

Introduction to Bokeh

INTERACTIVE DATA VISUALIZATION WITH BOKEH



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What is Bokeh?

- Documentation
- Gallery

bokeh

2.4.0 ▾

First steps

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Installation details

First steps 1: Creating a line chart

First steps 2: Adding and customizing renderers

First steps 3: Adding legends, text, and annotations

First steps 4: Customizing your plot

First steps 5: Vectorizing glyph properties

First steps 6: Combining plots

First steps 7: Displaying and exporting

First steps 8: Providing and filtering data

First steps 9: Using widgets

First steps

Installing Bokeh

Bokeh is officially supported and tested on Python 3.7 and above (CPython).

You can install Bokeh with either `conda` or `pip`:

Installing with conda

Use this command to install Bokeh:

`conda install bokeh`

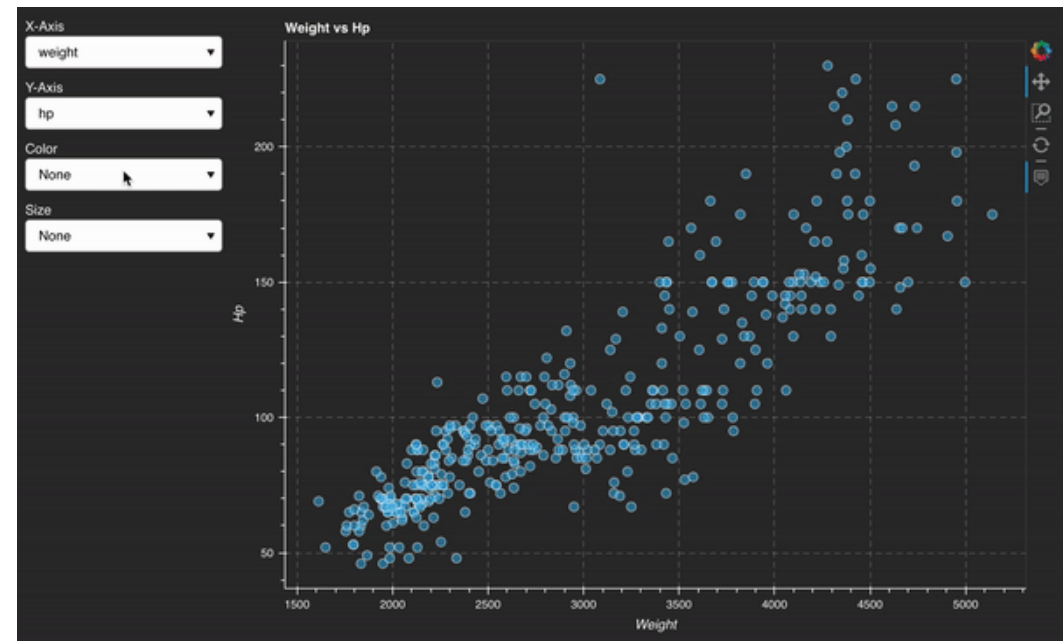
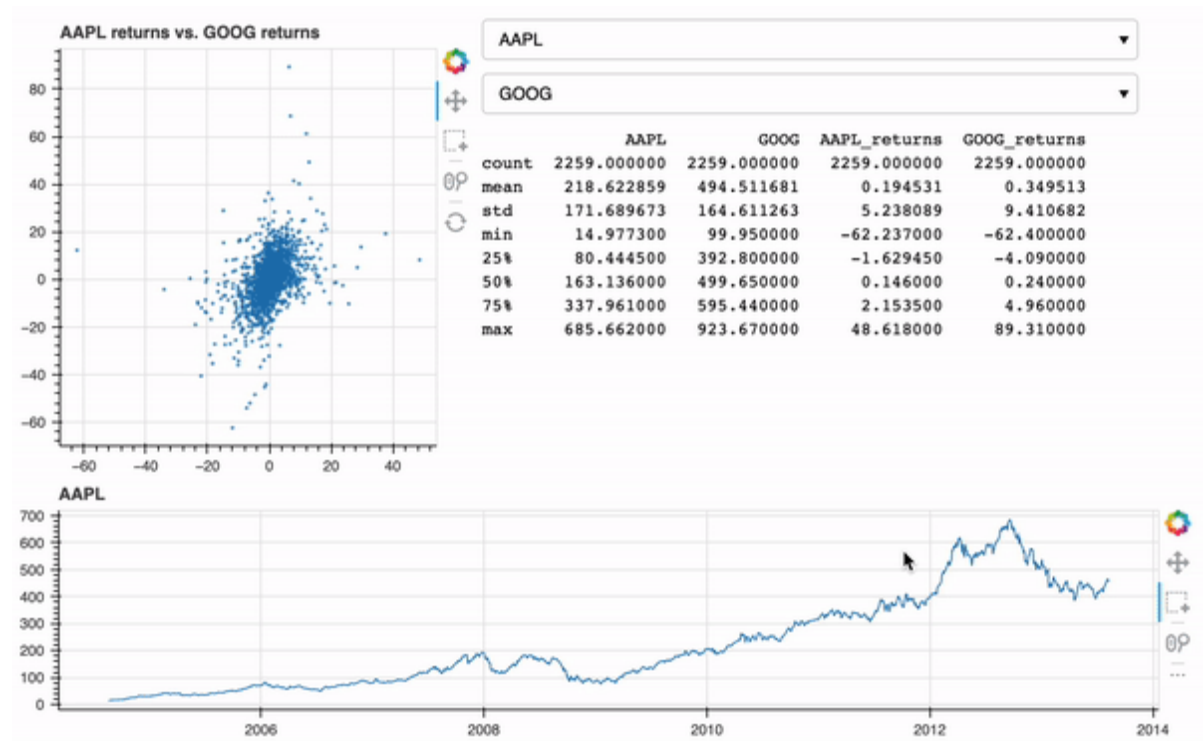
Conda requires either **Anaconda** or **Miniconda** to be installed on your system.

Installing with pip

Use this command to install Bokeh:

`pip install bokeh`

For more detailed information on installing and potential problems you might encounter, go to the [Installation details](#) section.



Course overview

- Chapter 1: Introduction to Bokeh
- Chapter 2: Customizing visualizations
- Chapter 3: Storytelling with visualizations
- Chapter 4: Introduction to widgets

```
import pandas as pd
nba = pd.read_csv("nba.csv")
print(nba.columns)
```

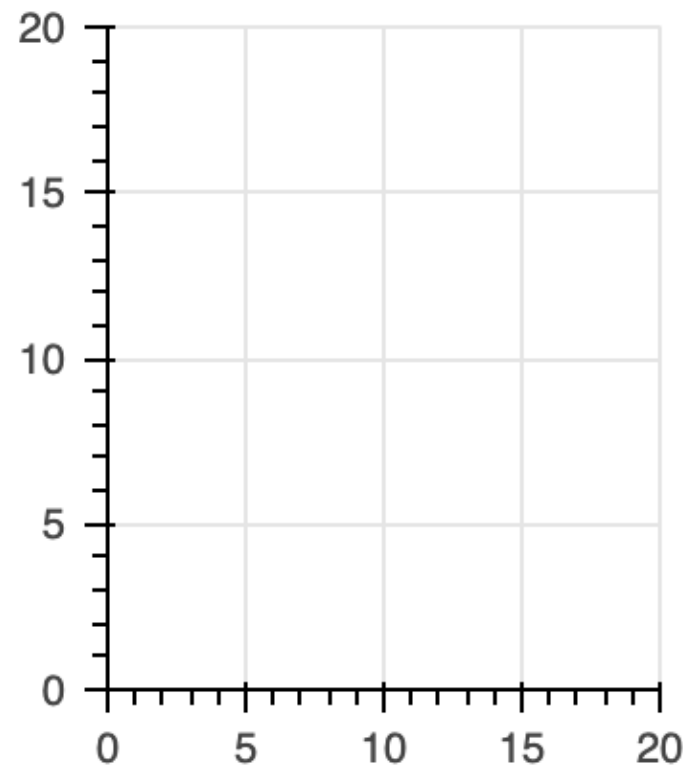
```
Index(['player', 'position', 'minutes', 'field_goal_perc', 'three_point_perc',
      'free_throw_perc', 'rebounds', 'assists', 'steals', 'blocks', 'points',
      'team', 'conference', 'scorer_category'],
      dtype='object')
```

```
print(nba.shape)
```

```
(424, 14)
```

