IQSS Beamer Class Demonstration

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IQSS

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Outline

What's this course about?

- Specific statistical methods for many research problems - How to learn (or create) new methods - Inference: Using facts you know to learn about facts you don't know

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How much math will you scare us with?

- All math requires two parts: proof and concepts & intuition
- Different classes emphasize:
  - Baby Stats: dumbed down proofs, vague intuition
  - Math Stats: rigorous mathematical proofs
  - Practical Stats: deep concepts and intuition, proofs when needed
    - Goal: how to do empirical research, in depth
    - Use rigorous statistical theory — when needed
    - Insure we understand the intuition — always
    - Always traverse from theoretical foundations to practical applications
    - Includes "how to" computation
    - $\rightsquigarrow$ Fewer proofs, more concepts, better practical knowledge
- Do you have the background for this class?

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A Test: What's this?

Systematic Components: Examples

- $E(Y_i) \equiv \mu_i = X_i\beta = \beta_0 + \beta_1 X_{1i} + \cdots + \beta_k X_{ki}$
- $\Pr(Y_i = 1) \equiv \pi_i = \frac{1}{1+e^{-x_i\beta}}$
- $V(Y_i) \equiv \sigma_i^2 = e^{x_i\beta}$
- Interpretation:
  - Each is a class of functional forms
  - Set β and it picks out one member of the class
  - β in each is an "effect parameter" vector, with different meaning

Negative Binomial Derivation

Recall:

one two three

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$$\begin{aligned}
\text{NegBin}(y|\phi, \sigma^2) &= \int_0^\infty \text{Poisson}(y|\lambda) \times \text{gamma}(\lambda|\phi, \sigma^2) d\lambda \\
&= \int_0^\infty \P(y, \lambda|\phi, \sigma^2) d\lambda \\
&= \frac{\Gamma\left(\frac{\phi}{\sigma^2-1} + y_i\right)}{y_i! \Gamma\left(\frac{\phi}{\sigma^2-1}\right)} \left(\frac{\sigma^2 - 1}{\sigma^2}\right)^{y_i} \left(\sigma^2\right)^{\frac{-\phi}{\sigma^2-1}}
\end{aligned}$$

Outline

Structural Features

Levels of Structure

- usual LaTeX \ section, \ subsection commands
- `frame` environments provide slides
- `block` environments divide slides into logical sections
- `columns` environments divide slides vertically (example later)
- overlays (‘a la prosper) change content of slides dynamically

Overlay Alerts

On the first overlay, this text is highlighted (or *alerted*).
On the second, this text is.

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# Say hello in R
hello <- function(name) paste("hello", name)
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```python
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def hello(name):
return("Hello" + " " + name)
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-- Say hello in Haskell
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# Say hello in Python
def hello(name):
return("Hello" + " " + name)

-- Say hello in Haskell
hello name = "Hello" ++ " " ++ name

/* Say hello in C */
#include <stdio.h>
int main()
{
  char name[256];
  fgets(name, sizeof(name), stdin);
  printf("Hello %s", name);
  return(0);
}
```

Alerts

- First level alert
- Second level alert
- Third level alert
- Fourth level alert
- Fifth level alert

Outline

Other Features

Levels of Structure

- Clean, extensively customizable visual style
- Hyperlinks (http://github.com/izahn/iqss-beamer-theme
- No weird scaling prosper
  - slides are $96_{\text{mm}} \times {}_{128}\text{mm}$
  - text is 10-12pt on slide
  - slide itself magnified with Adobe Reader/xpdf/gv to fill screen
- pgf graphics framework easy to use
- include external JPEG/PNG/PDF figures
- output directly to pdf: no PostScript hurdles
- detailed User's Manual (with good presentation advice, too)

Theorems and Proofs

The proof uses *reductio ad absurdum*.

Theorem

There is no largest prime number.

Proof

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- Suppose p were the largest prime number.
- Let q be the product of the first p numbers.
- Then $q + 1$ is not divisible by any of them.
- But $q + 1$ is greater than 1, thus divisible by some prime number not in the first p numbers.

Blocks

Normal block

A set consists of elements.

Alert block

$2 = 2$.

Example block

The set $\{1, 2, 3, 5\}$ has four elements.

Outline

Backup Slides

Details

Text omitted in main talk.

More details

Even more details