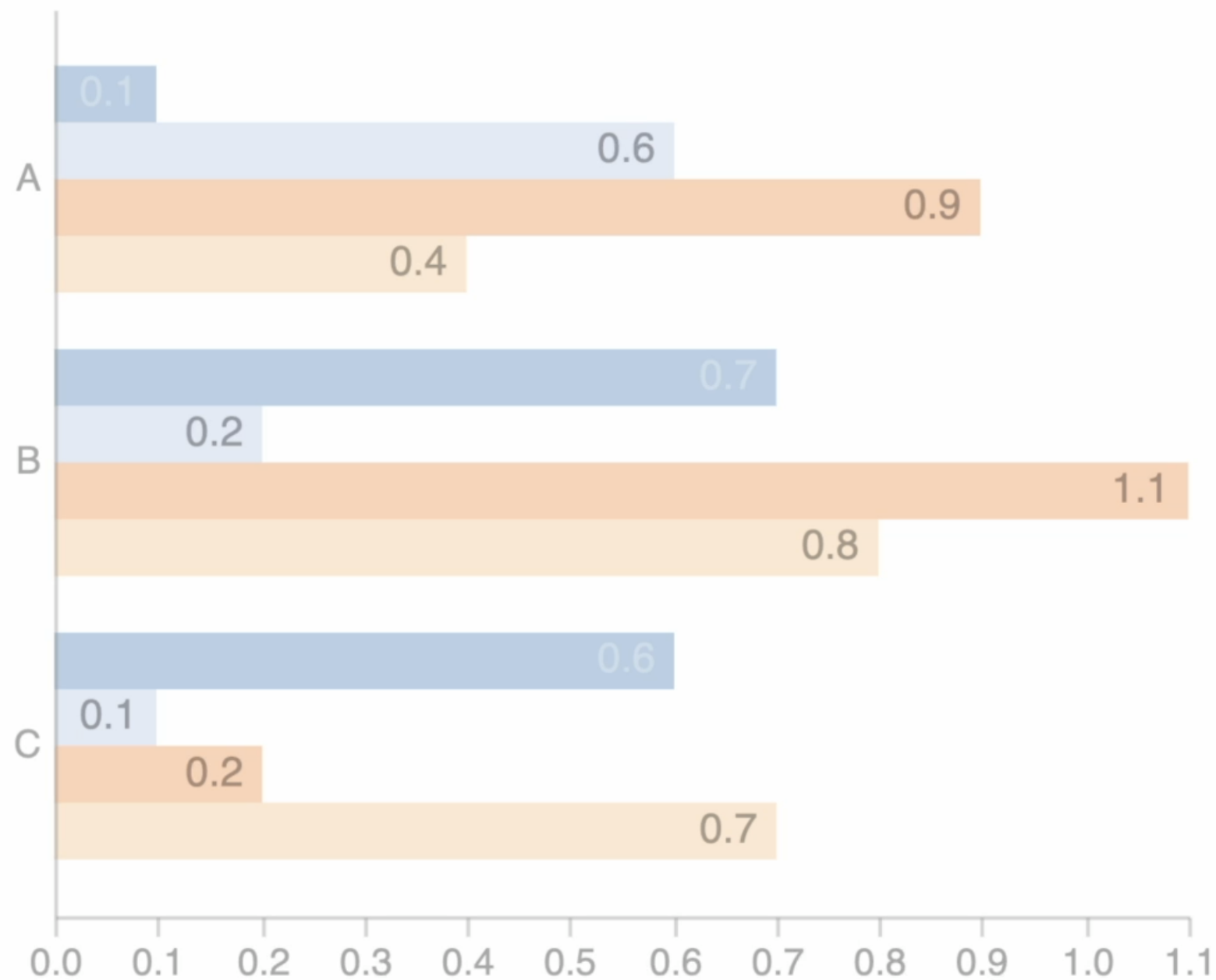


Select groups by clicking and then **merge**; if you want to redo the grouping, please click **clear**.

path5, path6, path7, path8

path10, path11, path12, path13

path15, path16, path17, path18



Grouping Structure

- Group 3

- - Group 0
 - path5
 - path6
 - path7
 - path8
- + Group 1
- + Group 2

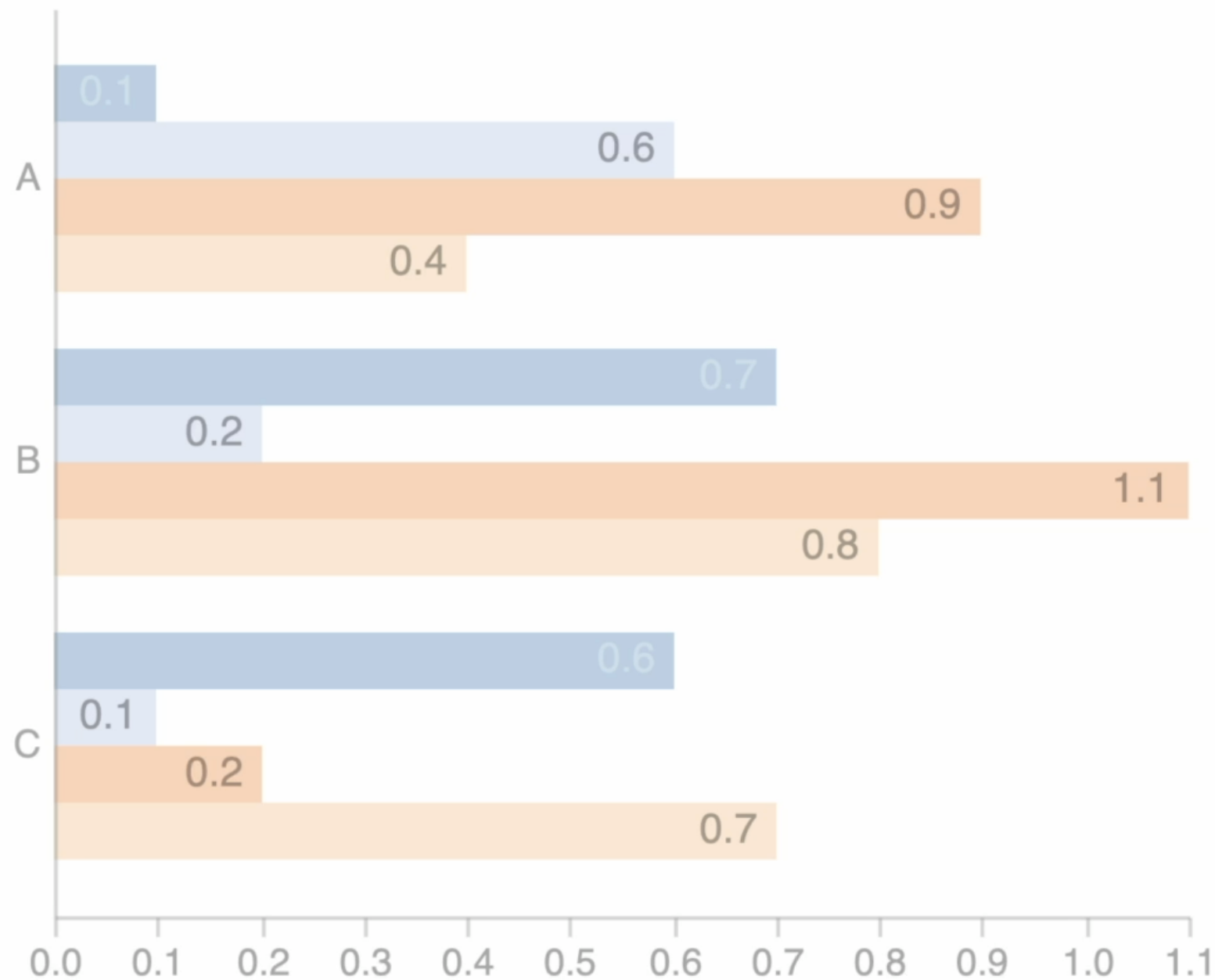
Layout Specification

Select a layout type for the selected group **Group 0**:

