

Presentation with L^AT_EX

Pedro Fonseca



ISEG Lisbon School of Economics & Management

April 26, 2020

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.



In this presentation you will learn how to:

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



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:

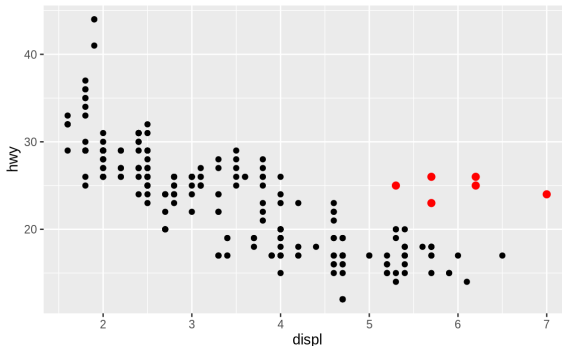


Figure 1: Fuel consumption (Hwy) vs engine size (displ)



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)

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

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: $\mathbf{x}|\boldsymbol{\theta} \sim \mathcal{M}_k(N, \boldsymbol{\theta})$
- 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: $m_i(\mathbf{x}) = \int_{\Theta_i} f(\mathbf{x}|\boldsymbol{\theta})\pi(\boldsymbol{\theta}|H_i) d\boldsymbol{\theta}$, $i = 0, 1$

$$\blacktriangleright m_0(\mathbf{x}) = \frac{N!}{\prod_{i=1}^{k+1} x_i!} \prod_{i=1}^{k+1} \theta_{0i}^{x_i}$$

$$\blacktriangleright m_1(\mathbf{x}) = \frac{N!}{\prod_{i=1}^{k+1} x_i!} \frac{B(\boldsymbol{\alpha} + \mathbf{x})}{B(\boldsymbol{\alpha})}$$

- Bayes factor:

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



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.