



INTERACTIVE DATA VISUALIZATION WITH BOKEH

Introduction to Layouts

Arranging multiple plots

- Arrange plots (and controls) visually on a page:
 - rows, columns
 - grid arrangements
 - tabbed layouts



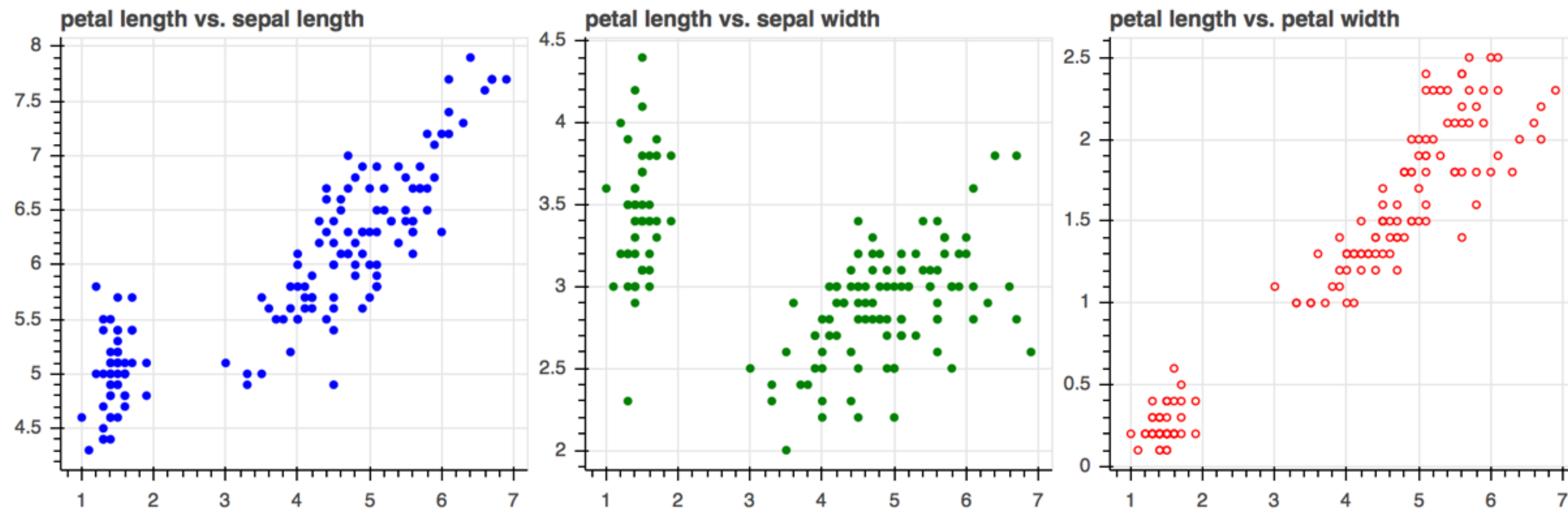
Rows of plots

```
In [1]: from bokeh.layouts import row
```

```
In [2]: layout = row(p1, p2, p3)
```

```
In [3]: output_file('row.html')
```

```
In [4]: show(layout)
```



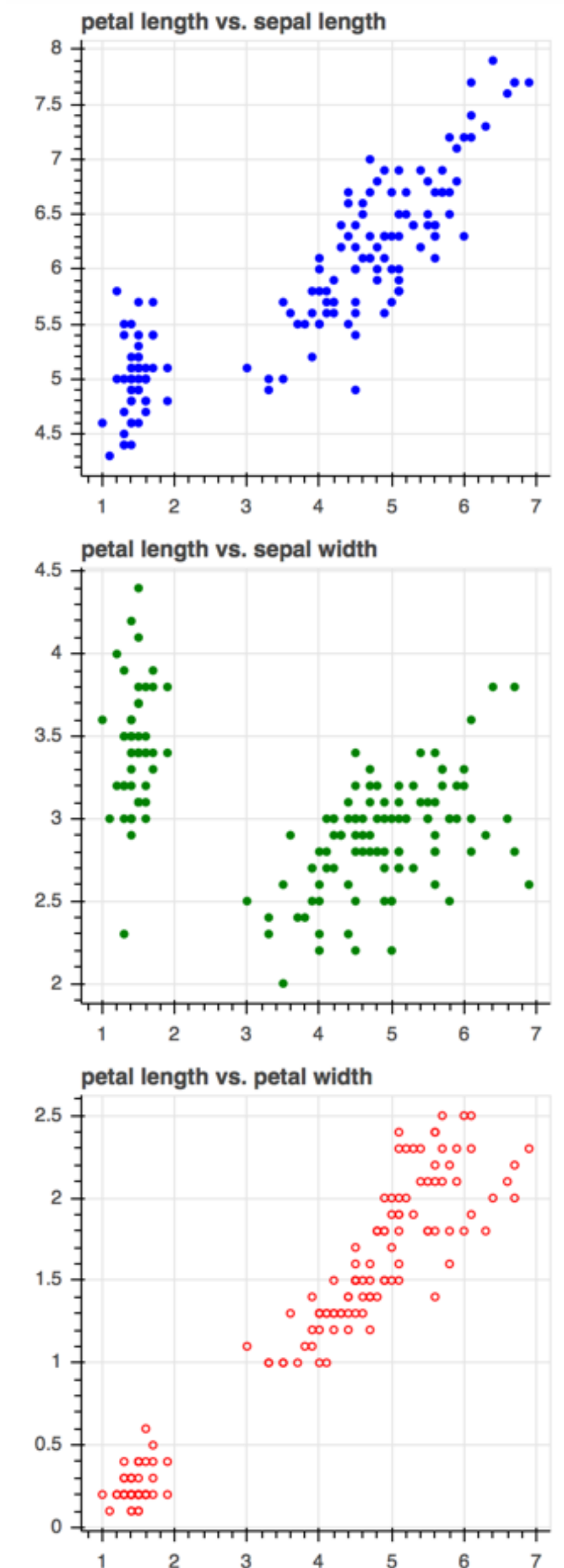
Columns of plots

```
In [1]: from bokeh.layouts import column
```

```
In [2]: layout = column(p1, p2, p3)
```

```
In [3]: output_file('column.html')
```

```
In [4]: show(layout)
```