- ✓ Grid
- Stack
- Packing
- Encoded with Data

Record layout for Group 0

Record layout for all
same-level groups



Grouping Structure

- Group 3
 - - Group 0
 - path5
 - path6
 - path7
 - path8
 - + Group 1
 - + Group 2

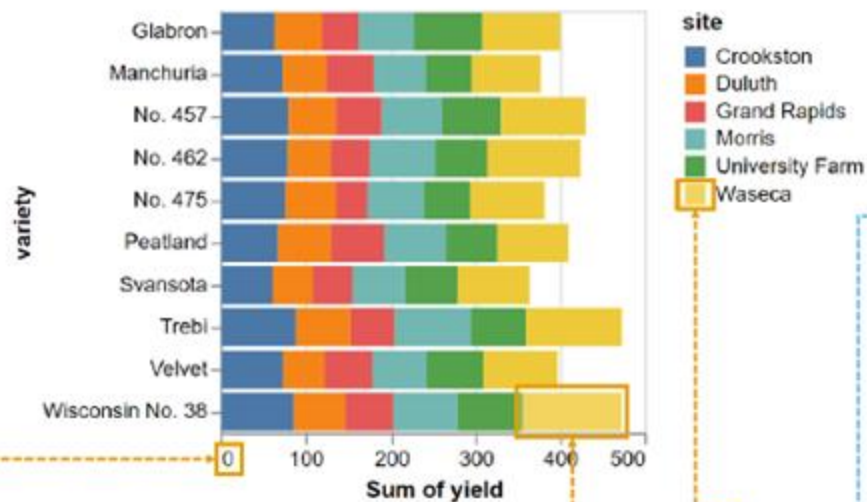
Encoded Channels

Select the channels that are used for encoding data for the selected object **path5**:

- ☒ width
- ☐ height
- ☒ color
- ☐ x
- ☐ y
- ☐ opacity
- ☐ shape
- ☐ size

Record encodings for path5

Record encodings for all same-level groups / same-type marks



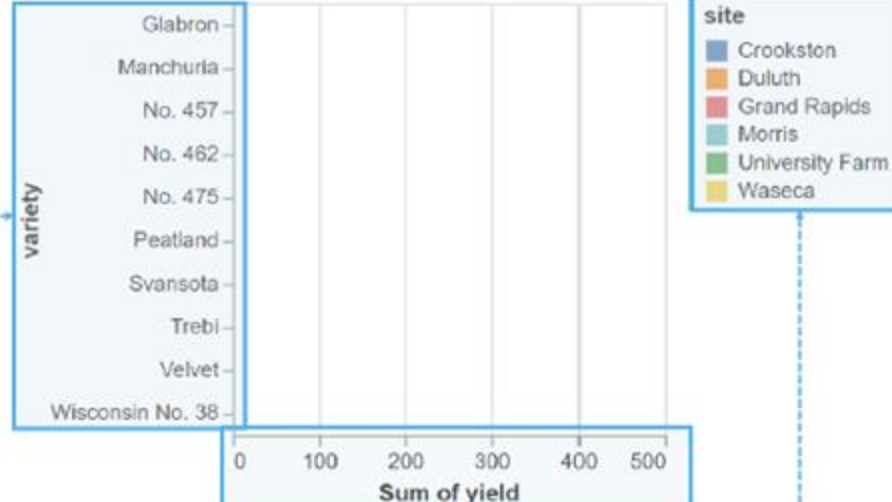
(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

```

(c) Element Type and Role

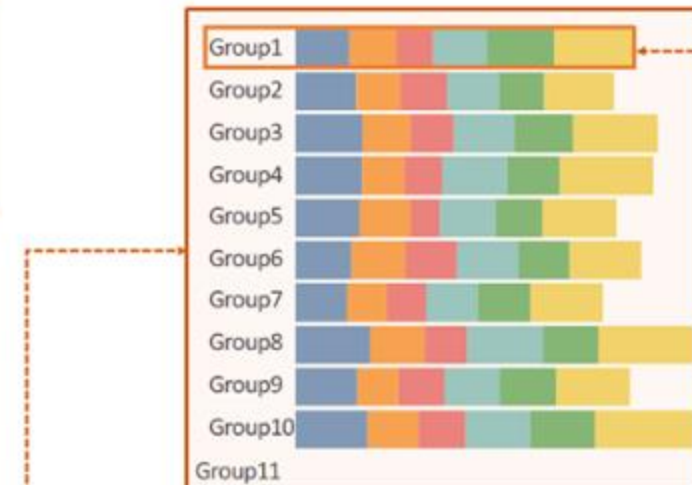


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15"],
  },
  "Group4": {
    "Objects": ["path16"],
  },
  "Group5": {
    "Objects": ["path17"],
  },
  "Group6": {
    "Objects": ["path18"],
  },
  "Group7": {
    "Objects": ["path19"],
  },
  "Group8": {
    "Objects": ["path20"],
  },
  "Group9": {
    "Objects": ["path21"],
  },
  "Group10": {
    "Objects": ["path22"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
}

```

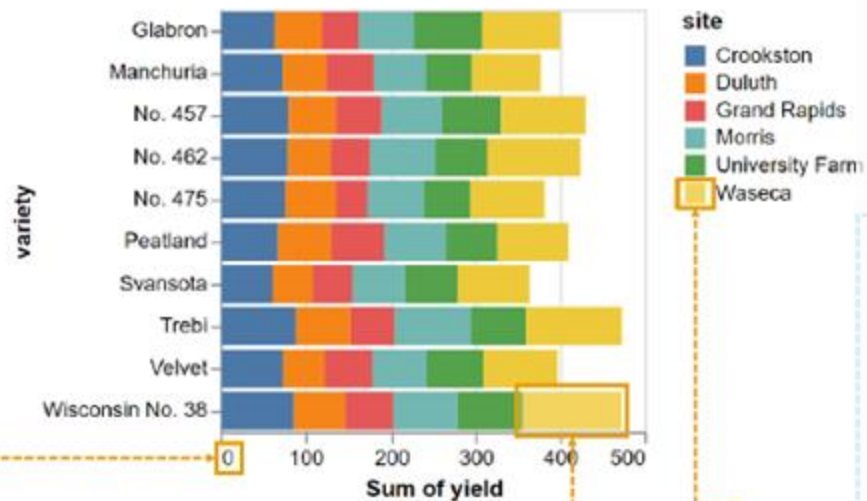
(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```



