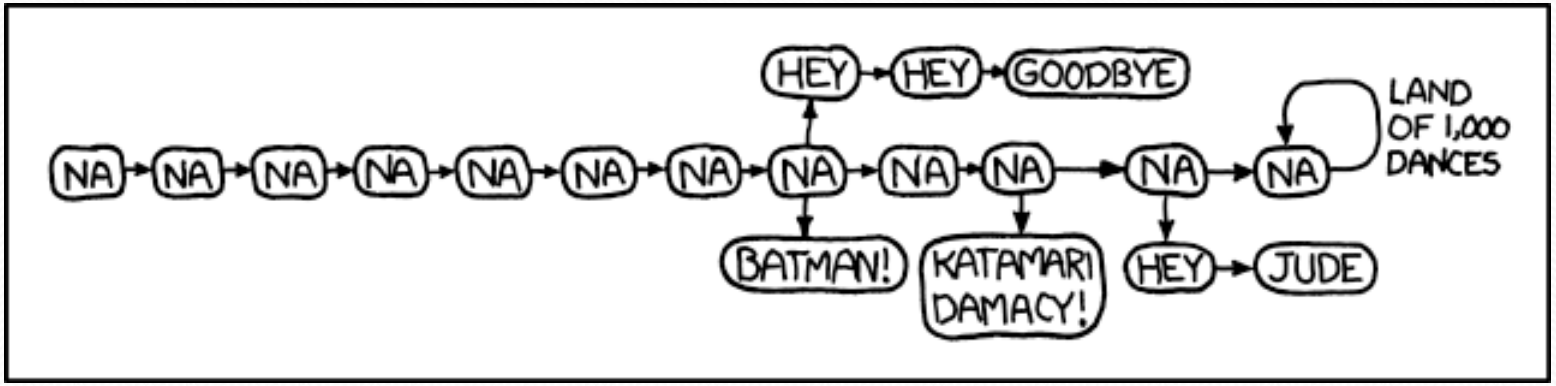
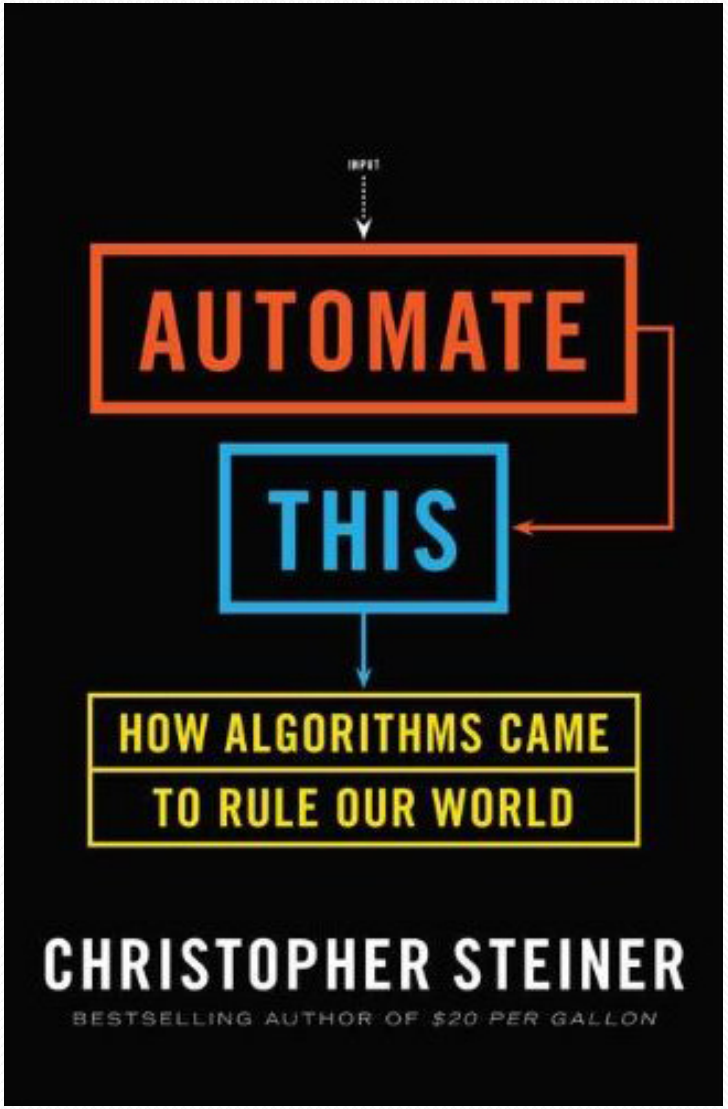
Goodbye, world!