Nested Layouts

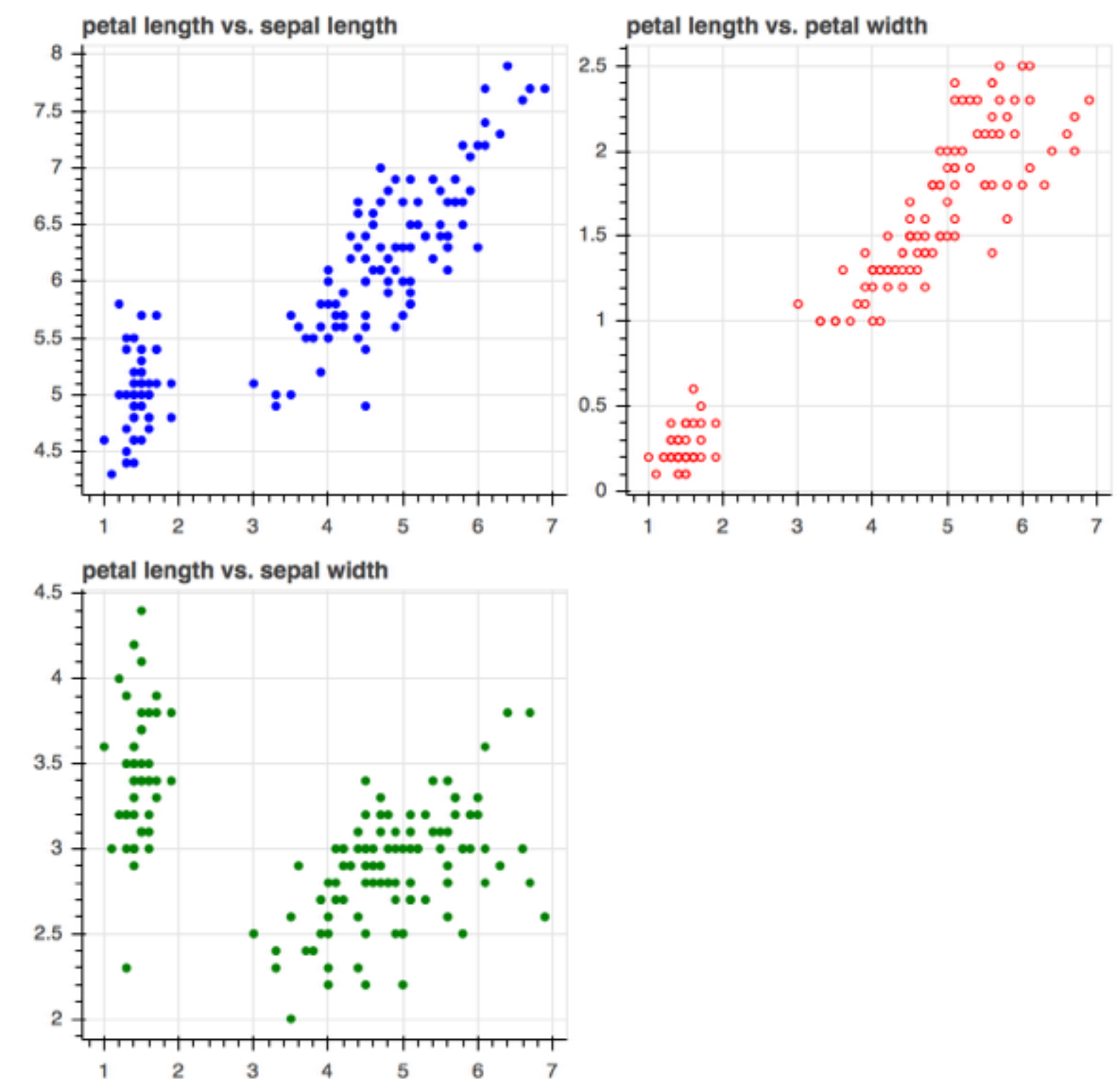
- Rows and column can be nested for more sophisticated layouts

```
In [1]: from bokeh.layouts import column, row
```

```
In [2]: layout = row(column(p1, p2), p3)
```

```
In [3]: output_file('nested.html')
```

```
In [4]: show(layout)
```





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Let's practice!



