Presentation title

Your name

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The first frame

- This is a simple beamer template with ISEG´s colors
- In the next slides you will see some examples of what you can do with beamer.
- Inspect the underlying code to learn how to make your own frames.

Lists of items

In this presentation you will learn how to:

- create a link to ISEG's website
- make ordered and unordered lists of items
- include pictures
- make citations
- use mathematical formulas
- display code
- create theorems and definitions

Some useful fonts

- you can use **bold** font
- you can also use *italics*
- the `typewriter` font can also be useful

Enumeration of items

In the last frame you learned how to create a list of items. Now lets create an enumeration of items:

1. make ordered and unordered lists of items
2. include pictures
3. use mathematical formulas
4. display code
5. create theorems and definitions

Itemized lists inside itemized lists

You can have itemized lists inside itemized lists:

- lists of items
  - ordered
  - unordered
- include pictures
- use mathematical formulas
- display code
  - Python code
  - R code
- create theorems and definitions

Including pictures

This picture is in the "figures" folder. We also included a caption:

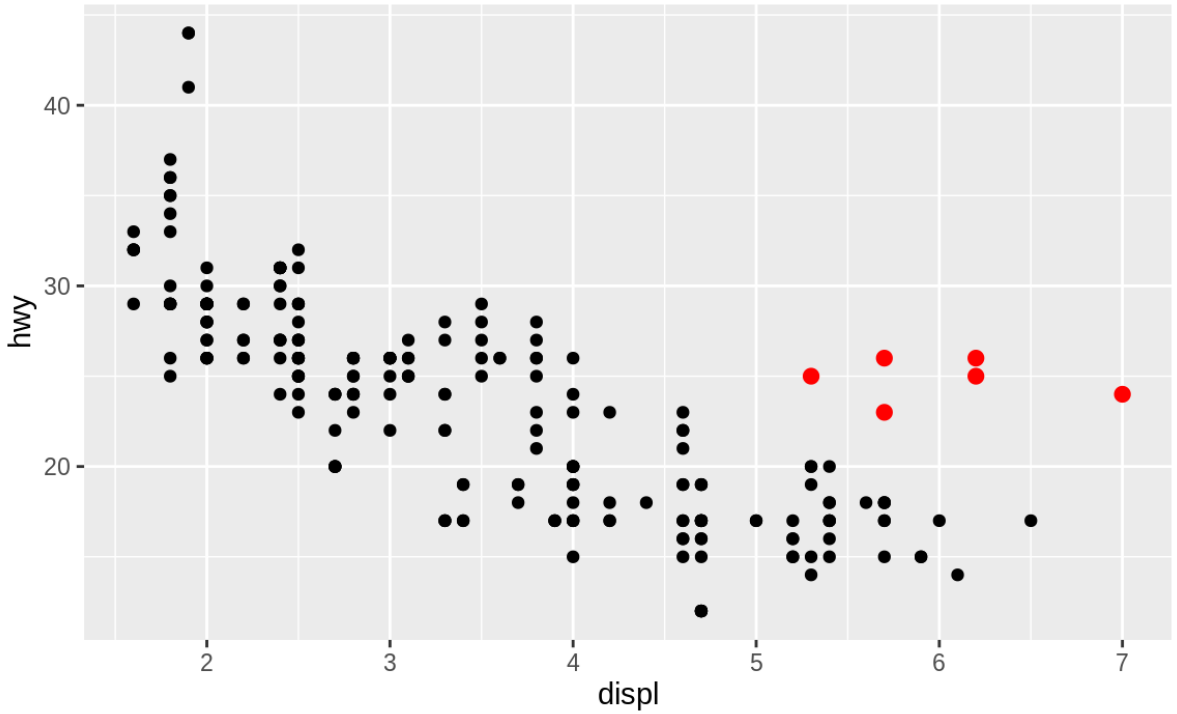

Figure 1: Fuel consumption (Hwy) vs engine size (displ)

Three ways to make citations

- Kass and Raftery, 1995
- (Kass and Raftery, 1995)
- Kass and Raftery (1995)

Definitions and theorems

You can display definitions and theorems:

Definition (Fibration)

A fibration is a mapping between two topological spaces that has the homotopy lifting property for every space X.