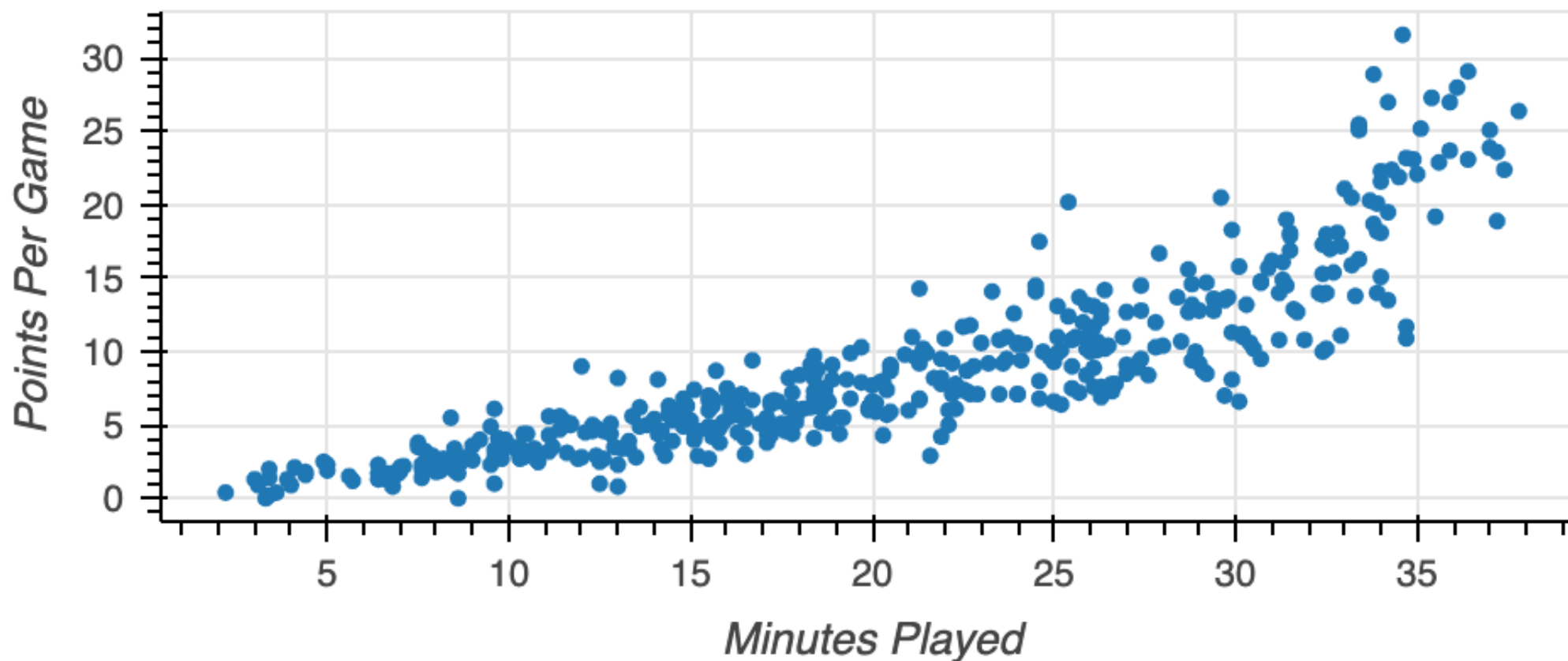
Setting up a figure

```
from bokeh.plotting import figure
from bokeh.io import output_file, show
fig = figure()
output_file(filename="empty_figure.html")
show(fig)
```



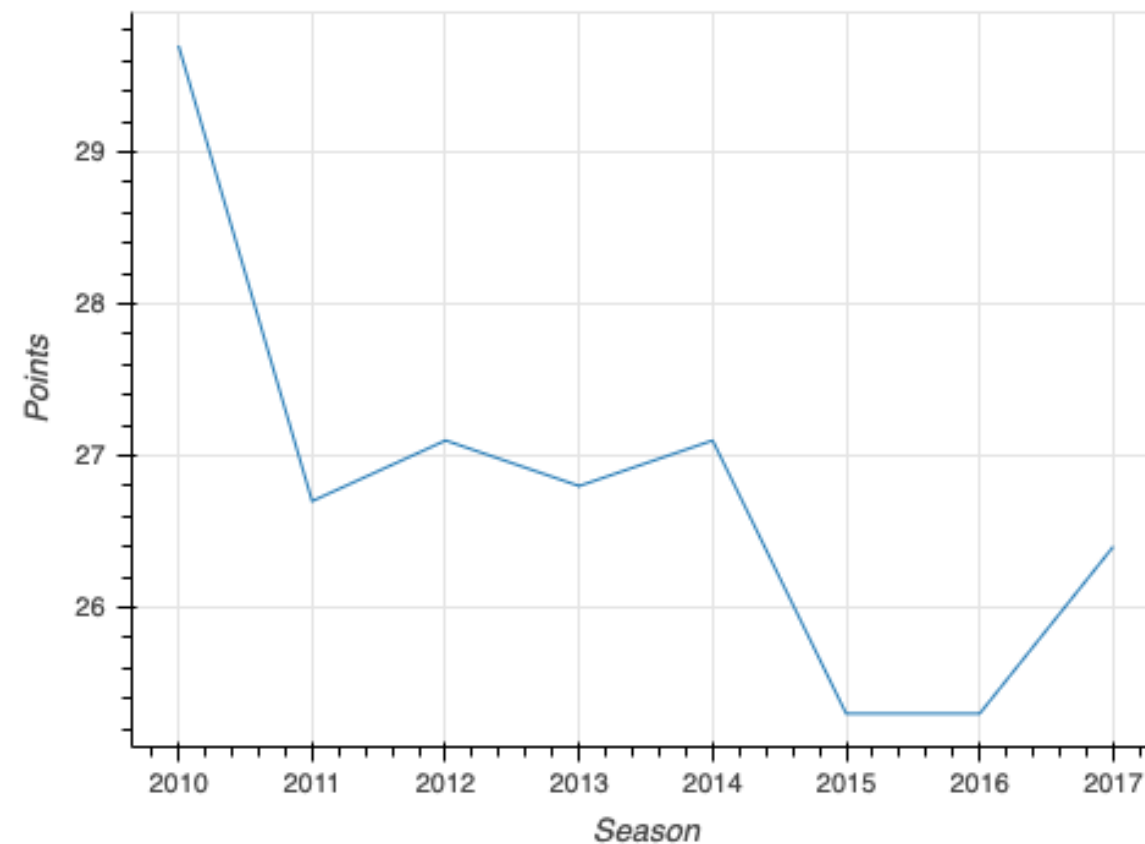
Building a scatter plot

```
fig = figure(x_axis_label="Minutes Played", y_axis_label="Points Per Game")
fig.circle(x=nba["minutes"], y=nba["points"])
output_file(filename="nba_points.html")
show(fig)
```