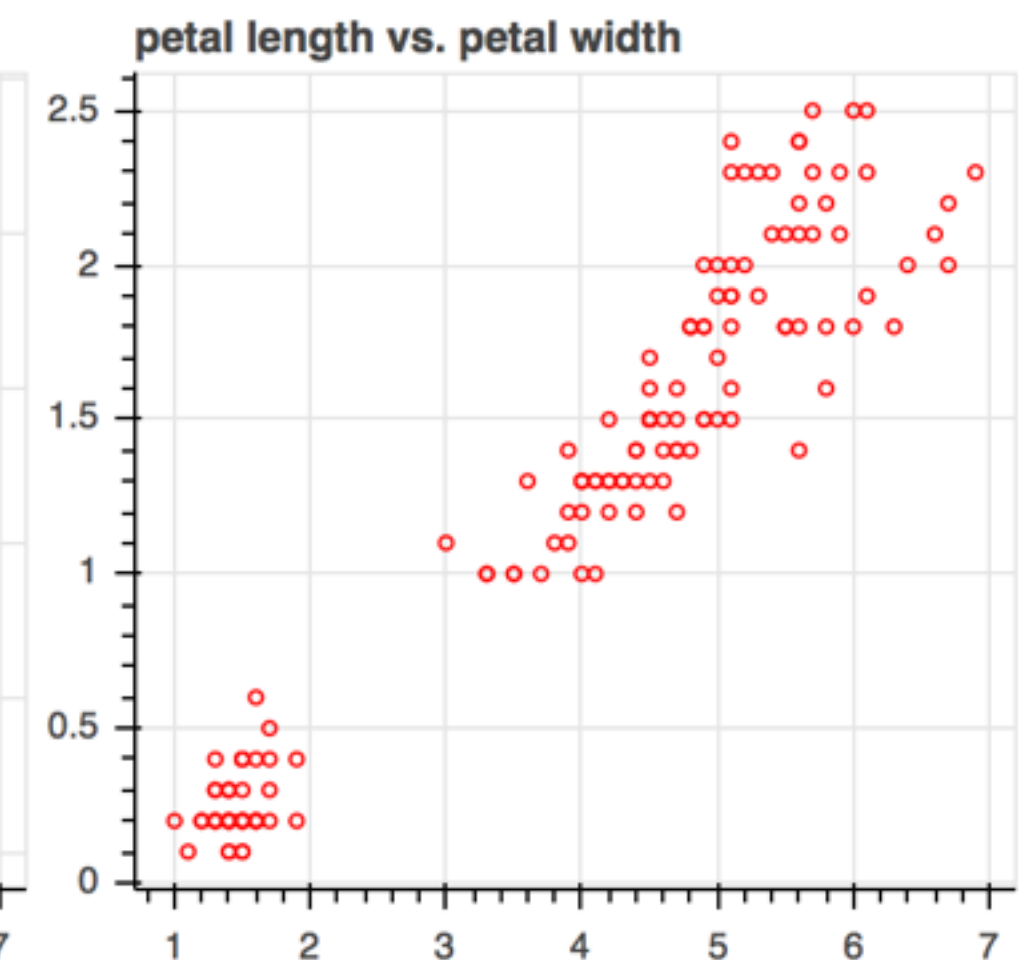
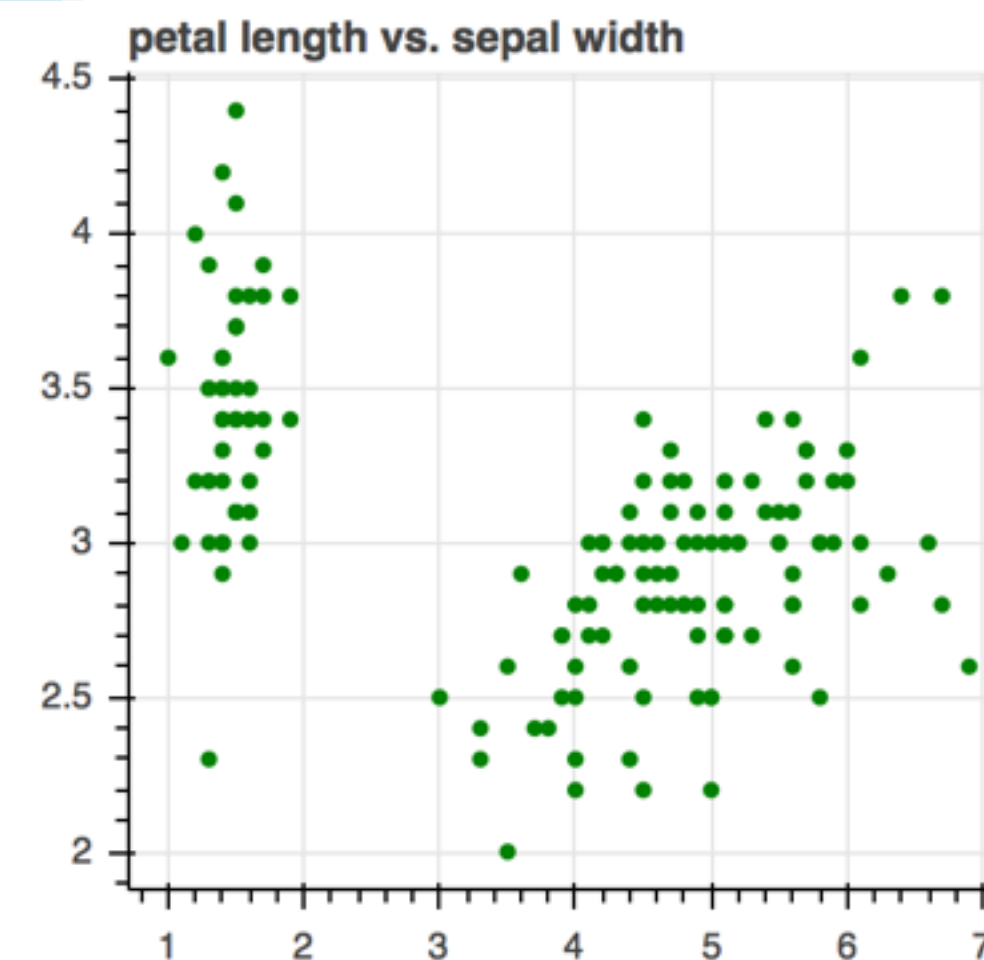