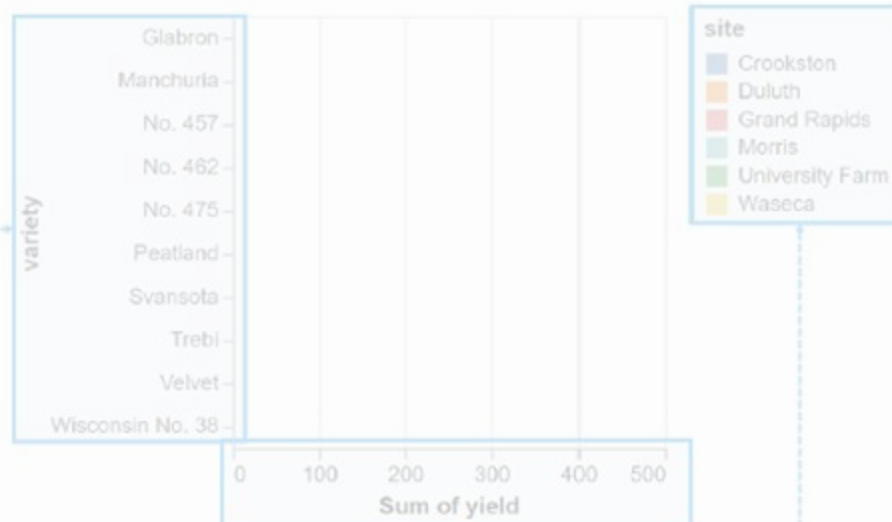
(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

```

(c) Element Type and Role

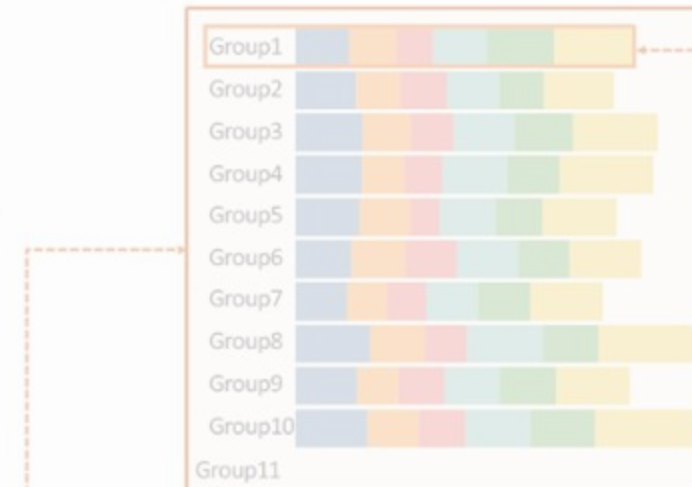


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group4": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group5": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group6": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group7": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group8": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group9": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group10": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
}

```

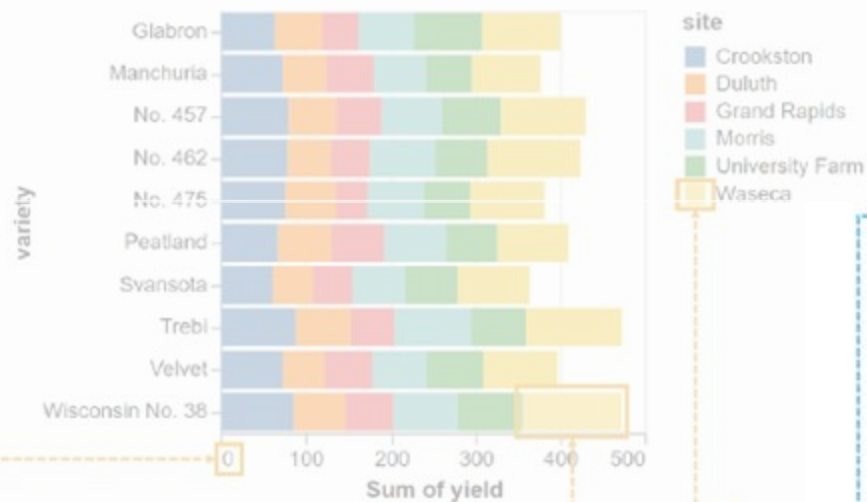
(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```



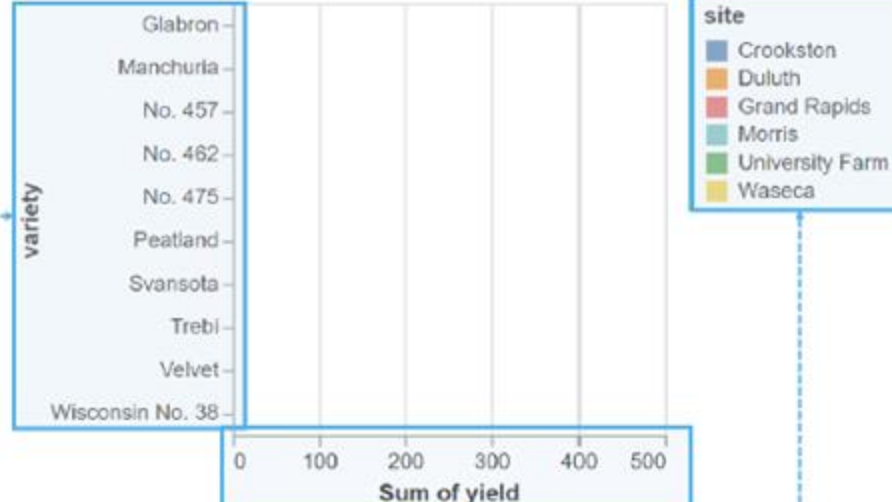
(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

```

(c) Element Type and Role

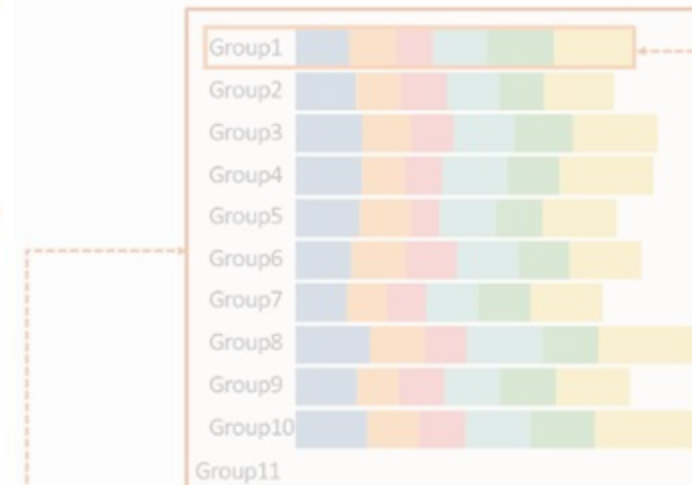


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group4": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group5": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group6": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group7": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group8": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group9": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group10": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
}

