

USP 410/510: Urban Informatics

Visualizing data with ggplot2

Liming Wang

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ggplot2 - grammar of graphics

`ggplot` is a grammar of graphics, a coherent system for describing and building graphs.

- **data (data frame):** `ggplot(dataset)`
- **aesthetic mapping (coordination system, color, size, line type, position etc):** `aes()`
- **geometries:** `geom_point`, `geom_line`, `geom_bar`, ...
- **stat (summarization/transformation of data):** `stat_smooth`,
- **scale (map data values into computer values):**
`scale_y_continuous(labels=percent)`, `scale_x_log10`, ...
- **facet:** `facet_wrap`, `facet_grid`
- **fine tuning**
 - **coordinate:** `coordinate_*`
 - **theme:** `theme_bw`
 - **labels:** `labs(x=..., y=...)`

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Code template:

```
ggplot(data = <DATA>) +  
  <GEOM_FUNCTION>(mapping = aes(<MAPPINGS>)) +  
  facet/theme_bw/labs()/...  
# data  
# aes & geometries  
# fine tuning
```

Types of Graphics

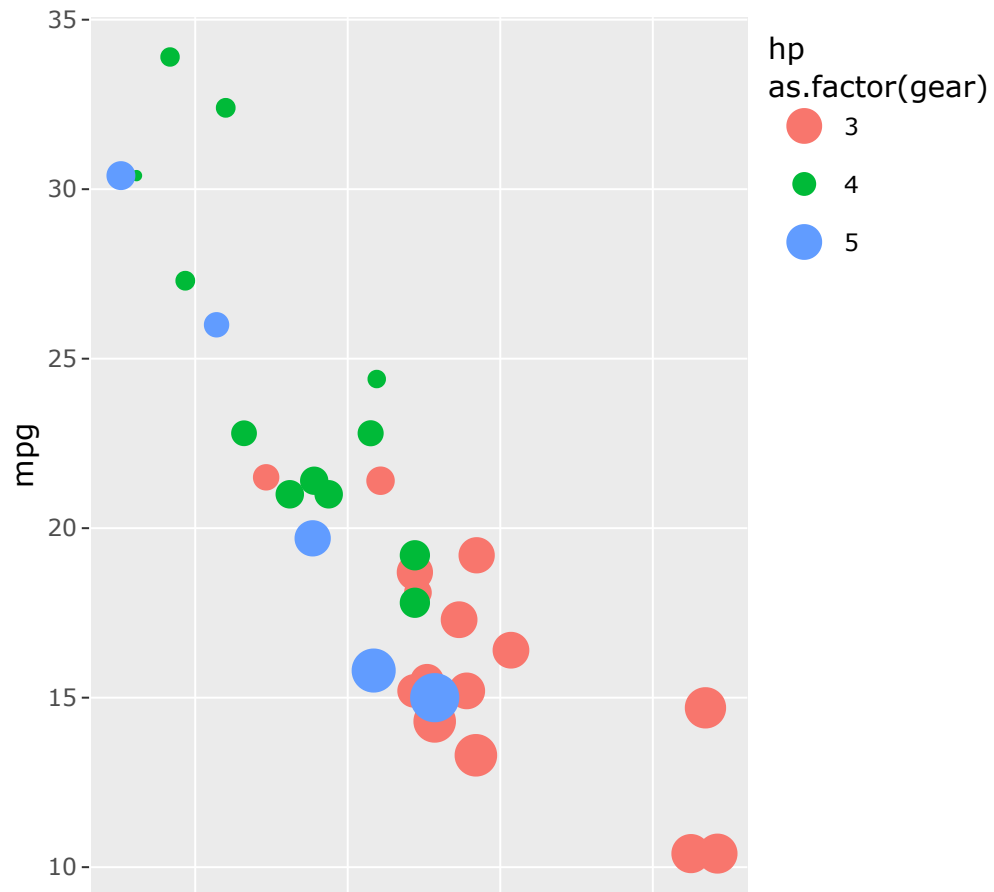
- numeric variables represent quantities, e.g. time, volume, money, distance, weight
 - histogram
 - scatter plot
- categorical variables represent categories/labels,
 - nominal categorical: no innate order between values
 - ordinal categorical: with order between values
 - bar plot
- mix & match (choose x & y axis)
 - ridgeline plot (boxplot if you must)
 - scatter plot

esquisse

Interactively explore data by visualizing it with the ggplot2 package

Interactive Plots

- plotly
- leaflet, tmap for interactive maps



ggplot2 - Resources/References

- r graph gallery: <https://r-graph-gallery.com/>
- ggplot2 cookbook: <https://r-graphics.org/>
- ggplot2 cheatsheet: <https://www.rstudio.com/resources/cheatsheets/>
- ggplot2: Elegant Graphics for Data Analysis: <https://ggplot2-book.org/>