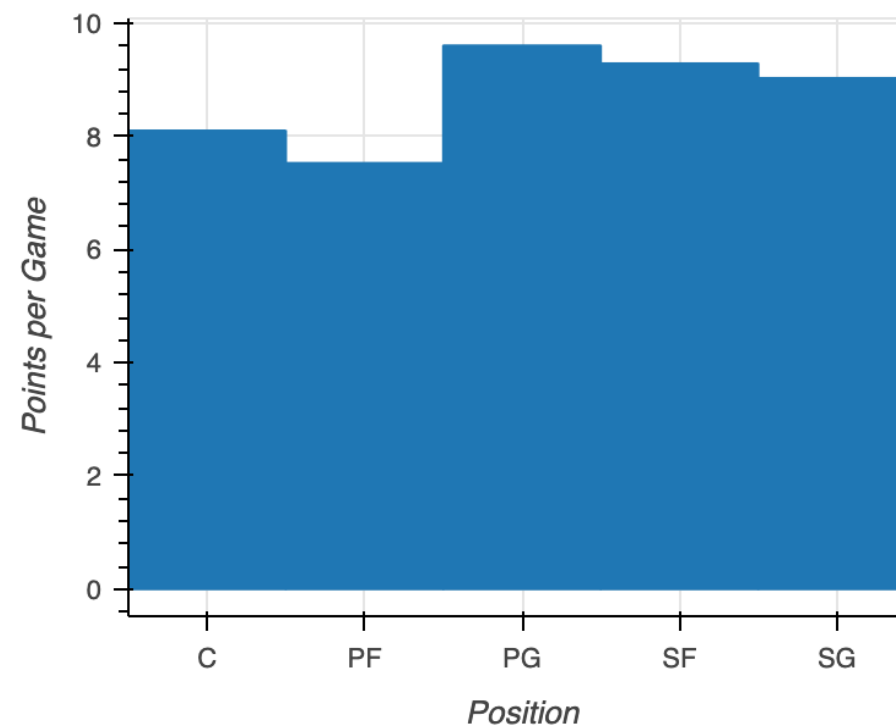
Displaying a line plot

```
fig = figure(x_axis_label="Season", y_axis_label="Points")
fig.line(x=lebron["season"], y=lebron["points"])
output_file(filename="lebron_points_per_season.html")
show(fig)
```



Plotting categorical data

```
positions = nba.groupby("position", as_index=False)["points"].mean()
fig = figure(x_axis_label="Position", y_axis_label="Points per Game",
             x_range=positions["position"])
fig.vbar(x=positions["position"], top=positions["points"])
output_file(filename="nba_points_by_position.html")
show(fig)
```

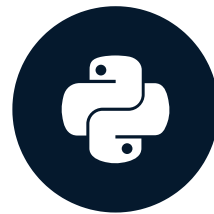


Let's practice!

INTERACTIVE DATA VISUALIZATION WITH BOKEH

Configuration tools






INTERACTIVE DATA VISUALIZATION WITH BOKEH

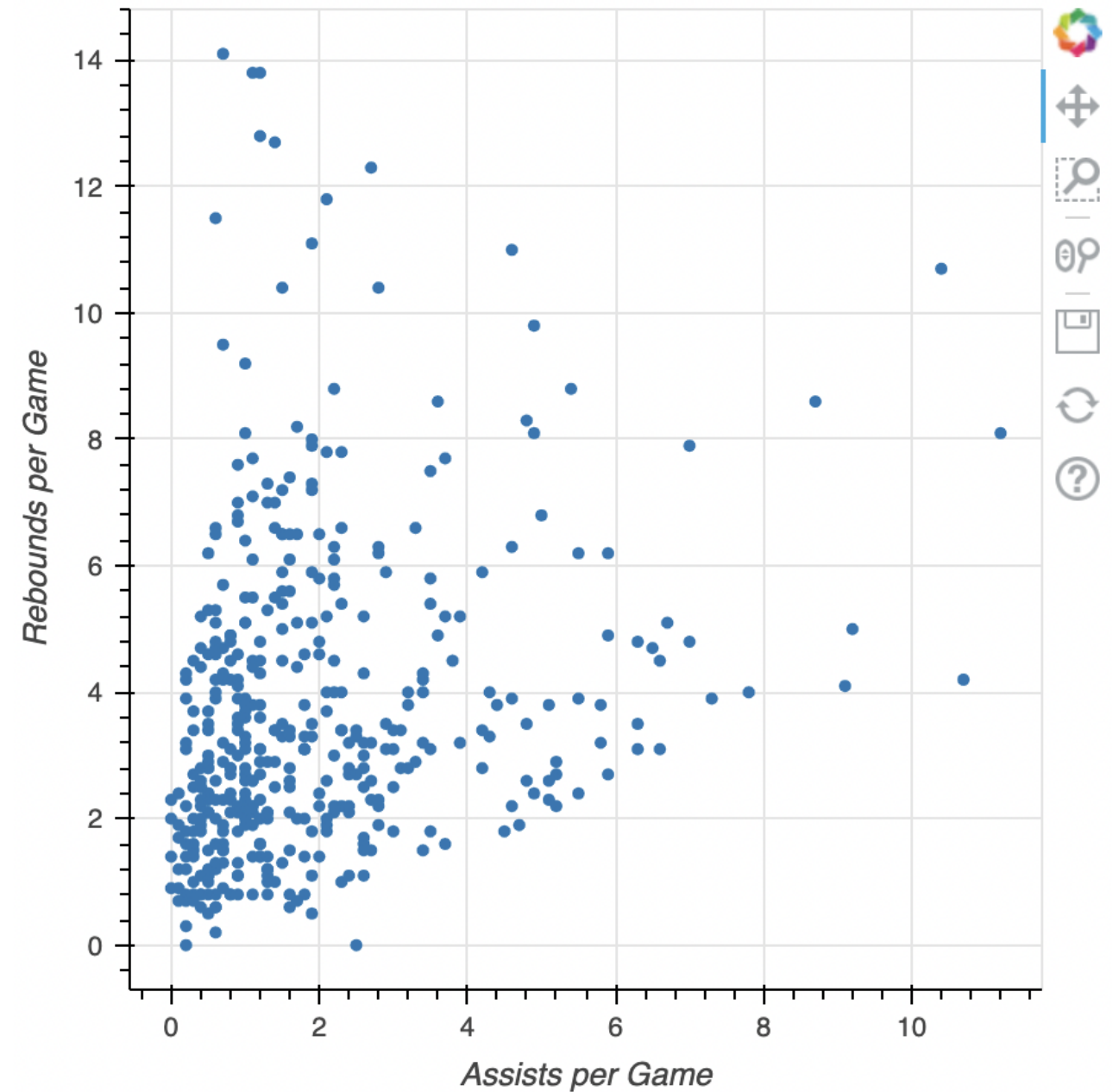


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The default toolbar

- PanTool
 - `pan` 
- BoxZoomTool
 - `box_zoom` 
- WheelZoomTool
 - `wheel_zoom` 
- Save
 - `save` 
- Reset
 - `reset` 



Configuration tools

We will cover:



- Pan/Drag tools
- Click/Tap tools
- Scroll/Pinch tools

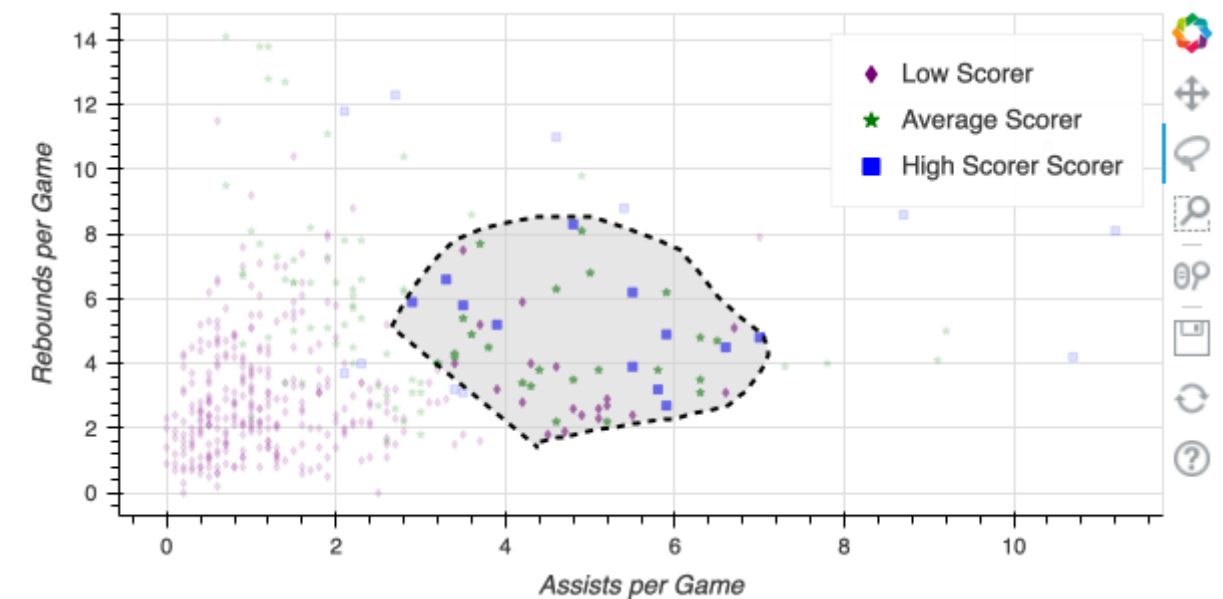
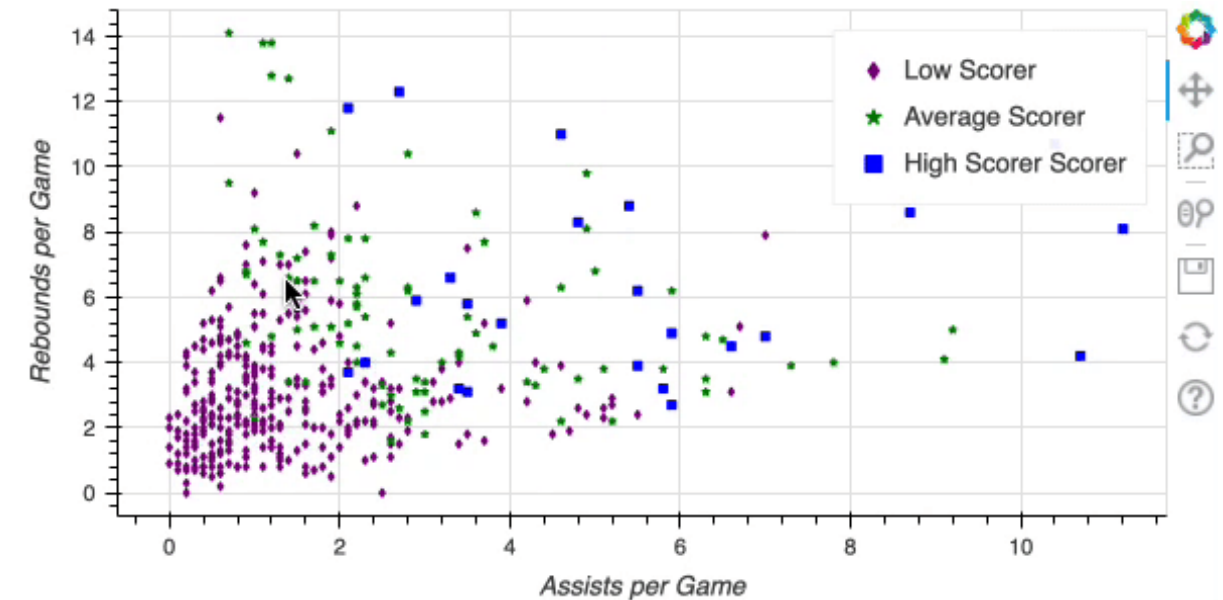
Other tools outside of course scope:

- Actions
- Inspectors
- Edit tools

¹ http://docs.bokeh.org/en/latest/docs/user_guide/tools.html

Pan/drag tools

- PanTool
 - `pan` 
- BoxSelectTool
 - `box_select` 
- BoxZoomTool
 - `box_zoom` 
- LassoSelectTool
 - `lasso_select` 



Click/tap tools

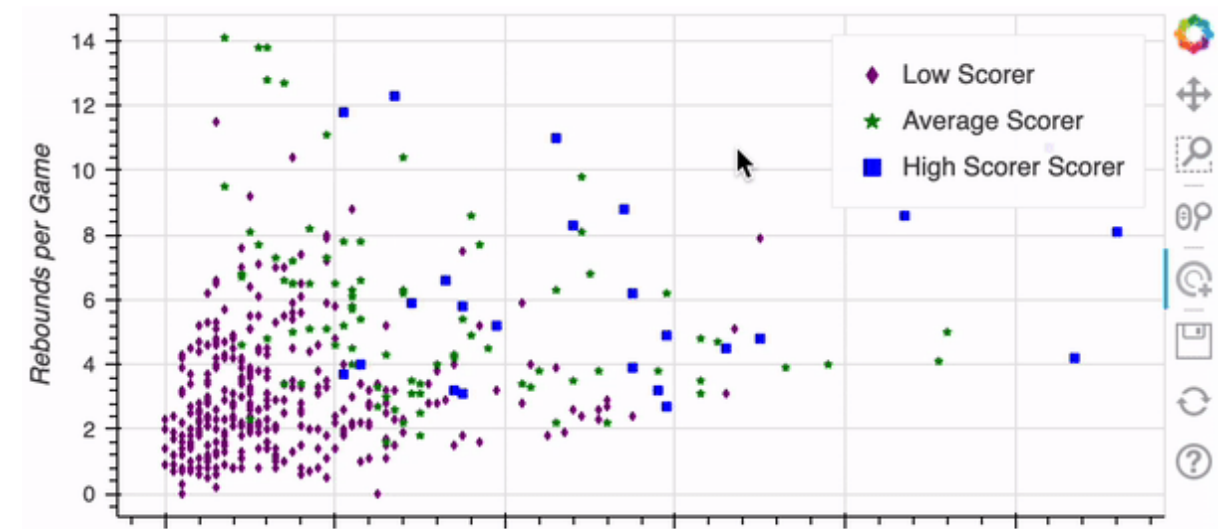
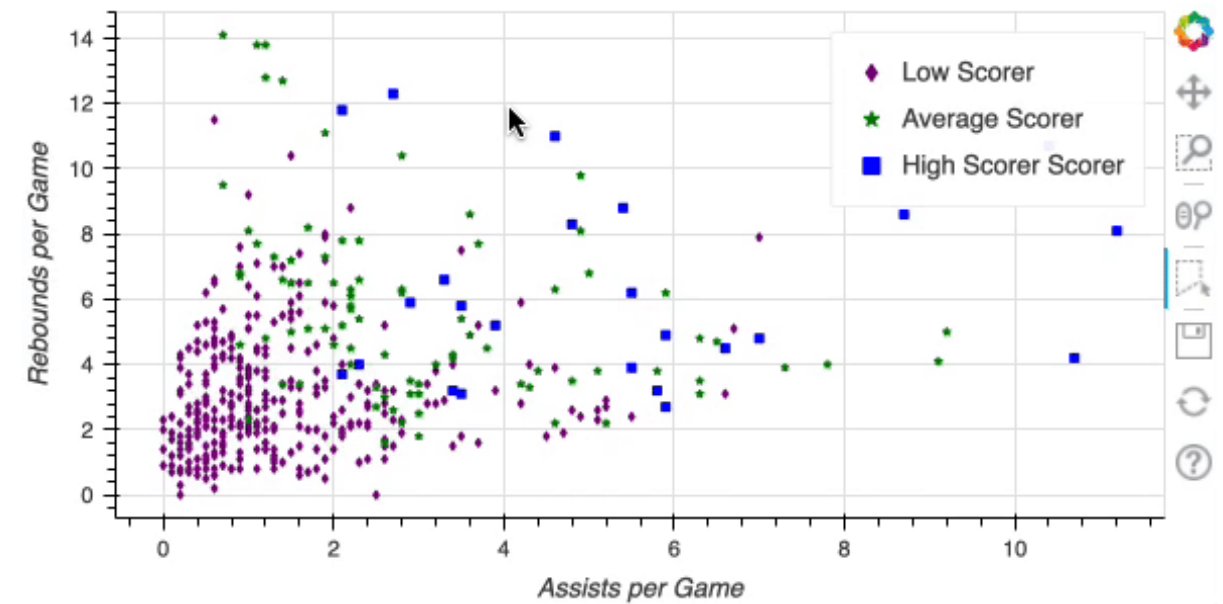
- PolySelectTool