```

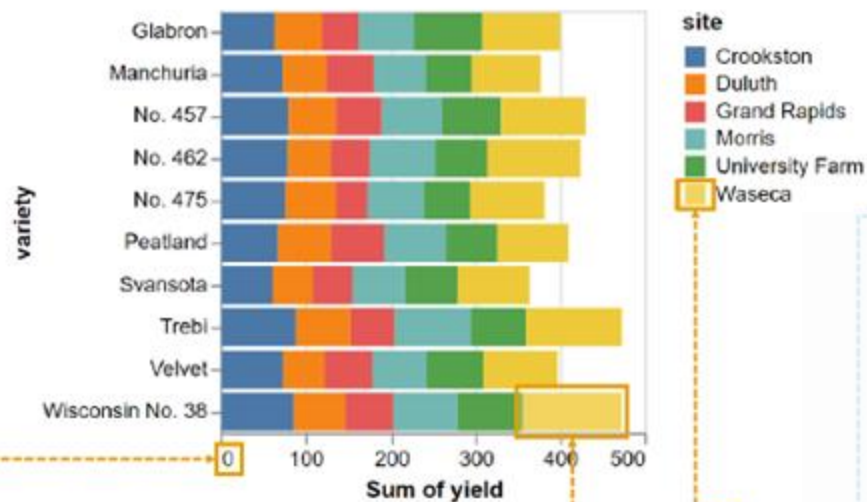
(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```



(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

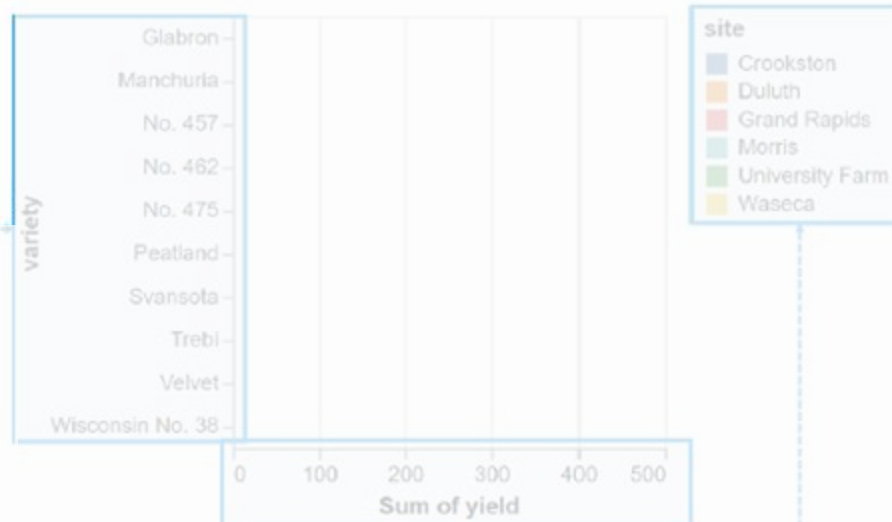
```

"path64": {
 "Type": "Rectangle", "Role": "Main Chart Mark"

"path82": {
 "Type": "Rectangle", "Role": "Legend Mark"

"text0": {
 "Type": "Text", "Role": "Axis 1 Label"

(c) Element Type and Role

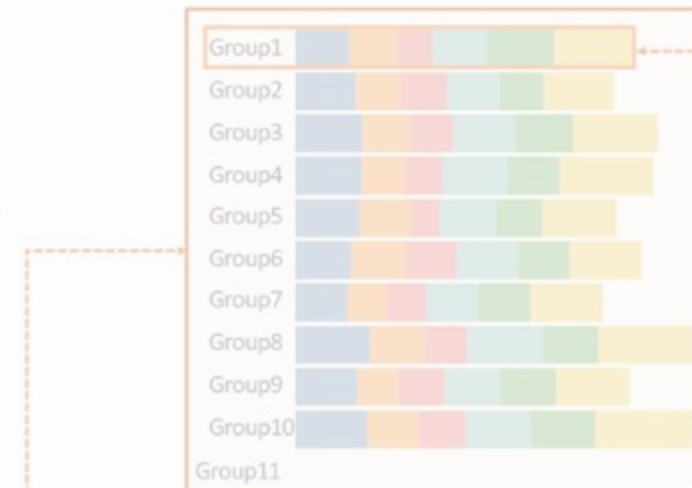


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group4": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group5": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group6": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group7": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group8": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group9": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group10": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
  "Group11": {
    "type": "Grid",
    "params": {
      "orientation": "Vertical",
      "horiAlignment": "left", "vertAlignment": ""
    }
  }
}

```

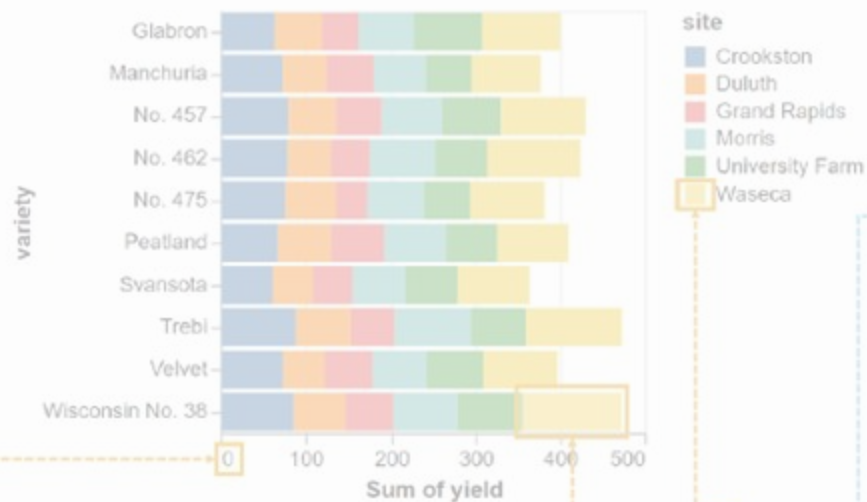
(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```



