IQSS Beamer Class Demonstration

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IQSS

September 19, 2018

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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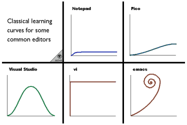
  - j.mp/G2001



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  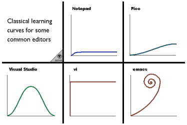

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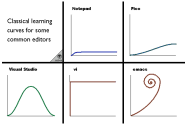
  j.mp/G2001 

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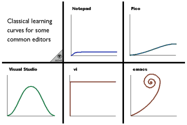
  j.mp/G2001 

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  - We will go as fast as possible subject to everyone following along
  - We cover different amounts of material each week

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
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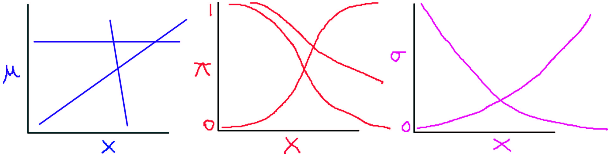
A Test: What's this?

$$b = (X'X)^{-1}X'y$$

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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&= \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}$$

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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*).
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-- Say hello in Haskell
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/* 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 $96_{mm} \times_{128}$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