- `poly_select`



- TapTool

- `tap`



Scroll/pinch tools

- WheelZoomTool

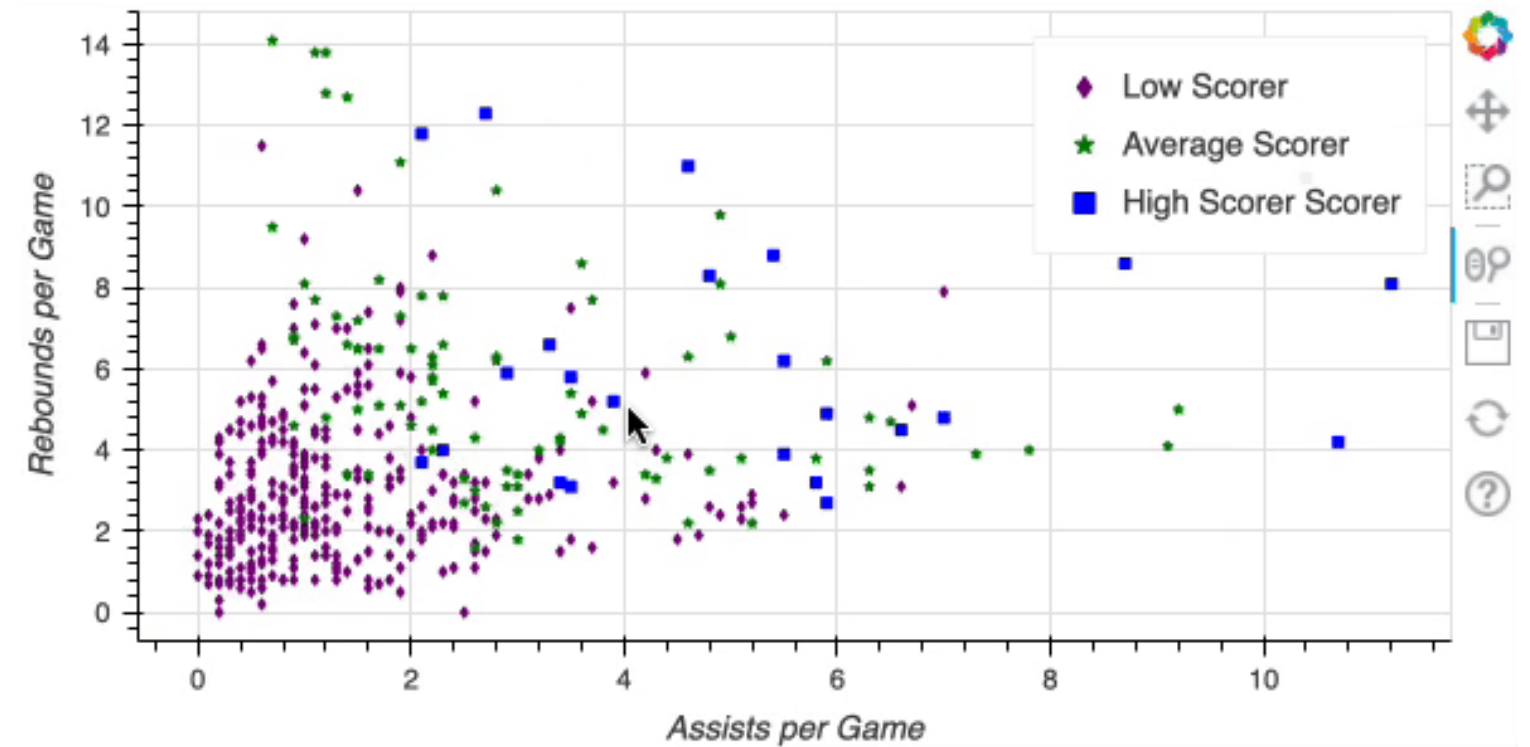
- `wheel_zoom`



- WheelPanTool

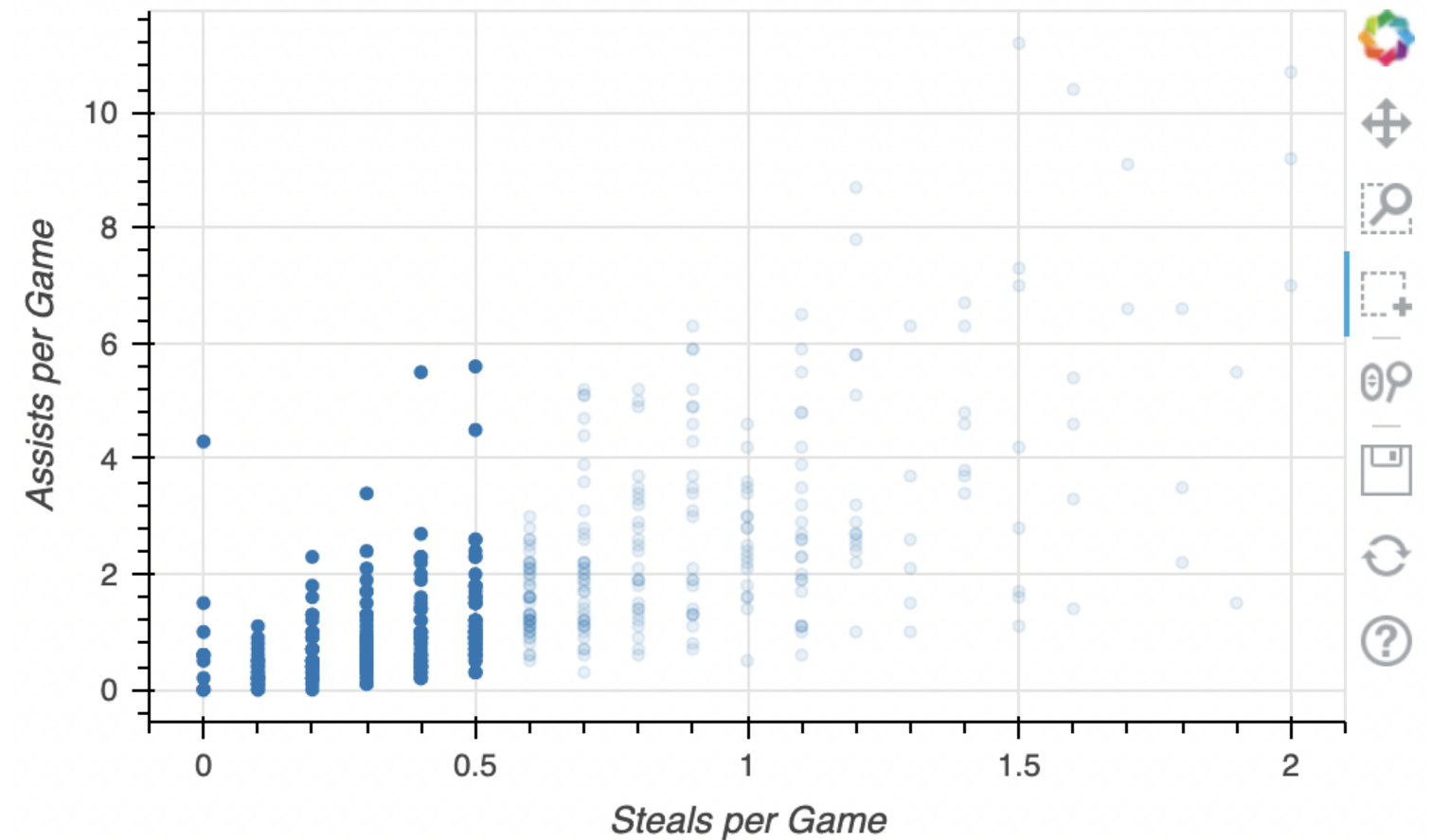
- `xwheel_pan`

- `ywheel_pan`



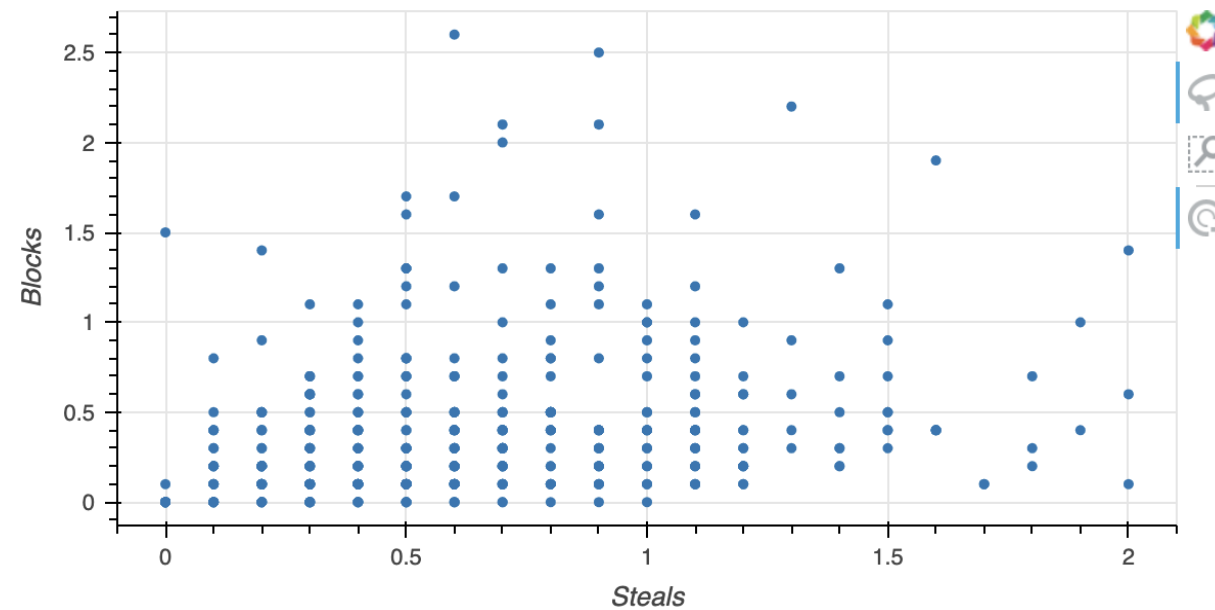
Customizing the toolbar

```
from bokeh.models import BoxSelectTool
fig = figure(x_axis_label="Steals per Game",
            y_axis_label="Assists per Game")
fig.circle(x=nba["steals"], y=nba["assists"])
fig.add_tools(BoxSelectTool())
output_file(filename="adding_box_select.html")
show(fig)
```



Custom list of tools

```
tools = ["lasso_select", "box_zoom", "tap"]  
fig = figure(x_axis_label="Steals", y_axis_label="Assists",  
            tools=tools)  
fig.circle(x=nba["steals"], y=nba["assists"])  
output_file(filename="custom_tools.html")  
show(fig)
```



Let's practice!