(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

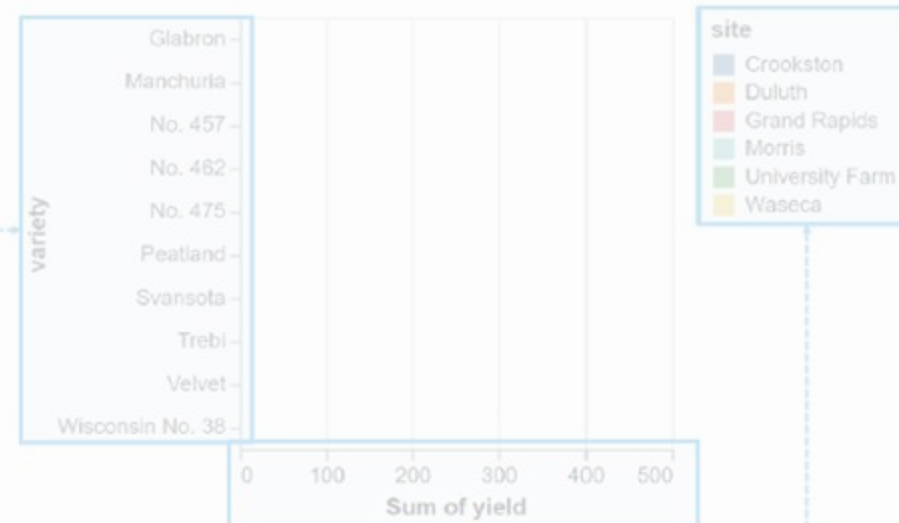
```

```

{
  "path64": {
    "Type": "Rectangle", "Role": "Main Chart Mark"
  },
  "path82": {
    "Type": "Rectangle", "Role": "Legend Mark"
  },
  "text0": {
    "Type": "Text", "Role": "Axis 1 Label"
  }
}

```

(c) Element Type and Role

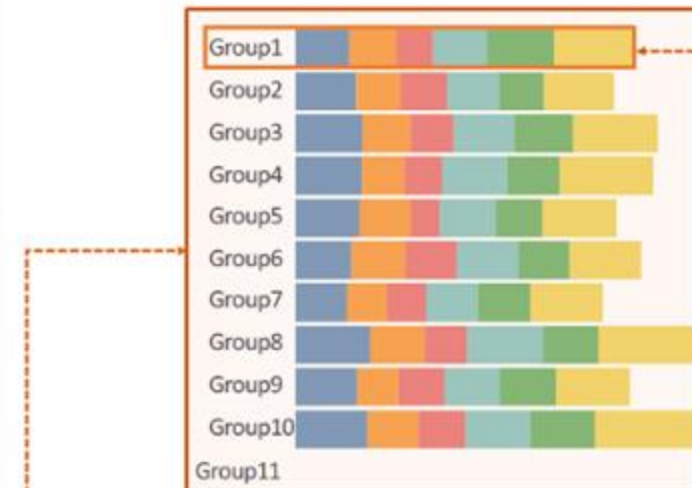


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group4": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group5": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group6": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group7": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group8": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group9": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group10": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
  "Group11": {
    {
      "type": "Stack",
      "params": {
        "orientation": "Horizontal",
        "horiAlignment": "", "vertAlignment": "Middle"
      }
    },
    {
      "type": "Grid",
      "params": {
        "orientation": "Vertical",
        "horiAlignment": "Left", "vertAlignment": ""
      }
    }
  }
}

```

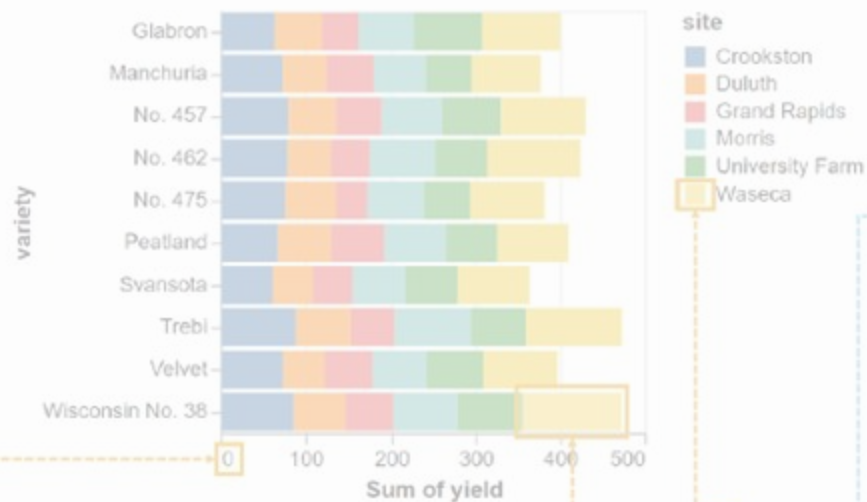
(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```



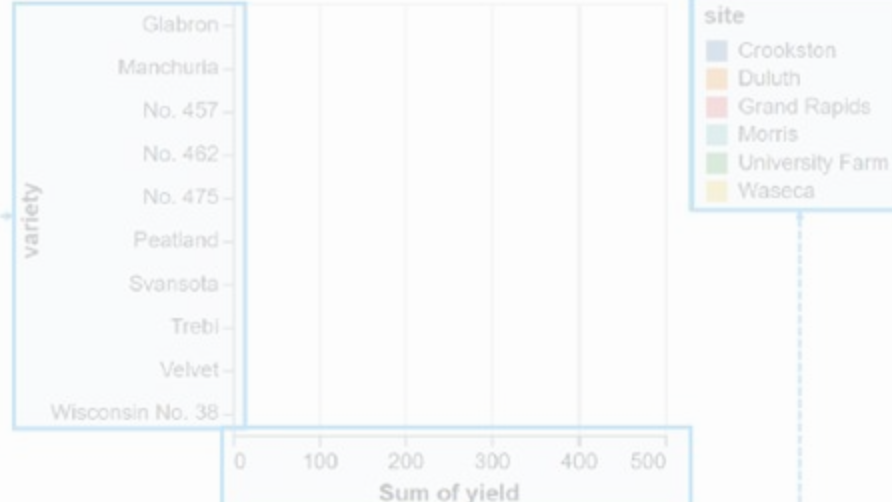
(a) All Graphical Primitives

```

{
  ...
  "path64": {
    "left": 247.31, "top": 186, "right": 294.09, "bottom": 204,
    "height": 18, "width": 46.79, "id": "path64",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "path82": {
    "left": 324, "top": 87, "right": 334, "bottom": 97,
    "height": 10, "width": 10, "id": "path82",
    "tagName": "path", "content": "", "fill": "#eeca3b",
  },
  ...
  "text0": {
    "left": 105.5, "top": 211.7, "right": 111.1, "bottom": 222.9,
    "height": 11.2, "width": 5.6, "id": "text0",
    "tagName": "text", "content": "0", "fill": "#000",
  },
  ...
}

```

(c) Element Type and Role

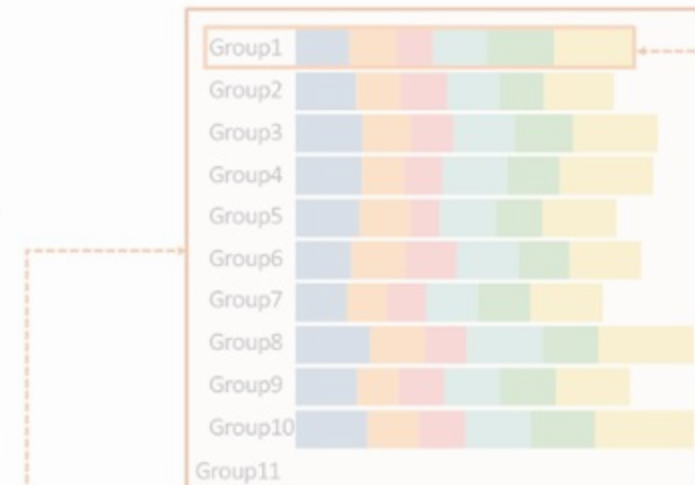


(b) Reference Elements

```

{
  "horizontalGridlines": [],
  "verticalGridlines": ["path2"],
  "axes": {
    "1": {
      "labels": ["text0", "text1", "text2", "text3", "text4", "text5"],
      "type": "x",
      "ticks": ["path4"], "path": ["path5"], "title": ["text6"],
      "fieldType": "number"
    },
    "2": {
      "labels": ["text7", "text8", "text9", "text10", "text11",
        "text12", "text13", "text14", "text15", "text16"],
      "type": "y", "ticks": ["path7"], "path": ["path8"],
      "title": ["text17"],
      "fieldType": "string"
    }
  },
  "legend": {
    "labels": ["text18", "text19", "text20", "text21", "text22", "text23"],
    "marks": ["path72", "path74", "path76", "path78", "path80", "path82"],
    "type": "discrete",
    "orientation": "vert",
    "mapping": {
      "Crookston": "#4c78a8", "Duluth": "#f58518",
      "Grand Rapids": "#e45756", "Morris": "#72b7b2",
      "University Farm": "#54a24b", "Waseca": "#eeca3b"
    },
    "title": ["text24"],
    "ticks": []
  }
}