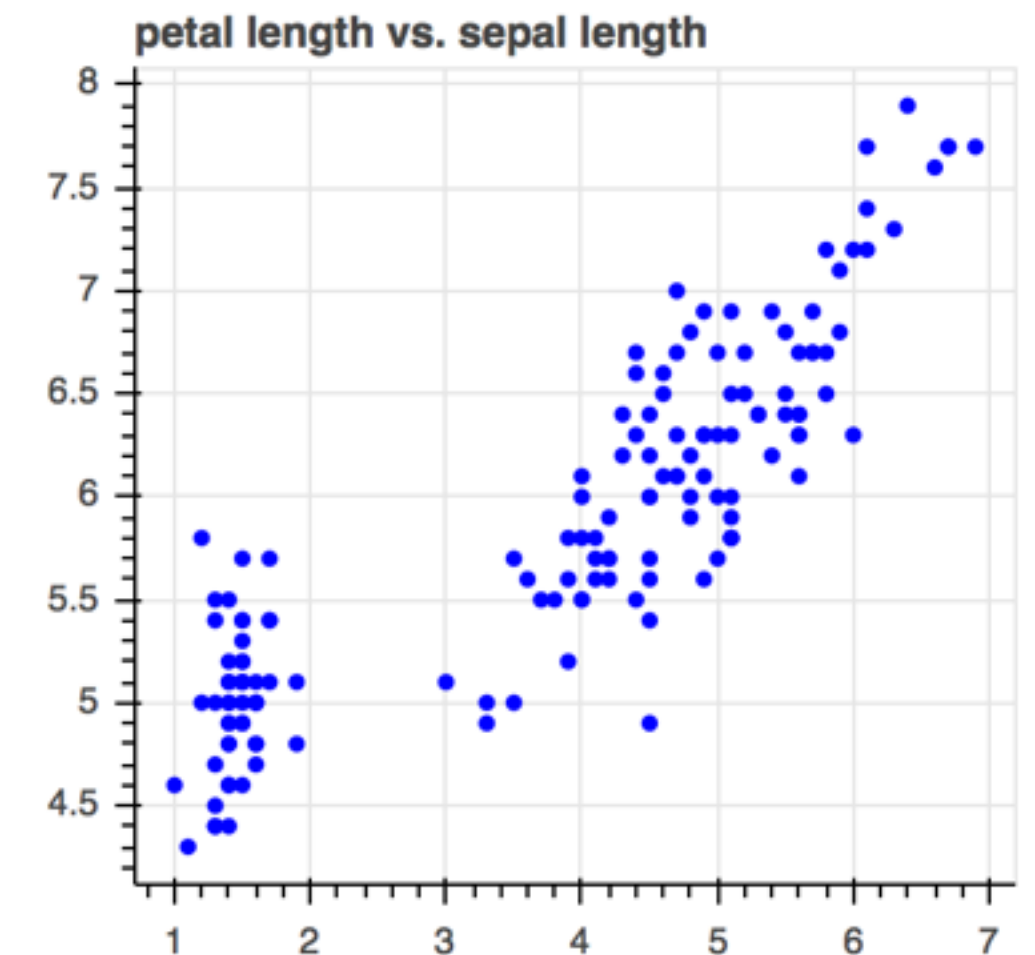
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Advanced Layouts

