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Data Visualisation in Insurance

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Research Background

1. **UCL has two major PhD centres:**
   - CDT in Financial Computing & Analytics
   - CDT in Foundational AI
2. UCL Actuari project aims to provide the insurance industry with software solutions that enable companies to **exploit advances in machine learning**(e.g. LSTM, GANs, Transfer/Meta Learning)
3. UCL is building a **pioneering analytics platform:**
   - Template library for Insurance applications (Python)
   - Federated Learning algorithms Templates
   - Visualisation Templates
4. About me:
   - PhD Researcher at UCL
   - Background: MSc in Mathematics
   - Experience : Qualified Actuary, 5 years of industry experience

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Agenda

1. Data Visualisation for Insurance
2. Visualisation Libraries in Python
3. Interactive plotting in Python
4. Bokeh basics (open source visualisation Library)
5. Interactive plotting examples
6. Conclusions

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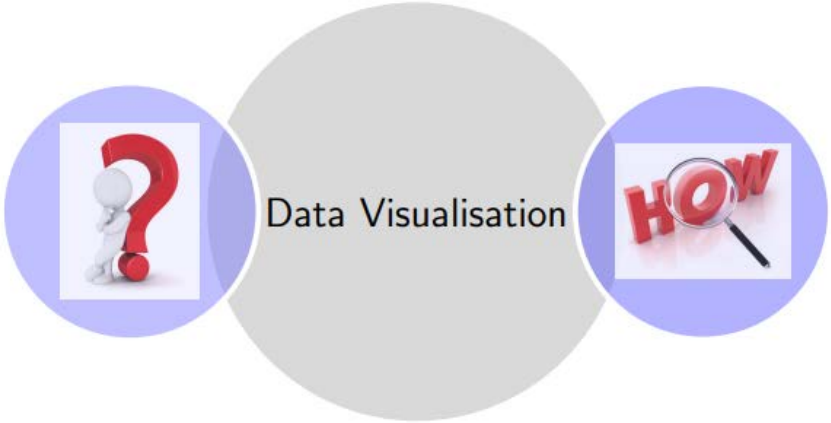
Data Visualisation for Insurance



- What is Data Visualisation ?
- Is it important ?
- Available Technology

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Visualization Libraries for Python

Static images files	Interactive visualizations
Matplotlib	**Bokeh**
Seaborn	Plotly
Pandas	Dash

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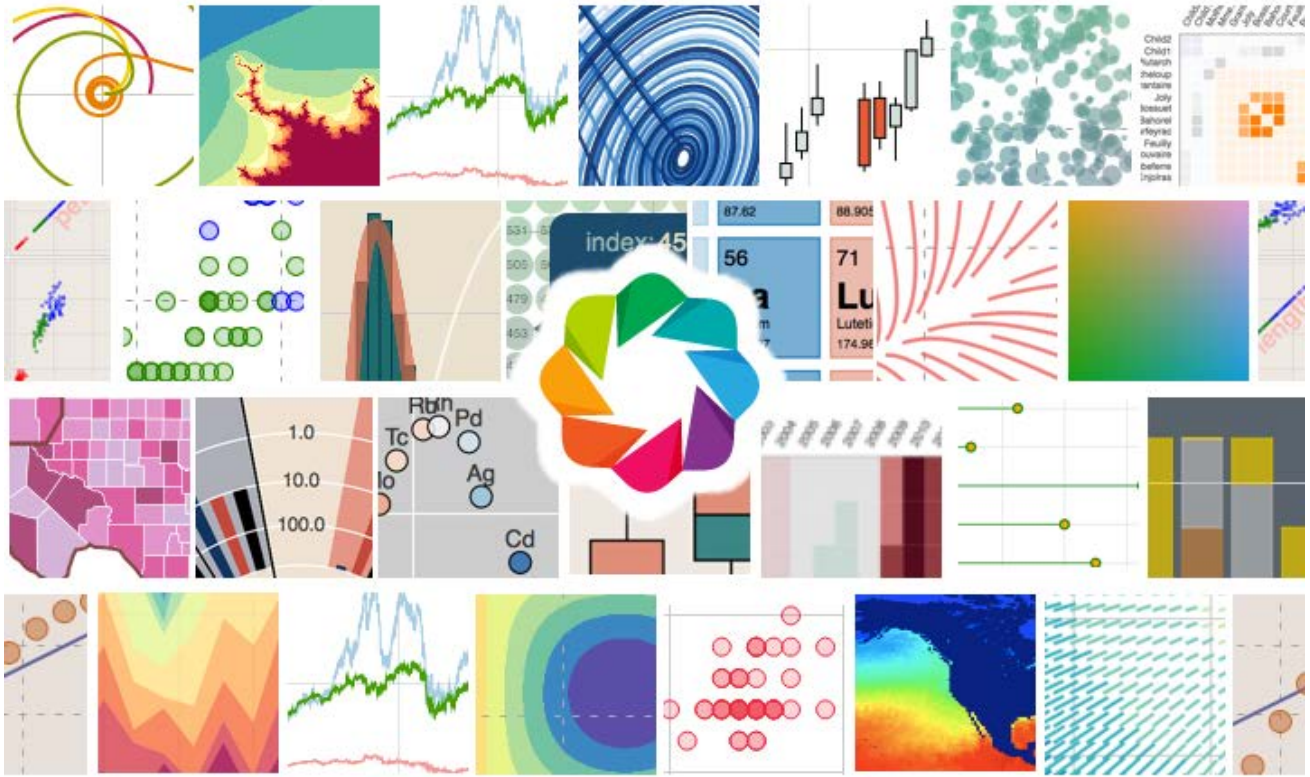
Interactive plotting in Python (using Bokeh open source)



