### Exploratory Data Analysis & Visualization Multivariate Data

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Today: Multivariate Analysis & Viz

#### Multivariate in the context of statistics

#### Descriptive

- Univariate: single variable
- Bivariate: relationships between two variables
- Multivariate: relationships between multiple variables
  - Dependency of a response on multiple variables; relationships between variables conditioned on the value of another variable; codependencies; ...

#### Inferential

- Hypothesis testing: testing whether your assumptions are true or not
- Model fitting: (predictive analytics) use your insights to make decisions or predictions

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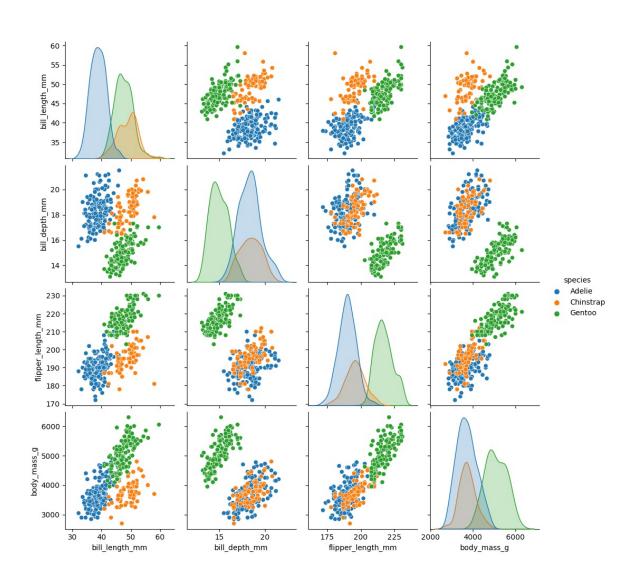
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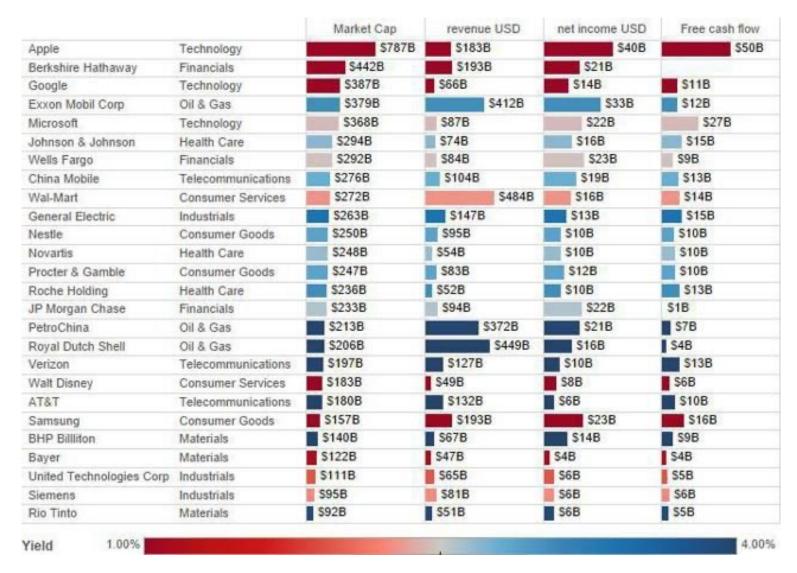
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  - What? Public policy, healthcare services, population, public transportation methods, public behavior, ...