Gridplots

```
In [1]: from bokeh.layouts import gridplot  
  
In [2]: layout = gridplot([[None, p1], [p2, p3]],  
    ...:                   toolbar_location=None)  
  
In [3]: output_file('nested.html')  
  
In [4]: show(layout)
```

- Give a “list of rows” for layout
- can use None as a placeholder
- Accepts toolbar_location





Tabbed Layouts

```
In [1]: from bokeh.models.widgets import Tabs, Panel

In [2]: # Create a Panel with a title for each tab

In [3]: first = Panel(child=row(p1, p2), title='first')

In [4]: second = Panel(child=row(p3), title='second')

In [5]: # Put the Panels in a Tabs object

In [6]: tabs = Tabs(tabs=[first, second])

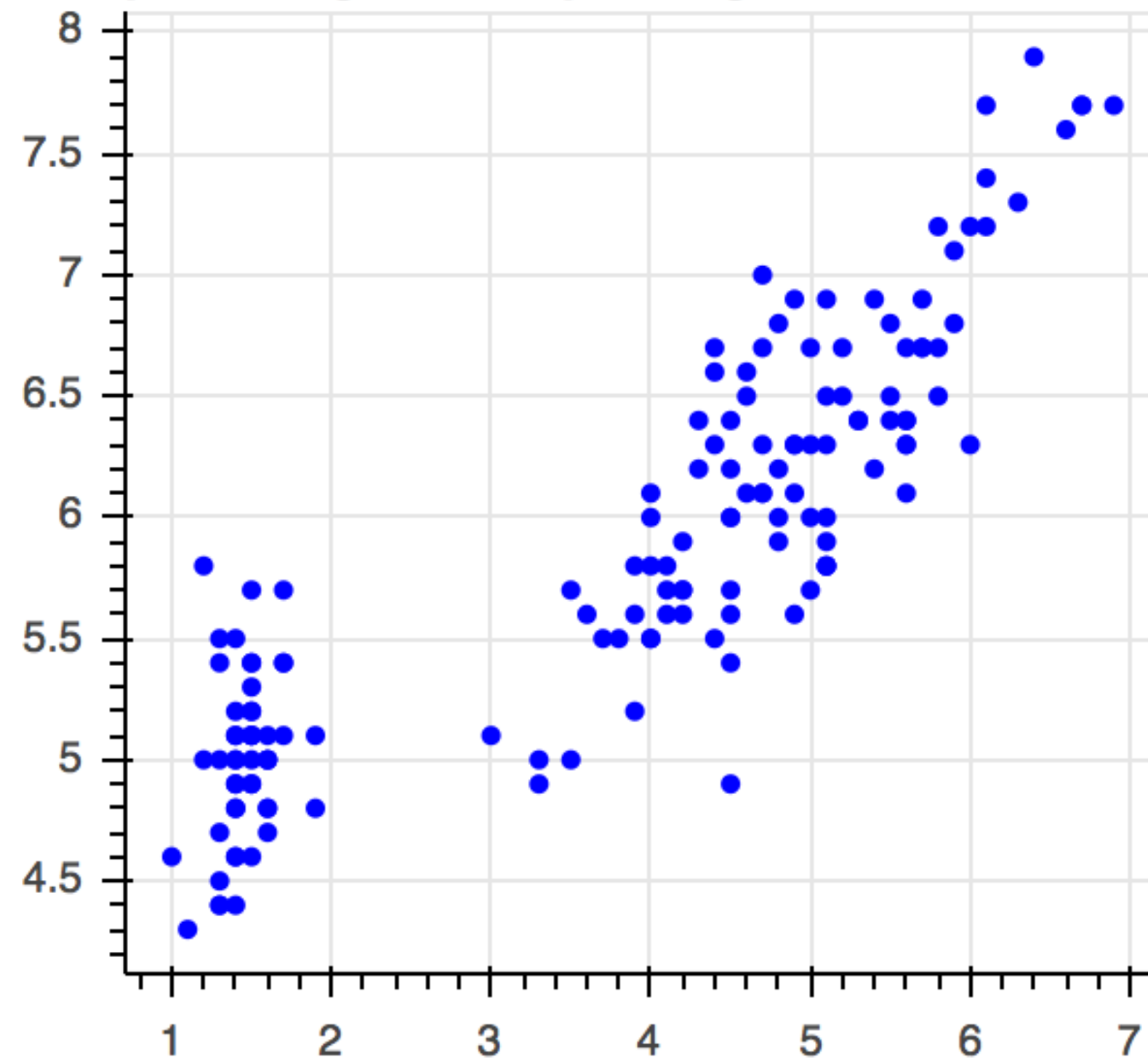
In [7]: output_file('tabbed.html')

In [8]: show(layout)
```