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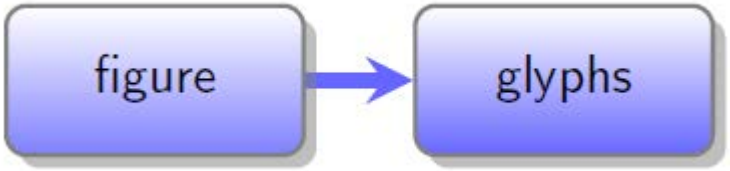
Bokeh basics



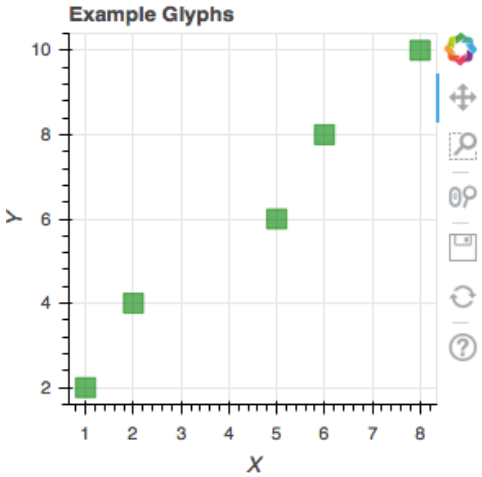

```
# imports
from bokeh.plotting import figure
from bokeh.io import show

# Create a blank figure with labels
p = figure(plot_width = 300, plot_height = 300,
           title = 'Example Glyphs',
           x_axis_label = 'X', y_axis_label = 'Y')

squares_x = [1, 2, 5, 6, 8]
squares_y = [2, 4, 6, 8, 10]

# Squares glyph
p.square(squares_x, squares_y, size = 12, color = 'green', alpha = 0.6)

# Show the plot
show(p)
```



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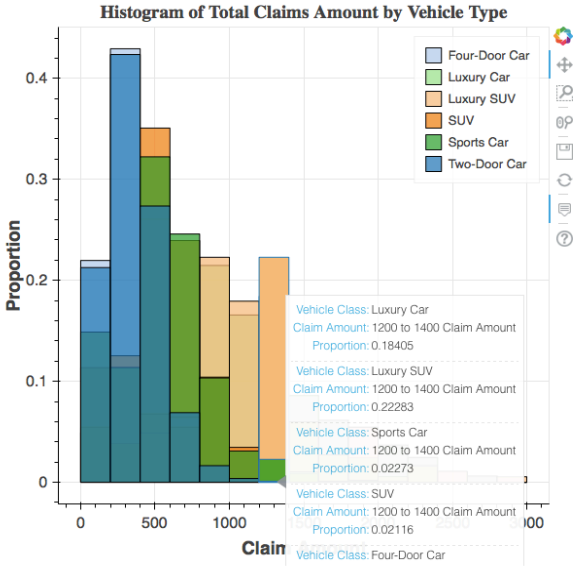
Interactive Histogram: Hover Tool

```
def make_plot(src):
        # Blank plot with correct labels
        p = figure(plot_width = 600, plot_height = 600,
                   title = 'Histogram of Total Claims Amount by Vehicle Type',
                   x_axis_label = 'Claim Amount', y_axis_label = 'Proportion')

        # Quad glyphs to create a histogram
        p.quad(source = src, bottom = 0, top = 'proportion', left = 'left', right = 'right',
               color = 'color', fill_alpha = 0.7, hover_fill_color = 'color', legend = 'name',
               hover_fill_alpha = 1.0, line_color = 'black')

        # Hover tool with vline mode
        hover = HoverTool(tooltips=[('Vehicle Class', '@name'),
                                    ('Claim Amount', '@f_interval'),
                                    ('Proportion', '@f_proportion')],
                          mode='vline')

        p.add_tools(hover)

        # Styling
        p = style(p)

        return p
```