```



(d) Hierarchical Grouping

```

{
  "Group1": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group2": {
    "Objects": ["path9", "path10", "path11", "path12", "path13", "path14"],
  },
  "Group3": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group4": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group5": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group6": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group7": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group8": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group9": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group10": {
    "Objects": ["path15", "path16", "path17", "path18", "path19", "path20"],
  },
  "Group11": {
    "Objects": ["Group1", "Group2", "Group3", "Group4", "Group5",
      "Group6", "Group7", "Group8", "Group9", "Group10"],
  },
}

```

(e) Group Layout

(f) Visual Encodings for main chart marks

```

{
  "path15": ["width", "fill"],
  "path15": ["width", "fill"],
  ...
  ...
  "path67": ["width", "fill"],
  "path68": ["width", "fill"],
}

```

Use Case: Semantic Role Inference with LLMs

each element in an SVG chart

```
<path id="mg6qmjw2_1dqaoayig3i"  
d="M98,393.9130434782609L93,393.9130434782609"  
style="fill: none; shape-rendering: crispedges; stroke:  
rgb(85, 85, 85); stroke-width: 1; stroke-dasharray:  
none;"></path>
```

```
<path d="M165.21,590.1,590.1" style="fill: none; stroke:  
rgb(50, 136, 189); stroke-width: 3px; stroke-dasharray:  
none;"></path>
```

... ..