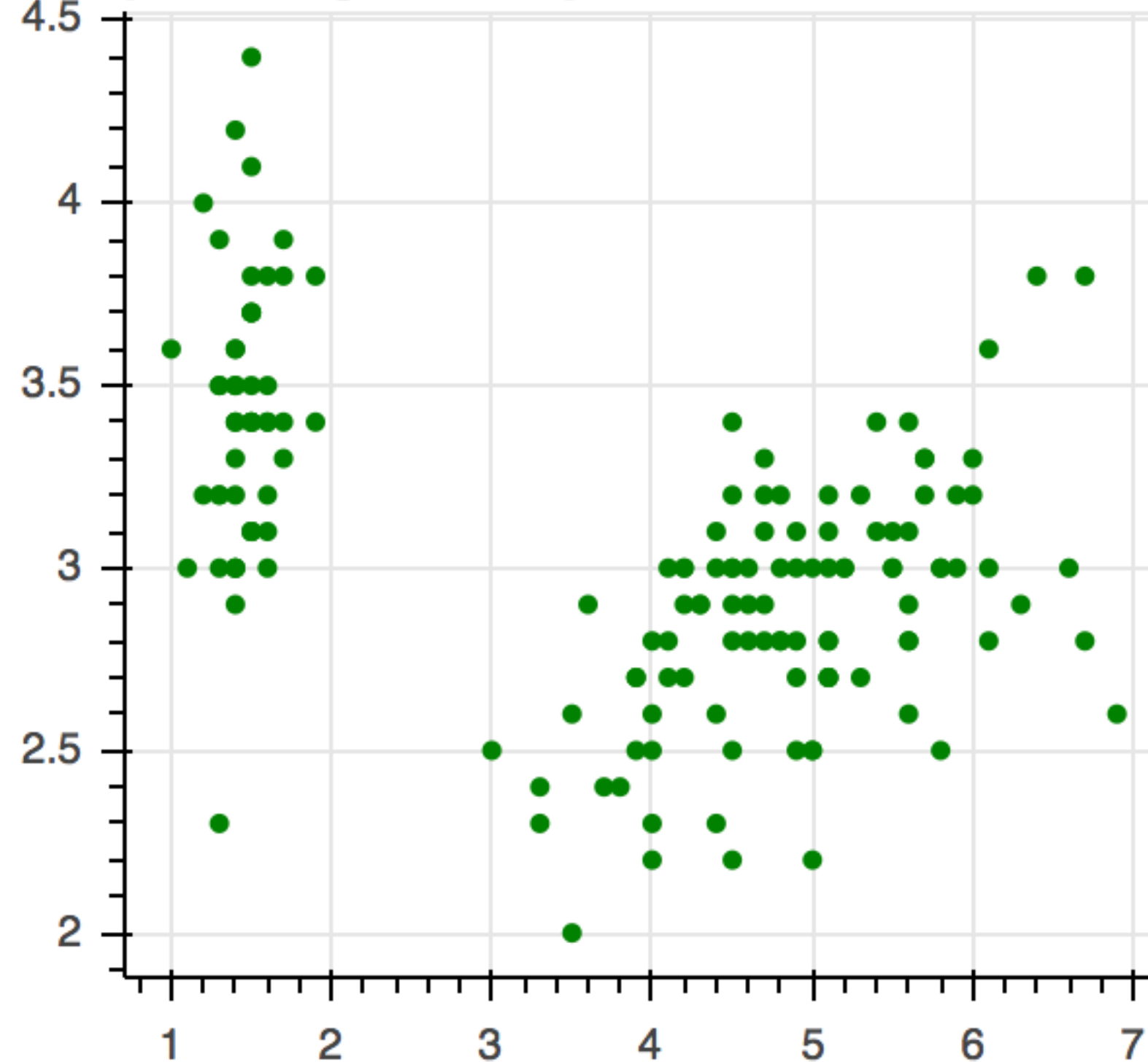
Tabbed Layouts

[first](#)[second](#)

petal length vs. sepal length



petal length vs. sepal width





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Let's practice!



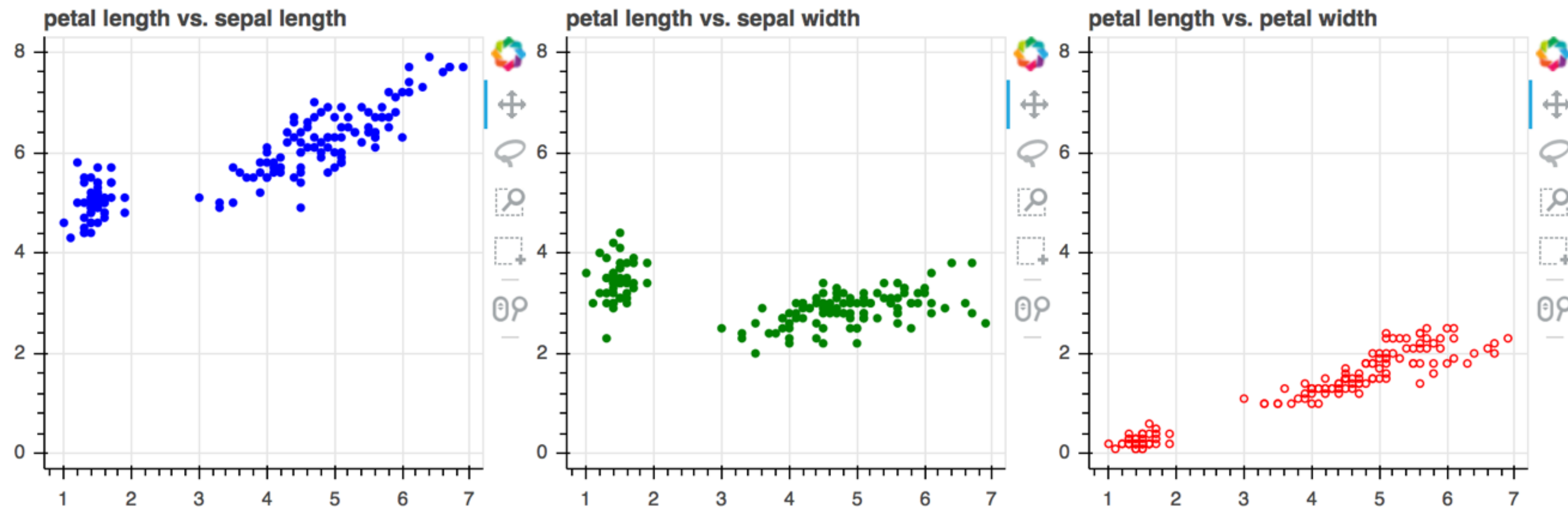
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Linking Plots Together

Linking axes

```
In [1]: p3.x_range = p2.x_range = p1.x_range
```

```
In [2]: p3.y_range = p2.y_range = p1.y_range
```