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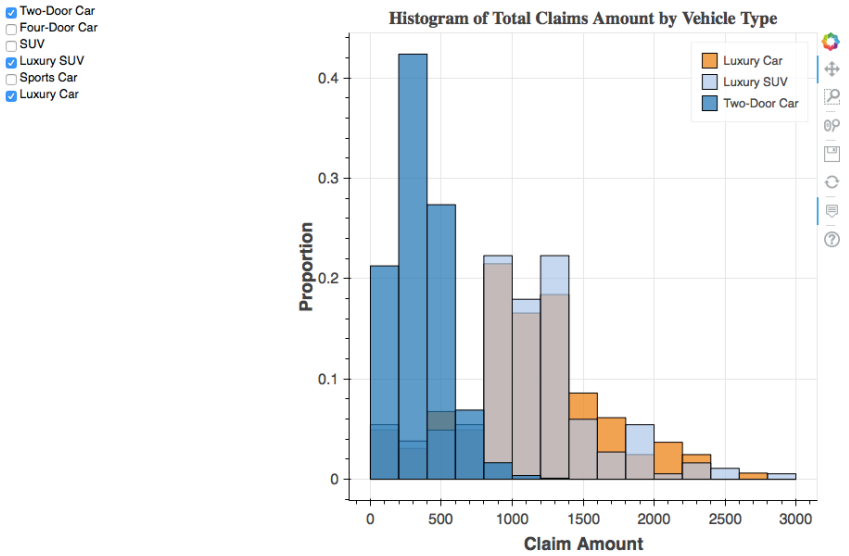
Interactive Histogram: Checkbox Tool




```
vehicle_selection = CheckboxGroup(labels=available_vehicleClass, active = [0, 1])

vehicle_selection.on_change('active', update)

controls = WidgetBox(vehicle_selection)
```

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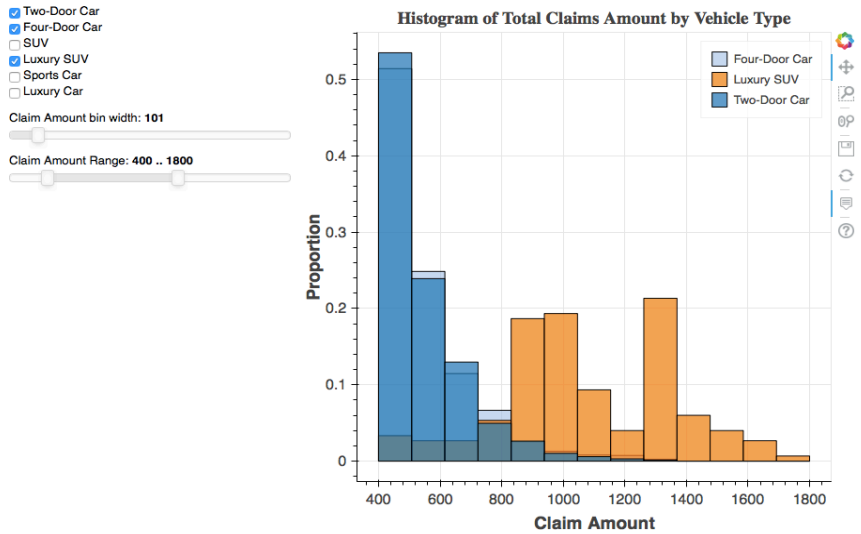
Interactive Histogram: Slider and Range Slider




```
binwidth_select = Slider(start = 1, end = 1000,
                         step = 100, value = 200,
                         title = 'Claim Amount bin width')
binwidth_select.on_change('value', update)

range_select = RangeSlider(start = 0, end = 3000, value = (0, 3000),
                           step = 100, title = 'Claim Amount Range')
range_select.on_change('value', update)
```