Major themes

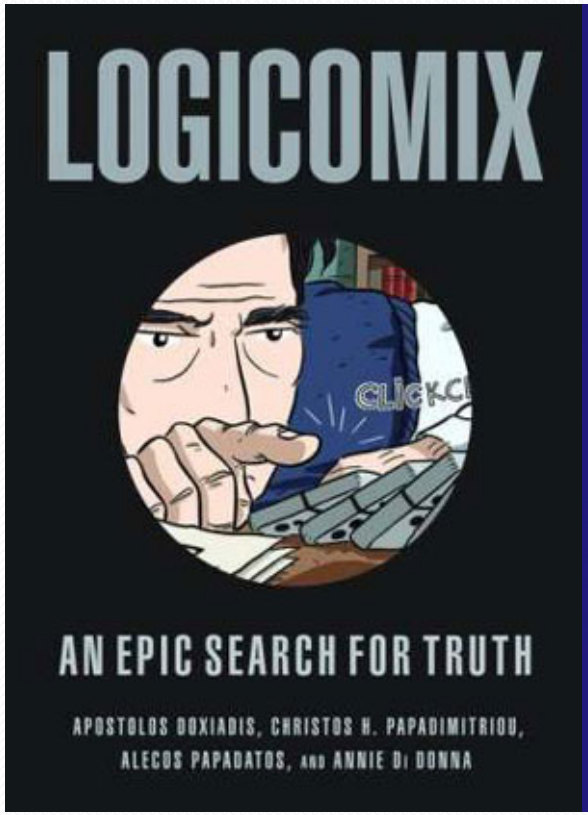
- Abstraction
  - Leverage existing components without understanding details
  - Create components that can be used as black boxes
- Design tradeoffs
  - Algorithm analysis - scalability and growth
  - Keeping code easy to read for maintainability
- Recursion
  - Reason about problems in terms of self-similarity
  - Write very short code to achieve complex behaviors
- Art – "A programmer who subconsciously views himself as an artist will enjoy what he does and will do it better." (Knuth)

Automate all the things

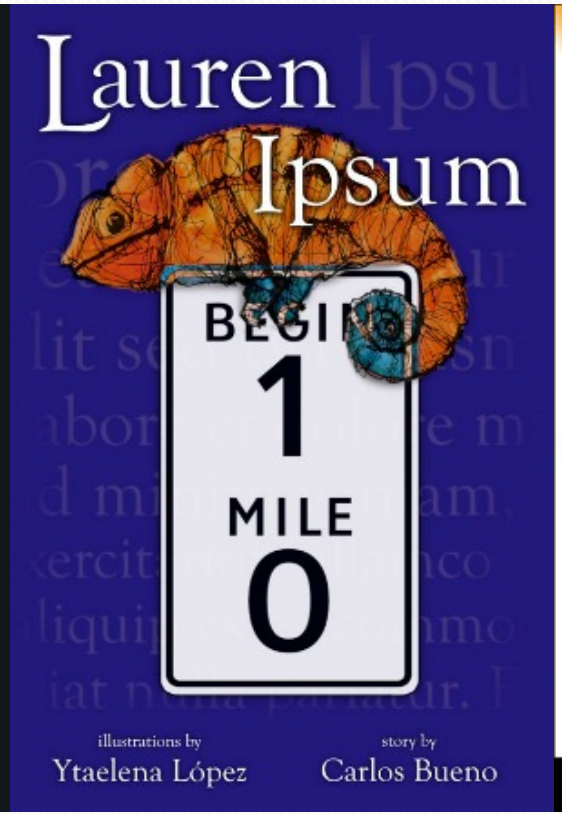


- Foreign policy: outcome prediction
- Law: evidence summary
- Medicine: smart diagnostics
- Music: hit identification
- Sports: superstar discovery
- Wall Street: high frequency trading