Main Chart Mark

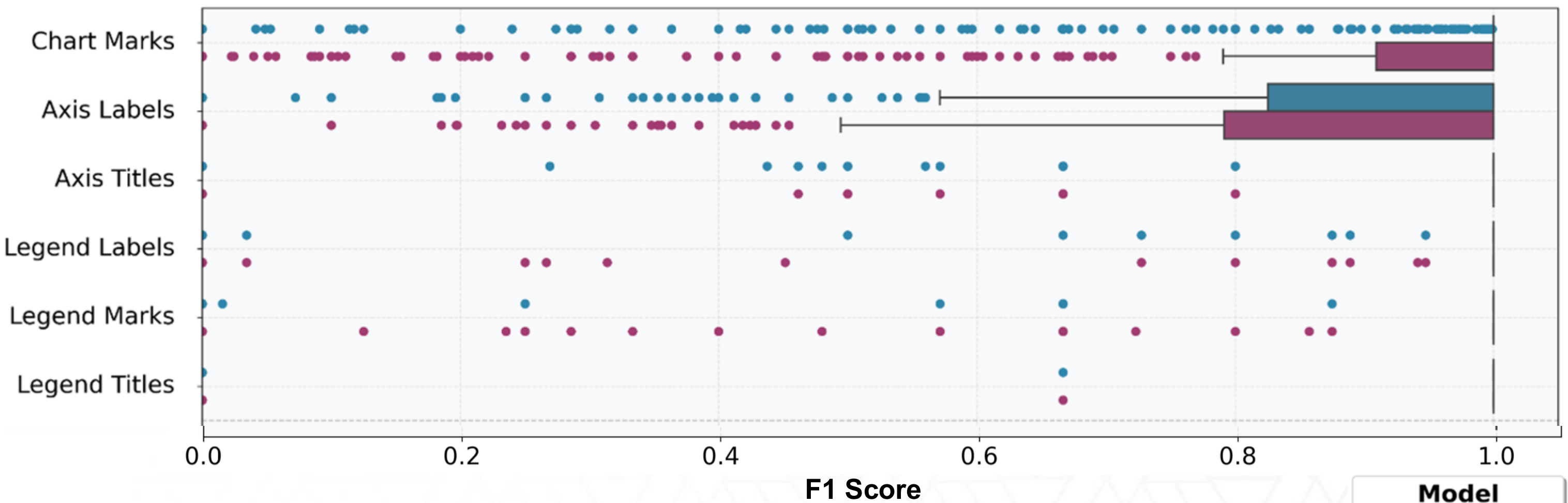
Axis Title

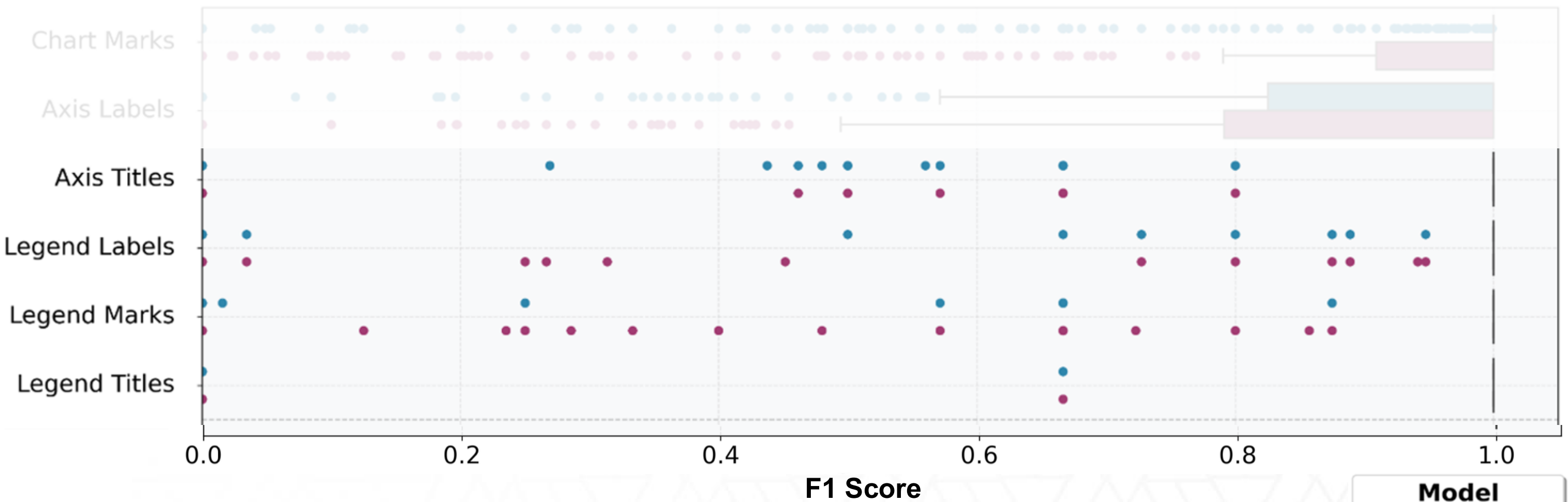
Axis Label

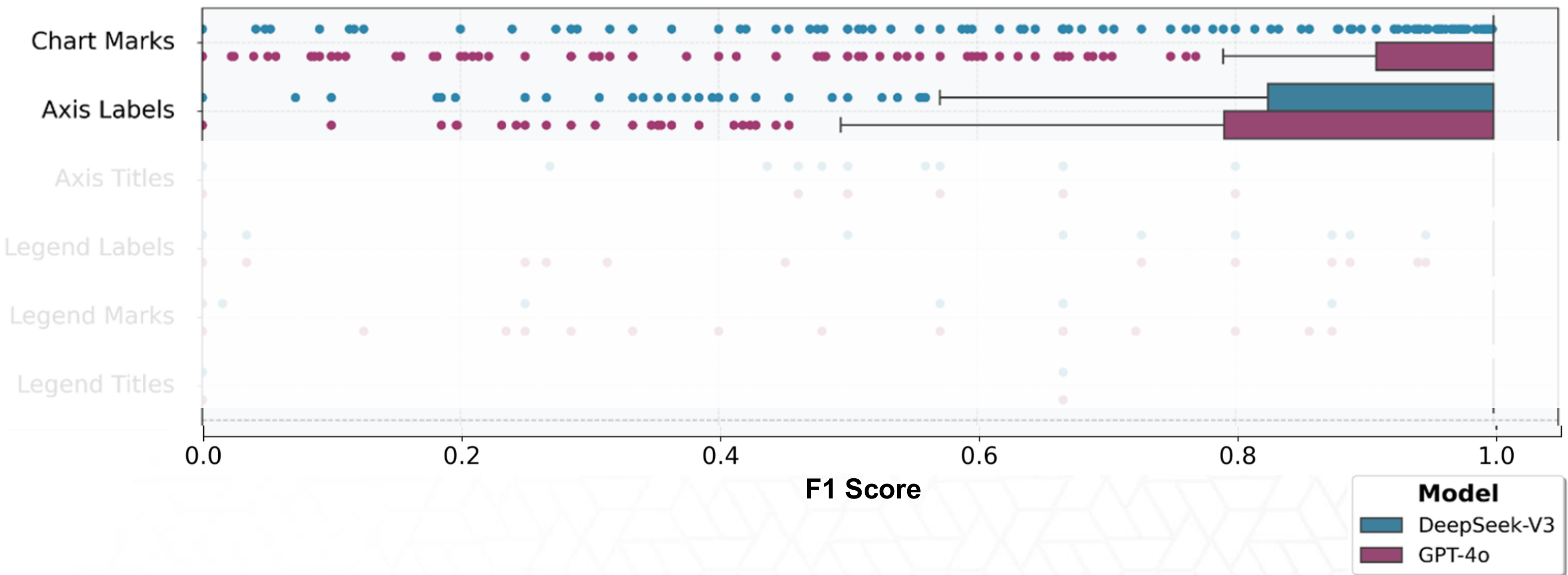
Legend Title

Legend Label

Legend Mark







Poorer performance in **chart marks** and **axis labels**

Additional Results

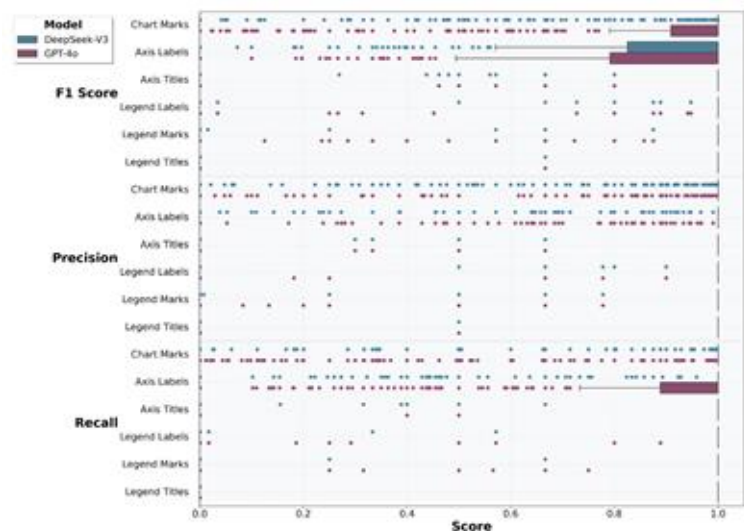
Deepseek better in **traditional** charts (e.g. bar, area),
GPT better in **bespoke** charts (e.g. bullet, circle packing)

Tools (10 charts minimum) with $F1 > 0.9$:

