

550.400: Mathematical Modeling and Consulting

Lecture Notes

Instructor:

Dr. N. H. Lee

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Outline

Preliminaries

Principles

Tools

Arguments from Scale

Graphical Methods

Basic Optimization

Programmings in this class

- \LaTeX :
 - moderncv
 - beamer
 - report
 - tikz
- R:
 - tikzDevice
 - lm
- Git
 - git gui

Tutorial: \LaTeX

\LaTeX is a computer language for writing a scholarly paper:

	HTML	\LaTeX
Code	<pre><html> . . . </html></pre>	<pre>\begin{document} . . . \end{document}</pre>
Compiler	Firefox and etc.	pdflatex and etc.
Output	Webpage	PDF file

Table: HTML vs \LaTeX

Tutorial: \LaTeX

- Demo on preparing a resume using \LaTeX `moderncv` package:
 - Install \LaTeX (MikTeX in Windows and MacTeX in OSX),
 - Download `moderncv` package files from the course folder,
 - Change file names to reflect you,
 - Edit the tex file,
 - Compile using your favorite \LaTeX editor,
 - Look at the resulting PDF file.

Tutorial: Git

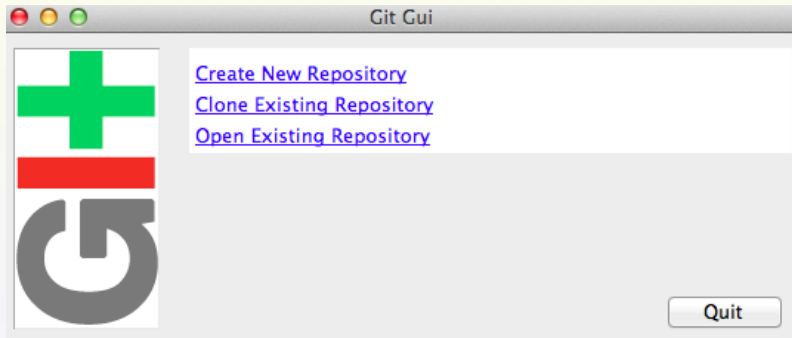
```
sudo apt-get install git
```



An alternative: `git gui`

Tutorial: Git

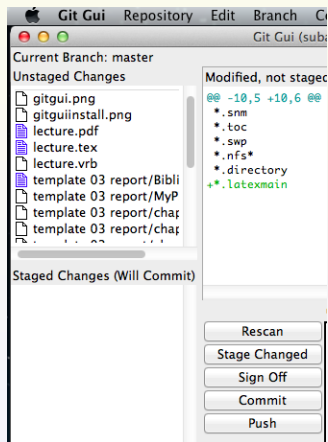
```
cd ~/
git clone http://cis.jhu.edu/~nhlee/550400.git
```



An alternative: `git gui`

Tutorial: Git

```
cd ~/550400.git  
git reset --hard HEAD  
git pull origin master
```

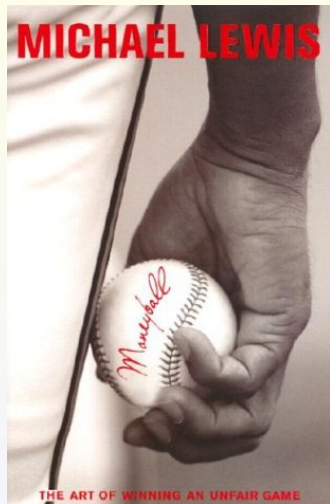


An alternative: git gui

Tutorial: Git

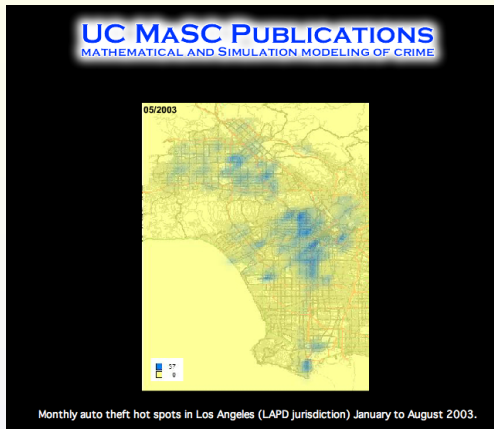
- Demo I: build a *personal* Git folder
 - Create some files
 - Stage the files
 - Commit the files
- Demo II: build the *course* Git folder

What is Mathematical Modeling?



Money Ball

What is Mathematical Modeling?



LAPD Fighting Crime with Math

What is Mathematical Modeling?

[NOVA Online | Trillion Dollar Bet](http://www.pbs.org/wgbh/nova/stockmarket/)

www.pbs.org/wgbh/nova/stockmarket/

Welcome to the companion Web site to "**Trillion Dollar Bet**," originally broadcast on February 8, 2000. The film tells the fascinating story of the invention of the ...

[The Formula that Shook The ...](#) - [Transcripts](#) - [A Trader's Lexicon](#) - [Resources](#)

[Videos for trillion dollar bet](#) - [Report videos](#)



[Trillion Dollar Bet 1 - YouTube](#)

youtube.com

Jan 8, 2009



[The Trillion Dollar Bet - YouTube](#)

youtube.com

Sep 15, 2007



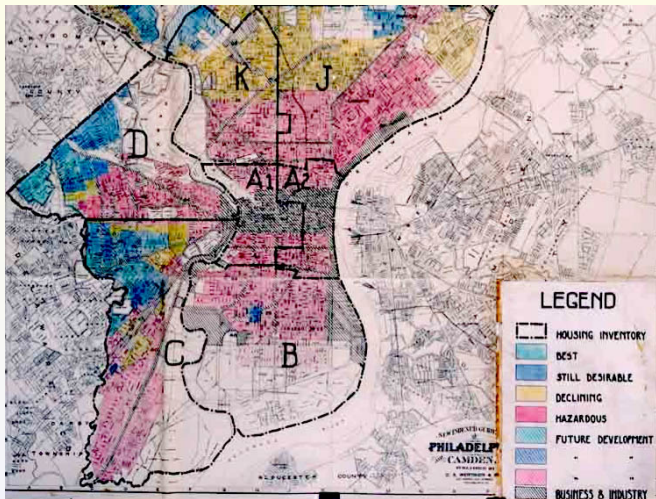
[The Midas Formula Stockmarket ...](#)

youtube.com

Aug 23, 2011

Trillion Dollar Bet

What is Mathematical Modeling?



Insurance Redlining

Example: Insurance Redlining

Frequently Recurring Elements of doing a Project in Industry:

1. Work Statement
2. Midterm Presentation
3. Progress Report
4. Final Presentation
5. Final Report

Seven Basic Principles

1. Set the context
2. Choose effective examples and analogies
3. Choose vocabulary to suit your readers
4. Decide whether to present #s in text, tables, or figures
5. Report and interpret #s in the text
6. Specify the direction *and* size of an association between variables
7. For many #s, summarize overall pattern

Creating Effective Tables

Example: Cost of Packaging

Example: The Nuclear Mission Arms Race

Example: Maintaining Inventory