Latex is very useful to write mathematical expressions:

Theorem (Bayes)

$$P(\theta|\boldsymbol{D}) = P(\theta)\frac{P(\boldsymbol{D}|\theta)}{P(\boldsymbol{D})}$$

The block environment

The block environment is more versatile. You can write whatever you want on the red block:

Pythagorean theorem

This is a theorem about right triangles and can be summarised in the next equation

$$x^2 + y^2 = z^2$$

Corollary

There's no right rectangle whose sides measure 3cm, 4cm, and 6cm.

Two part functions

I also included an environment that allows you to easily write two part functions:

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

Examples of mathematical expressions

- Likelihood: $\boldsymbol{x}|\boldsymbol{\theta} \sim \mathcal{M}_k(N, \boldsymbol{\theta})$
- Hypotheses: $H_0 : \boldsymbol{\theta} = \boldsymbol{\theta_0}$ vs $H_1 : \boldsymbol{\theta} \neq \boldsymbol{\theta_0}$
- Prior: $\pi(\boldsymbol{\theta}|H_0) = 1_{\boldsymbol{\theta_0}}(\boldsymbol{\theta_0})$ and $\boldsymbol{\theta}|H_1, \boldsymbol{\alpha} \sim \text{Dir}_k(\boldsymbol{\alpha})$
- Marginal density: $m_i(\boldsymbol{x}) = \int_{\Theta_i} f(\boldsymbol{x}|\boldsymbol{\theta})\pi(\boldsymbol{\theta}|H_i)\, d\boldsymbol{\theta}, \quad i = 0, 1$
  - $m_0(\boldsymbol{x}) = \frac{N!}{\prod_{i=1}^{k+1} x_i!} \prod_{i=1}^{k+1} {\theta_{0i}}^{x_i}$
  - $m_1(\boldsymbol{x}) = \frac{N!}{\prod_{i=1}^{k+1} x_i!} \frac{B(\boldsymbol{\alpha}+\boldsymbol{x})}{B(\boldsymbol{\alpha})}$
- Bayes factor:

$$B_{01}(\boldsymbol{x}) = \frac{m_0(\boldsymbol{x})}{m_1(\boldsymbol{x})} = \frac{\prod_{i=1}^{k+1} ({\theta_{0i}}^{x_i}) \prod_{i=1}^{k+1} [\Gamma(\alpha_i)] \Gamma[\sum_{i=1}^{k+1} (\alpha_i + x_i)]}{\Gamma(\sum_{i=1}^{k+1} \alpha_i) \prod_{i=1}^{k+1} \Gamma(\alpha_i + x_i)}$$

- For an interesting applicaton see Pericchi and Torres (2011)

Python code looks good on verbatim

Code is usually displayed in verbatim. This code prints the Fibonacci sequence:

```
nterms = int(input("How many terms? "))
n1, n2 = 0, 1
count = 0
print("Fibonacci sequence:")
while count < nterms:
    print(n1)
    nth = n1 + n2
    n1 = n2
    n2 = nth
    count += 1
}
```

R code looks good too

I also included a verbatim environment with background color:

```
getmode <- function(v) {
        uniqv <- unique(v)
        uniqv[which.max(tabulate(match(v, uniqv)))]
        }
```

With this R code you can build a function that calculates the mode.

References

Kass, RE and AE Raftery (1995). Bayes factors. *Journal of the American Statistical Association* **90**(430), 773–795.

Pericchi, L and D Torres (2011). Quick anomaly detection by the Newcomb—Benford law, with applications to electoral processes data from the USA, Puerto Rico and Venezuela. *Statistical Science* **26**(4), 502–516.