Linking selections

```
In [1]: p1 = figure(title='petal length vs. sepal length')

In [2]: p1.circle('petal_length', 'sepal_length',
...:              color='blue', source=source)

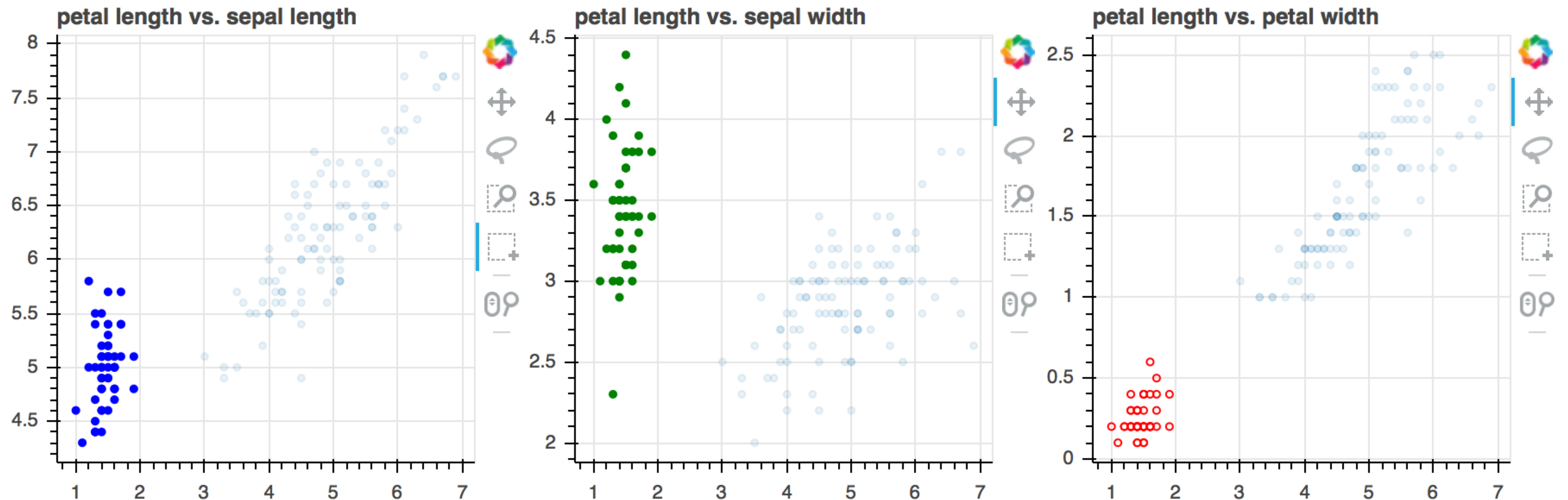
In [3]: p2 = figure(title='petal length vs. sepal width')

In [4]: p2.circle('petal_length', 'sepal_width',
...:              color='green', source=source)

In [5]: p3 = figure(title='petal length vs. petal width')

In [6]: p3.circle('petal_length', 'petal_width',
...:              line_color='red', fill_color=None,
...:              source=source)
```


Linking selections





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Let's practice!



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Annotations and Guides



What are they?

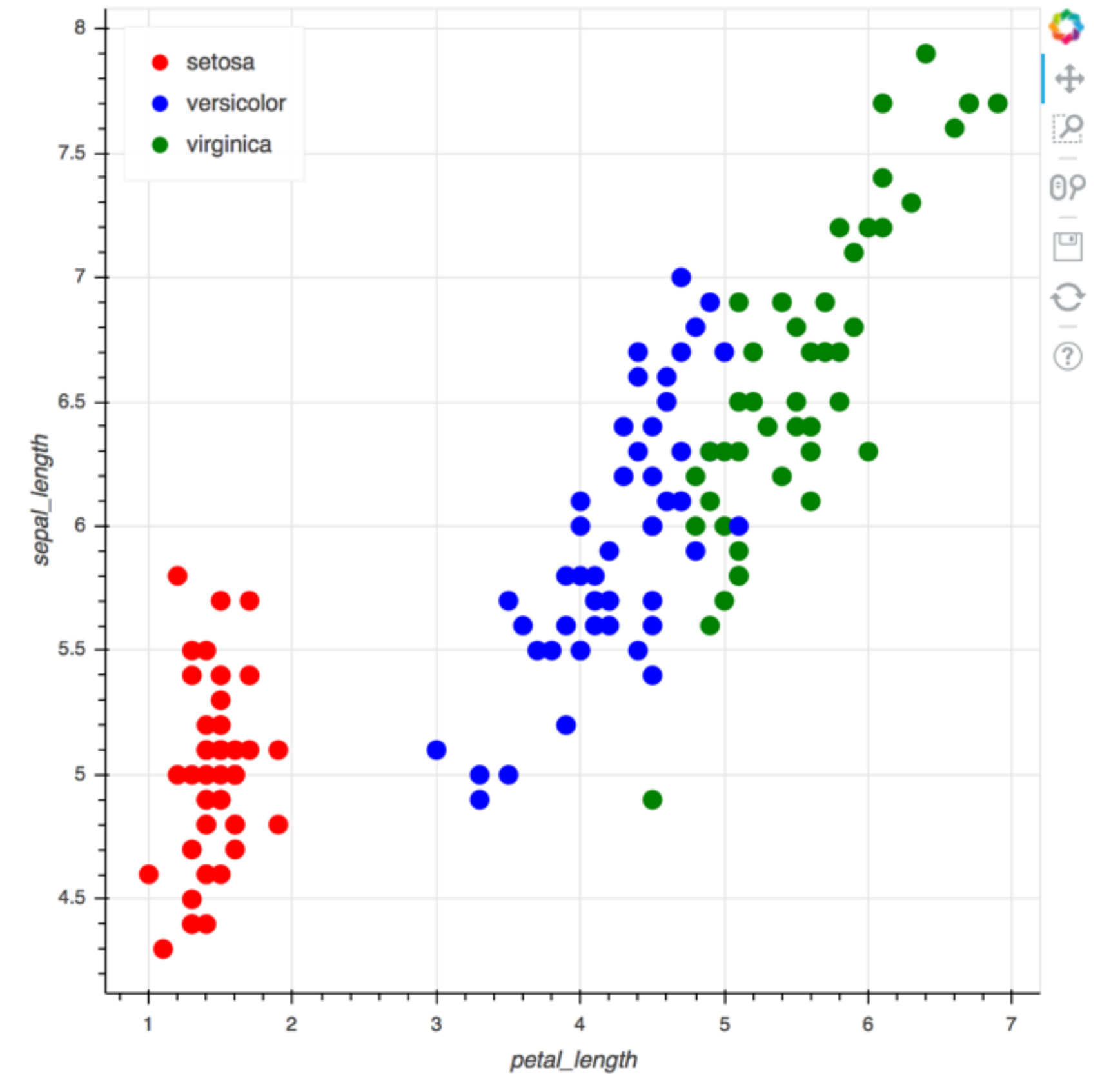
- Help relate scale information to the viewer
 - Axes, Grids (default on most plots)
- Explain the visual encodings that are used
 - Legends
- Drill down into details not visible in the plot
 - Hover Tooltips