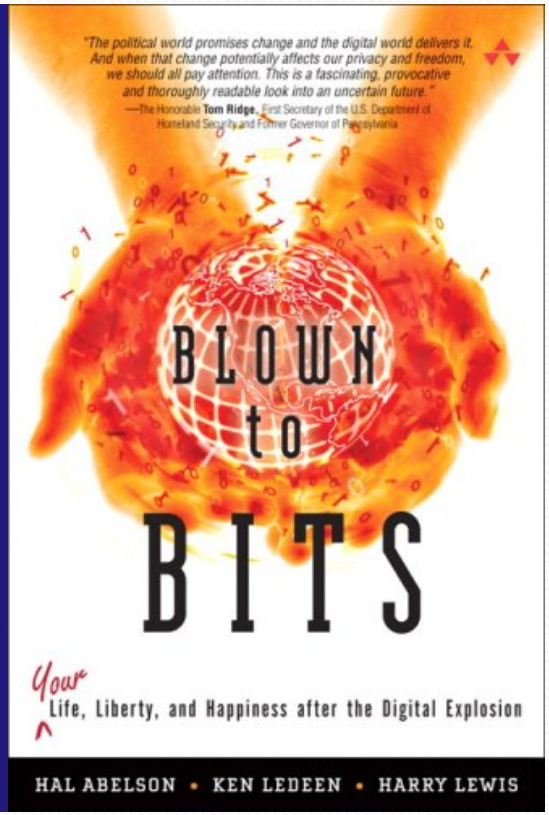
Explore Big Ideas



Historical context



Key algorithms



Privacy

Beyond programming

- Mind-controlled robots
  - http://www.youtube.com/watch?v=TQ7EOpPNQyw
- Muscle-controlled interfaces
  - http://www.youtube.com/watch?v=pktVSTwC8qo
- 3D models from pictures
  - http://www.youtube.com/watch?v=25Yifq70elY
- Face aging
  - http://www.youtube.com/watch?v=fLQtssJDMMc
- Animation
  - http://www.youtube.com/watch?v=b4kkPlLdMvI
- Security
  - http://www.pbs.org/wgbh/nova/tech/tadayoshi-kohno.html

What project?

- Little text-processing applications
  - identify lines above 100
  - remove line-breaks
- Add a GUI to the random sentence generator
- Automate chemistry, physics, calculus problems, etc
- Find quotes by keyword in books
- What are you currently doing that a computer could do?

What language?

- Expanding your Java knowledge with a project is valuable

- Pick a project, see what language is most appropriate
  - iOS: Objective-C
  - Android: Java
  - Client-side web: Javascript
  - Beautiful visuals: Processing
  - Quick data processing: Python
  - Embedded systems: C/C++

- Learn a new paradigm
  - Functional languages: Racket, Haskell (now, Java 8, too!)

Leveraging existing code

- Processing language
  - http://nlp.stanford.edu/software/
- Building games
  - http://lwjgl.org/
- Building games with physics
  - http://jbox2d.org/
- Processing biological data
  - http://biojava.org/wiki/Main_Page
- Accessing Facebook data
  - http://restfb.com/

Using the restFB API

- Add the restfb jar to your build path
  - In Eclipse, right click on your project > properties
  - In Java Build Path, Add JARs...

- Get an access token from the Facebook Graph API Explorer


MAGIC

Courses?

- CSE non-majors
  - CSE 154: Web Programming
  - CSE 373: Data Structures and Algorithms
  - CSE 374: Programming Concepts and Tools (C/C++, Linux, ...)
  - CSE 131: Digital Photography
  - CSE 460: Animation Capstone (open to all majors)
  - INFO, AMATH, DXARTS, ...
- CSE majors
  - CSE 311: (Mathematical) Foundations of Computing
  - CSE 332: Data Abstractions (Data Structures and Algorithms)
  - CSE 331: Software Design and Implementation
  - CSE 341: Programming Languages
  - CSE 344: Intro to Data Management (and databases)
  - CSE 351: Hardware/Software Interface

Weekly meetings

- Change – technologies for low-income regions
  - http://change.washington.edu/
- Dub – human-computer interaction and design
  - http://dub.washington.edu/

Job Growth, 2012-22 - U.S. Bureau of Labor Statistics

Computer Occupations = 71% of all STEM