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Adding LassoSelectTool

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Inspectors

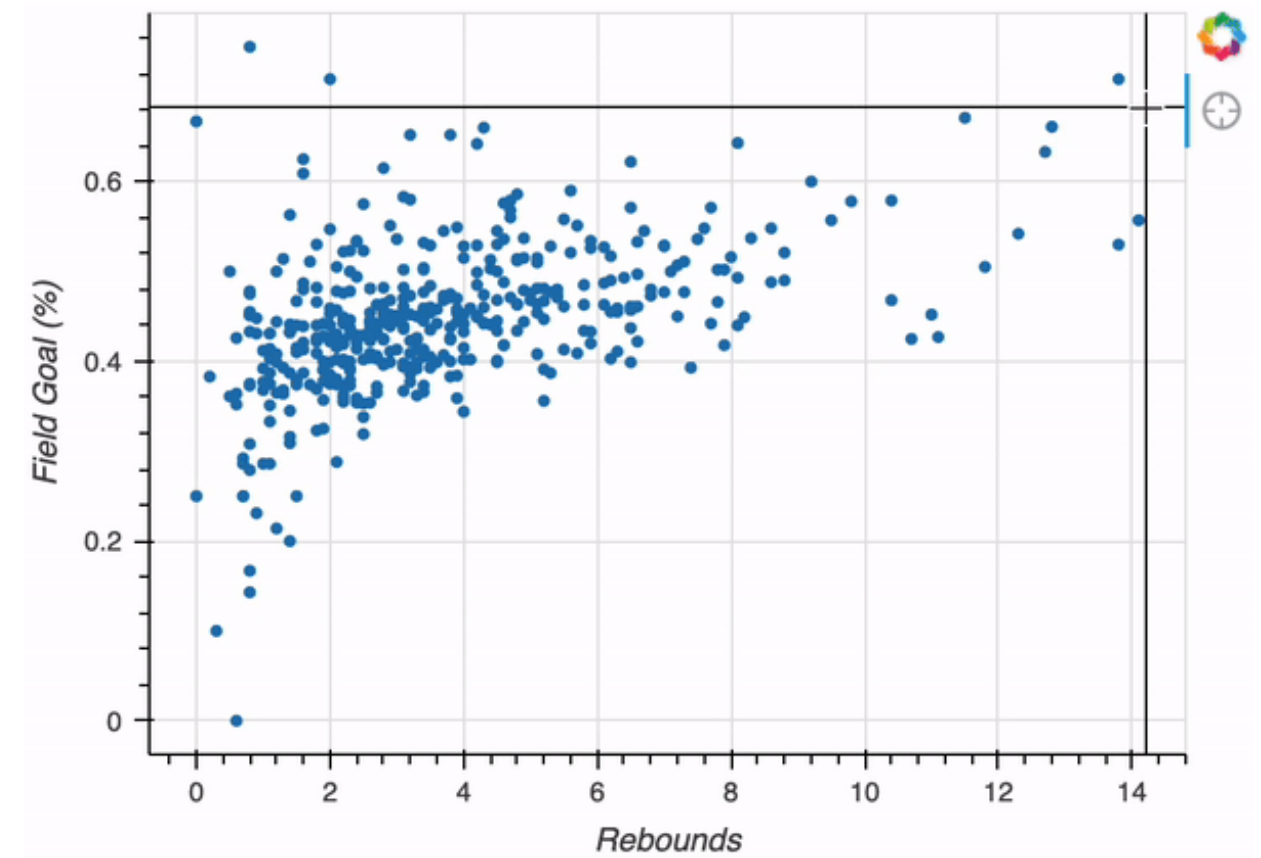
- CrosshairTool

- crosshair



- HoverTool

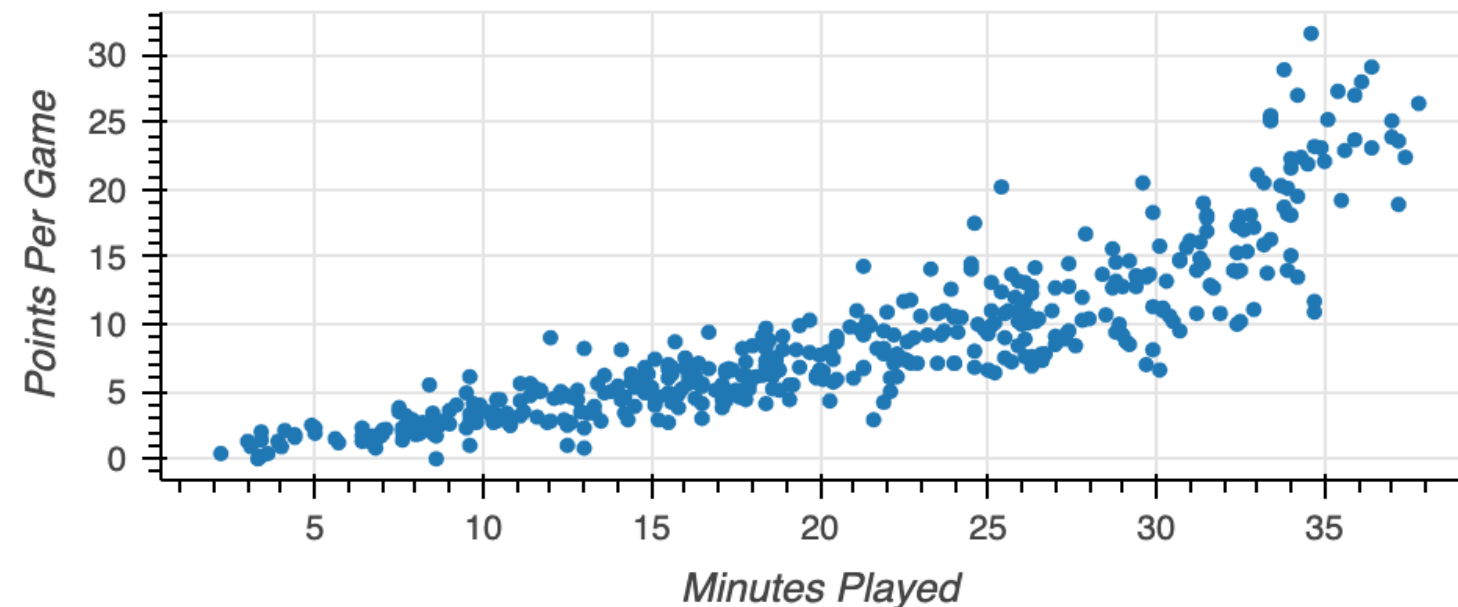
- hover



¹ https://docs.bokeh.org/en/latest/docs/user_guide/tools.html#userguide-tools-inspectors

Bokeh data source objects

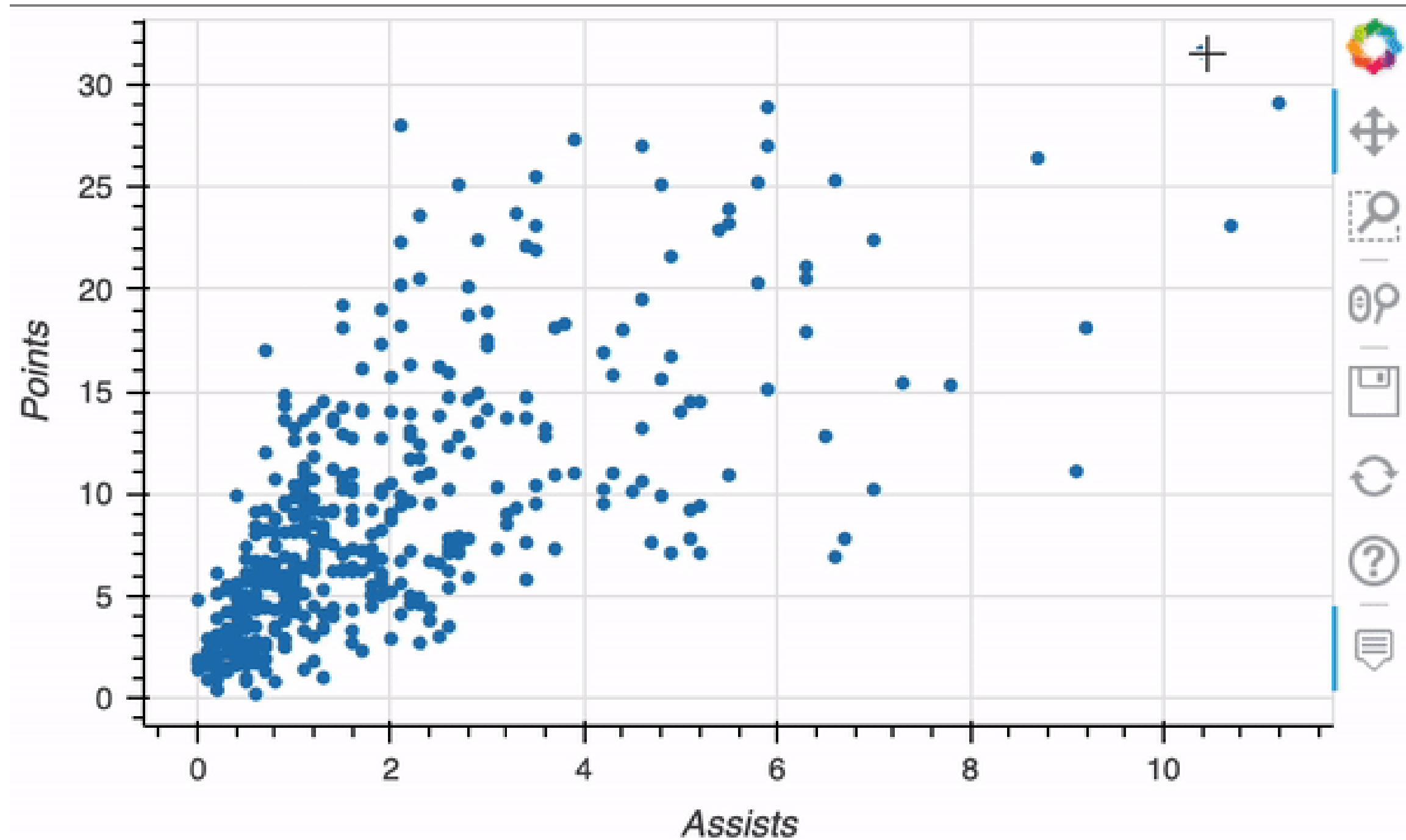
```
from bokeh.models import ColumnDataSource
source = ColumnDataSource(data=nba)
fig = figure(x_axis_label="Minutes Played", y_axis_label="Points Per Game")
fig.circle(x="assists", y="points", source=source)
output_file(filename="ColumnDataSource.html")
show(fig)
```



