Presentation with LaTeX

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The first frame

- This is a simple beamer template with ISEG's colors
- In the next slides wou 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:

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

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:

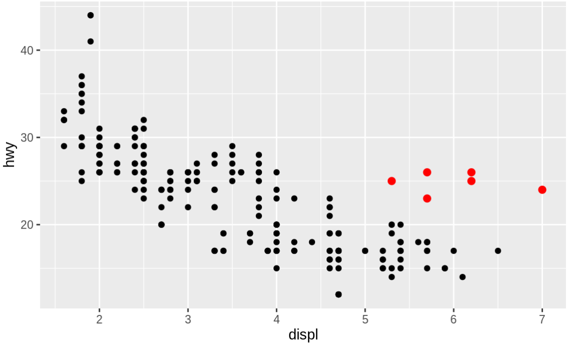

Figure 1: Fuel consumption (Hwy) vs engine size (displ)

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)

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

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 $\boldsymbol{\theta}|H_1, \boldsymbol{\alpha} \sim \mathrm{Dir}_k(\boldsymbol{\alpha})$
- 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:

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

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.