Legends

```
In [1]: plot.circle('petal_length', 'sepal_length',  
....:               size=10, source=source,  
....:               color={'field': 'species',  
....:                     'transform': mapper},  
....:               legend='species')
```

```
In [2]: plot.legend.location = 'top_left'
```

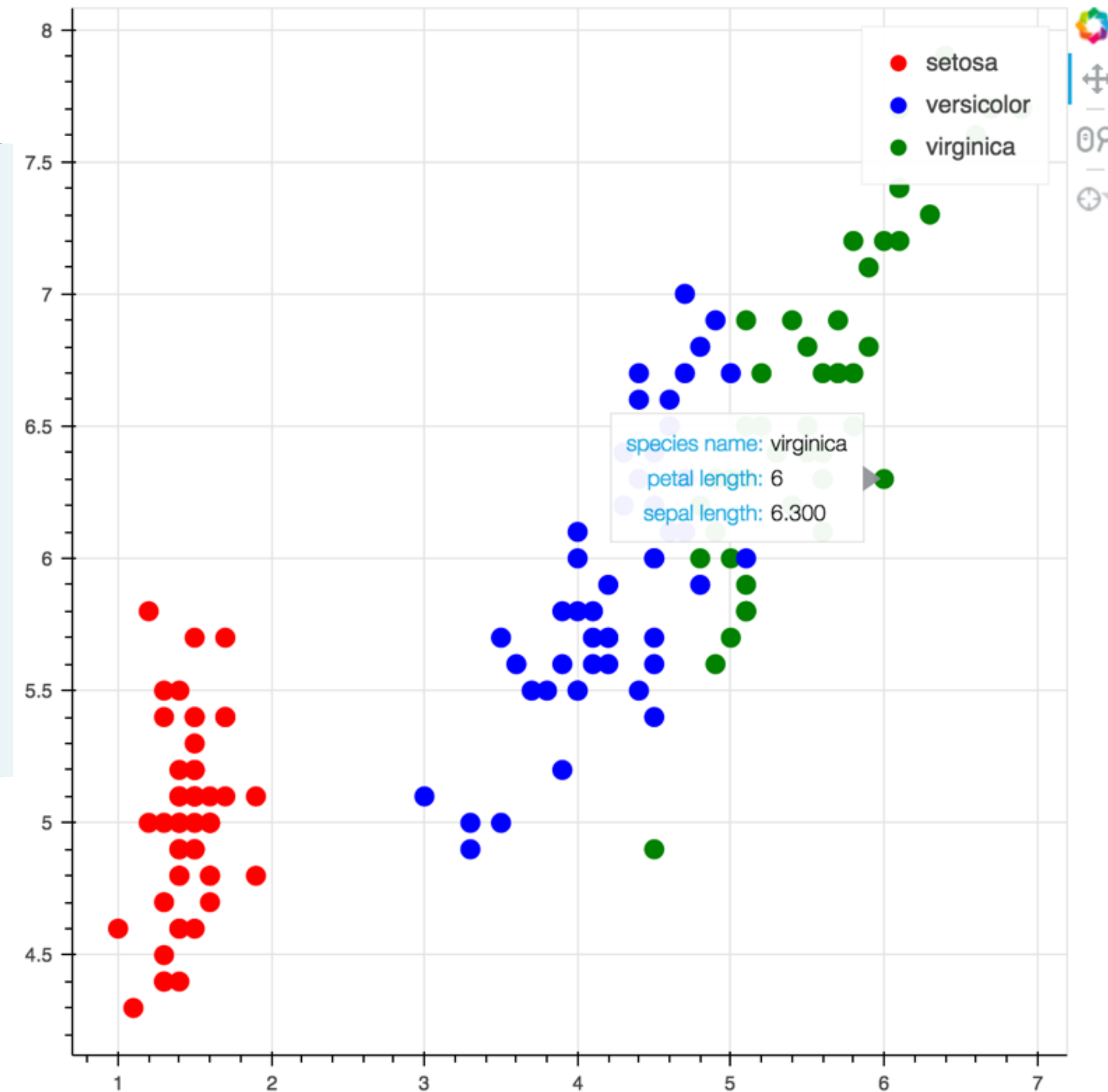


Hover Tooltips

```
In [1]: from bokeh.models import HoverTool

In [2]: hover = HoverTool(tooltips=[
....:     ('species name', '@species'),
....:     ('petal length', '@petal_length'),
....:     ('sepal length', '@sepal_length'),
....: ])

In [3]: plot = figure(tools=[hover, 'pan',
....:     'wheel_zoom'])
```





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