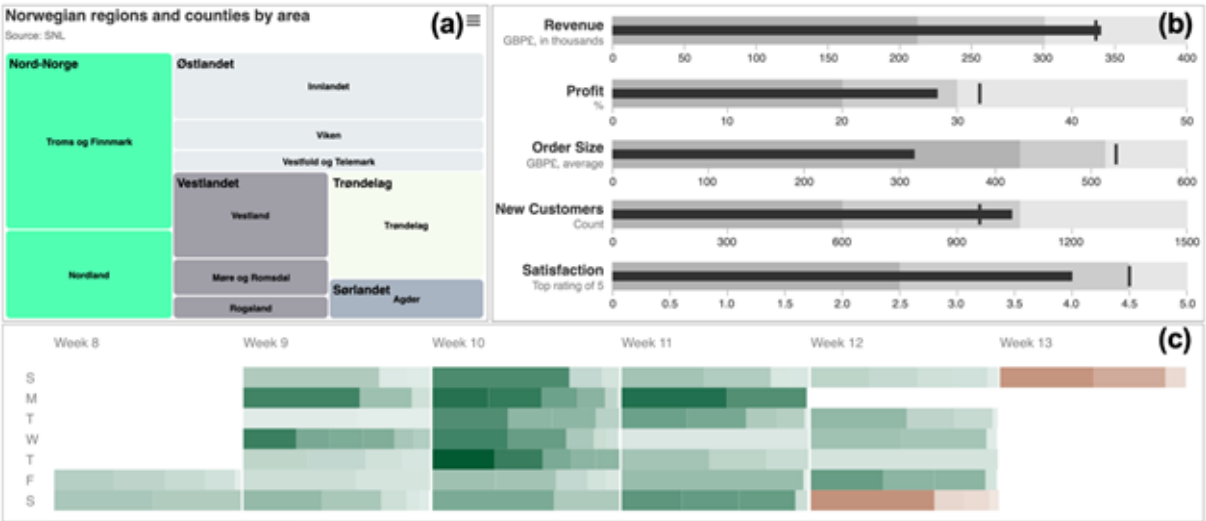
Deepseek **16**

GPT **7**

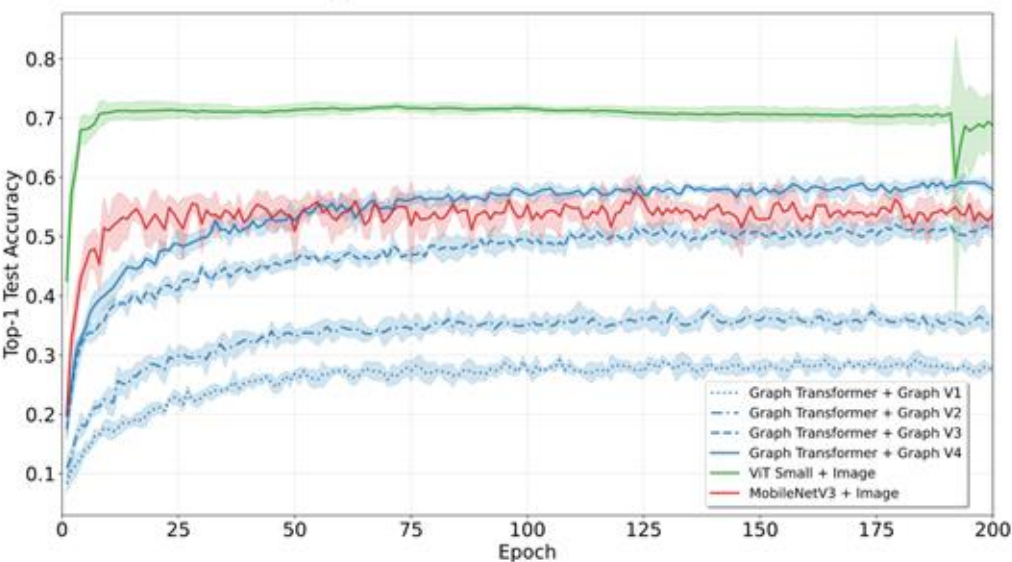
More Use Cases in the Paper



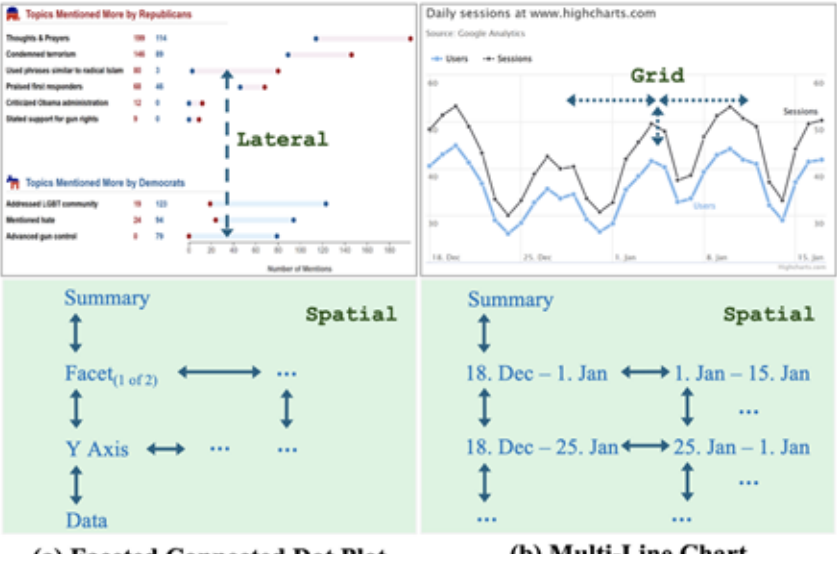
Infer SVG element role with LLMs



Decompose SVG charts for layout reuse



Classify chart types using GNNs and vision models



Accessible chart navigation

Future Work

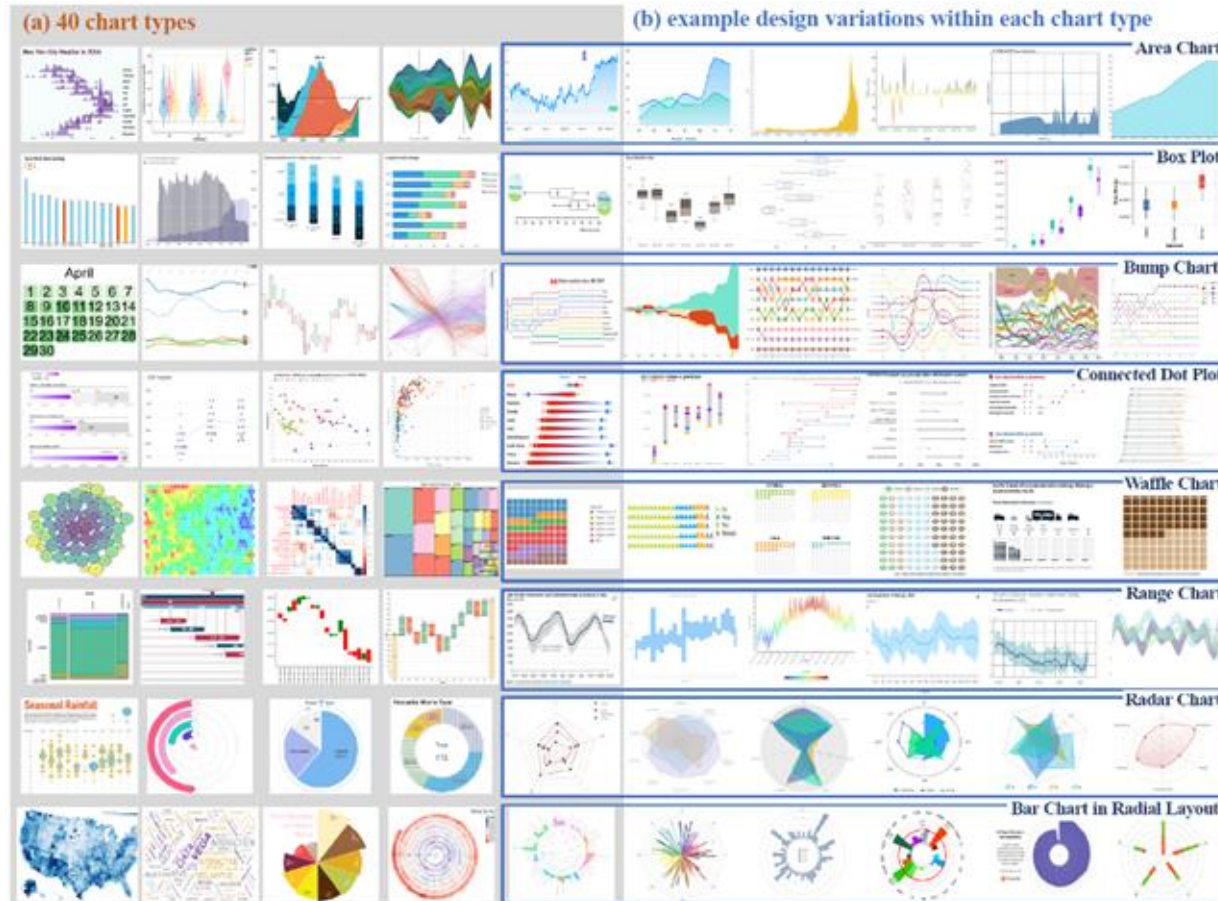
Enhance the quantity and variety of charts

Add natural language questions and responses

Supplement charts with data tables (only 329/942)

Explore more applications

VisAnatomy



Github Repository

<https://github.com/hdi-umd/VisAnatomy>



Online Browser

<https://visanatomy.github.io/>