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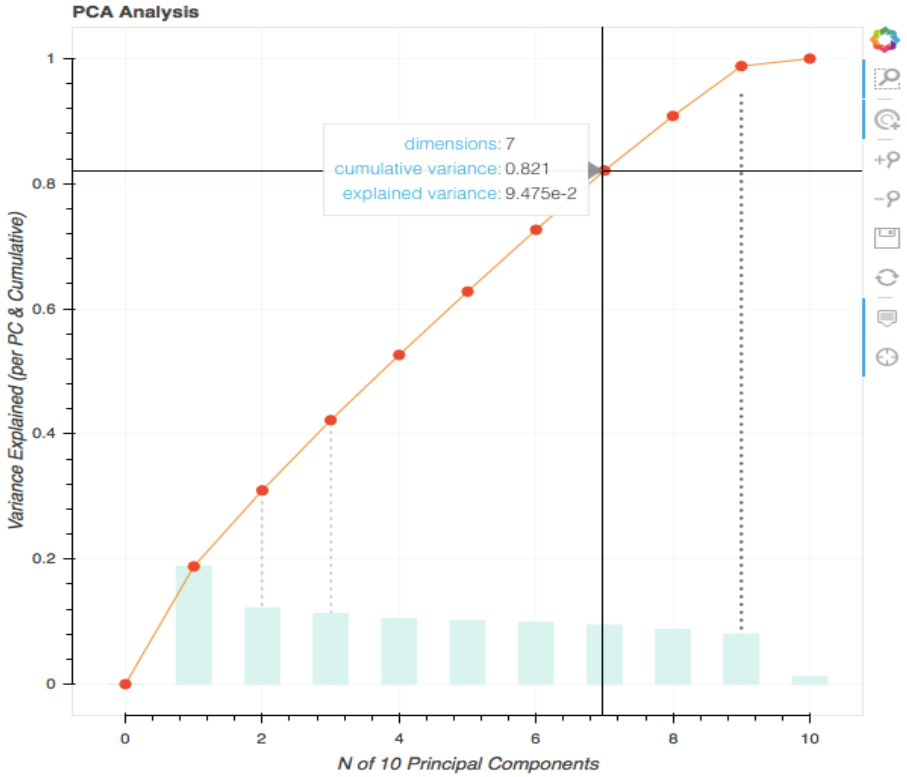
Interactive PCA



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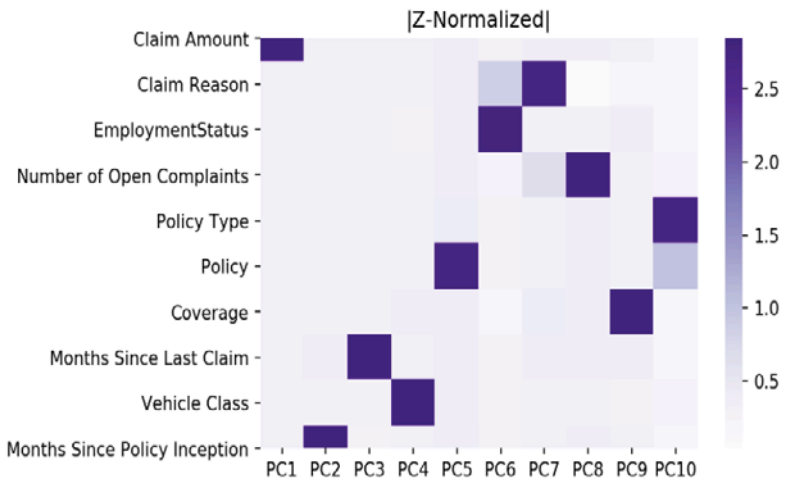
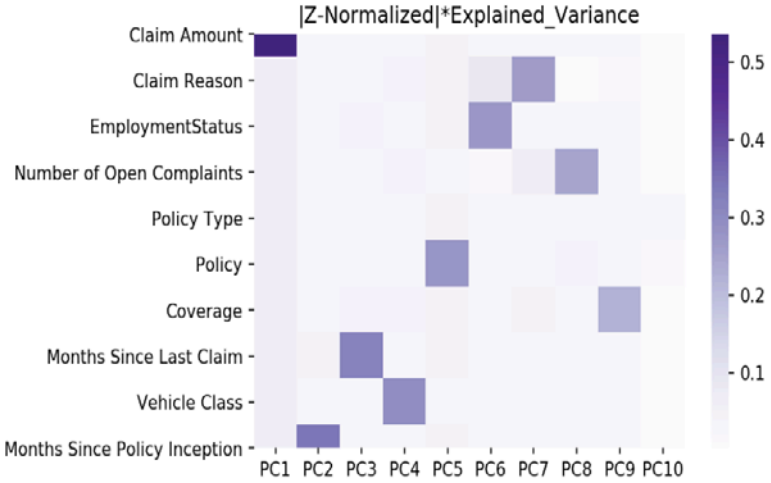
Interactive PCA





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Conclusions

UCL Actuari project:

1. The importance of Data Visualisation
2. **UCL InsurTech Analytics platform:**
   - Template Library for Insurance applications
   - Visualisation Templates
3. If you are interested in **collaborating** please contact:

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Questions

Comments

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