#### Multivariate visualization



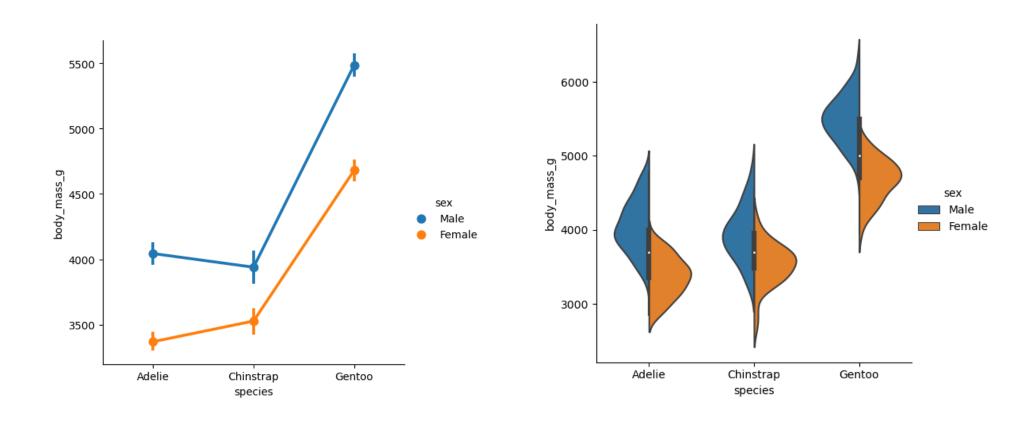
#### Multivariate visualization

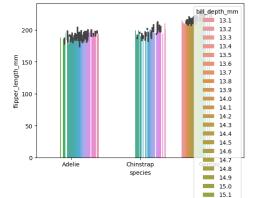


#### Multivariate visualization

- Data visualizations can be used to understand and assess statistical models.
- Prematurely committing to a model, or foregoing adequate verification and validation, can lead you astray
- Tailor you viz to your questions, but ALSO, be open to surprises!
- Even simple data can merit a variety of graphical investigations

#### Follow your objective





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#### Do not let the visualization scare you

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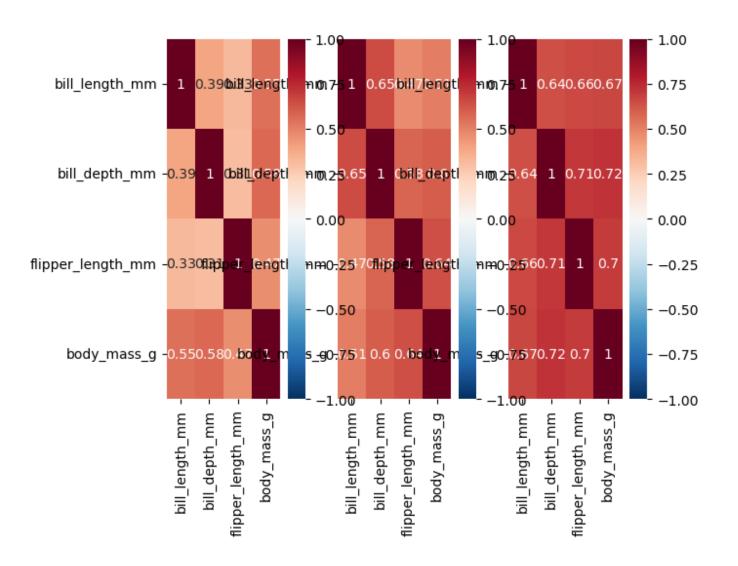
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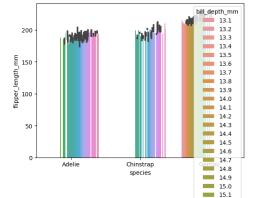
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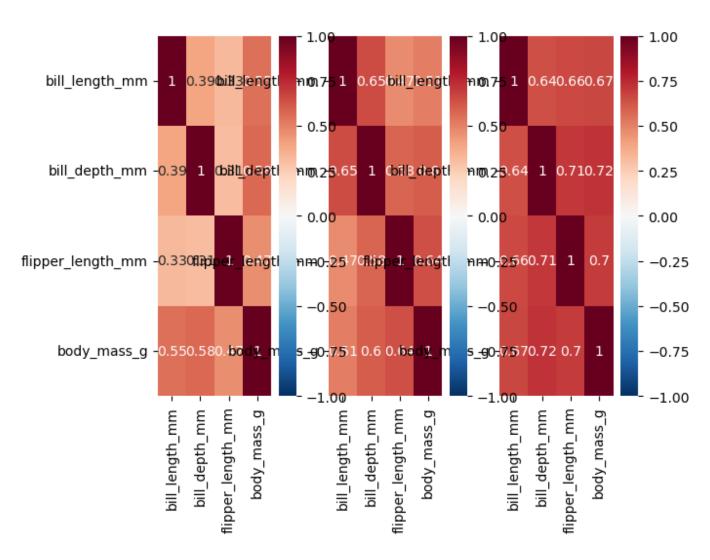
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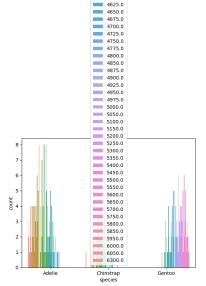
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# Data visualization is an exploratory journey





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- It requires complex computations to arrive at satisfactory conclusions
- It can be a time-consuming process
- It can require a lot of visual experimentation
- It can be fun
  - There is rarely a single visualization that answers all questions. Instead, the ability to generate appropriate visualizations quickly is key
- Today -> more development of visualization skills
- Saved for later -> some useful analytical calculations to use in exploration