Setting up the HoverTool

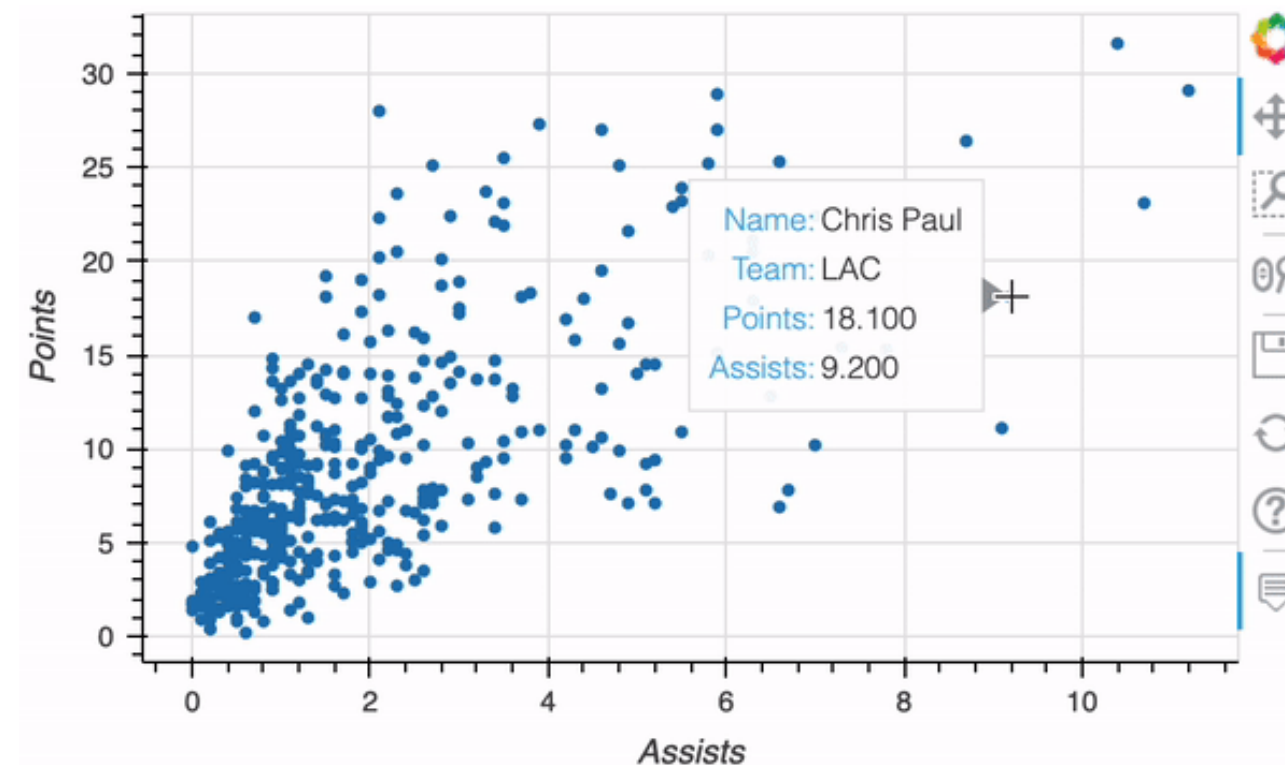
```
from bokeh.models import ColumnDataSource
source = ColumnDataSource(data=nba)
TOOLTIPS = [("Name", "@player"), ("Team", "@team")]
fig = figure(x_axis_label="Assists", y_axis_label="Points",
             tooltips=TOOLTIPS)
fig.circle(x="assists", y="points", source=source)
output_file("name_and_team.html")
show(fig)
```

HoverTool in action



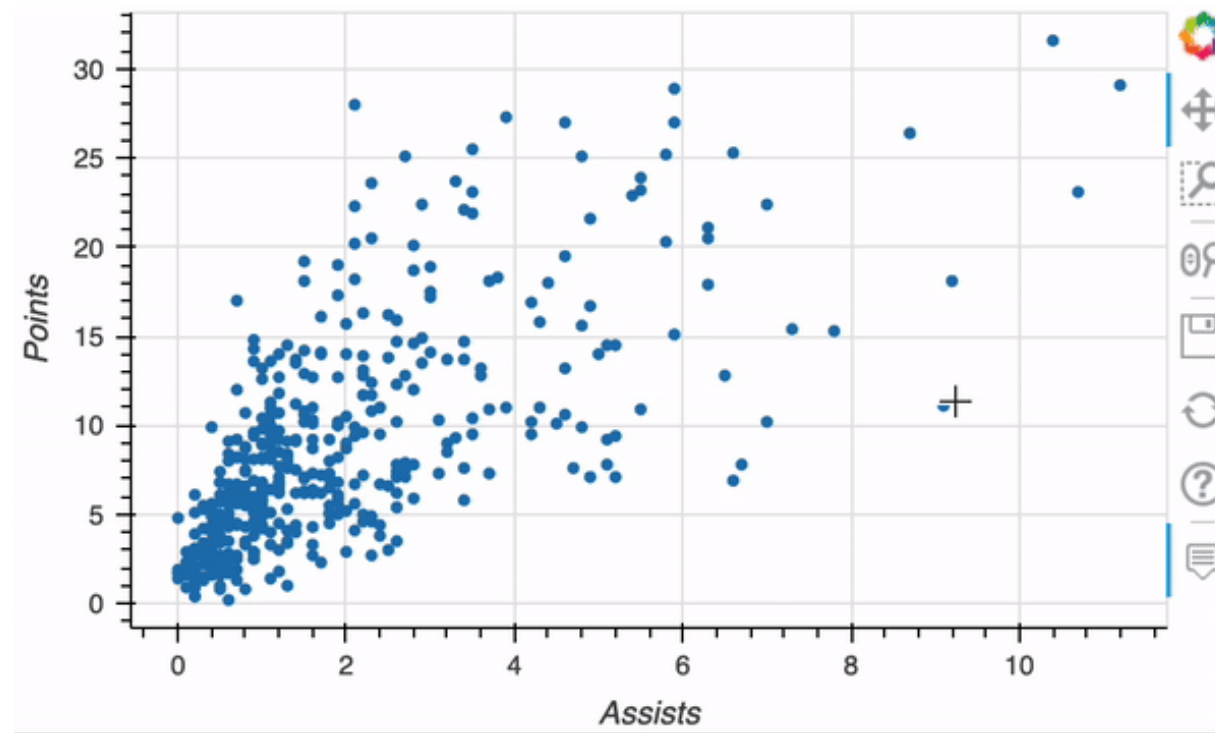
Displaying numeric data

```
TOOLTIPS = [("Name", "@player"), ("Team", "@team"),  
            ("Points", "@points"), ("Assists", "@assists")]  
fig = figure(x_axis_label="Assists", y_axis_label="Points", tooltips=TOOLTIPS)  
fig.circle(x="assists", y="points", source=source)  
output_file("hovertool.html")  
show(fig)
```



Formatting the HoverTool

```
TOOLTIPS = [("Name", "@player"), ("Team", "@team"),  
            ("Points", "@points{0.2f}"), ("Assists", "@assists{0.2f}")]  
fig = figure(x_axis_label="Assists", y_axis_label="Points", tooltips=TOOLTIPS)  
fig.circle(x="assists", y="points", source=source)  
output_file("formatted_hovertool.html")  
show(fig)
```



Let's practice!

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