SENIOR RESEARCH: SOME FINAL THOUGHTS

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How to read a research article

- What is the research problem, motivation, significance?
- What are the main findings?
- How do the authors try to convince you that these findings are valid? Experiments? Observational studies? Proofs?
- How does this work fit in the broader discipline?
- How can the work be followed up on?
- What are limitations of the work?

Writing a research paper, proposal, etc.

- Write with specificity and clarity
  - Background
  - Significance
  - Objective (can specifically state)
  - Results
  - Discussion
  - Etc
- Follow instructions and do not make any spelling or grammatical mistakes!

What did you guys learn?

- Data analysis
  - Analysis of Twitter Sentiment
  - Comparing proportions of cat-related tweets in the U.S
  - Comparing video game-related tweets across the U.S.
  - Predicting treatment response in multiple myeloma
  - Top 5 Genetic Mutations Found in Lung, Liver, and Breast Cancer
  - Predicting Recidivism Rates in Connecticut
  - Non-Intrusive apnea monitoring system utilizing a depth camera
- Gamification
  - Developing a Game to Teach Statistical Concepts using *R*
  - Development of an educational game for better understanding *for* loops
- Surveys – gauging "public" opinion
  - User comfort with targeted advertising
  - Preferences regarding web page design

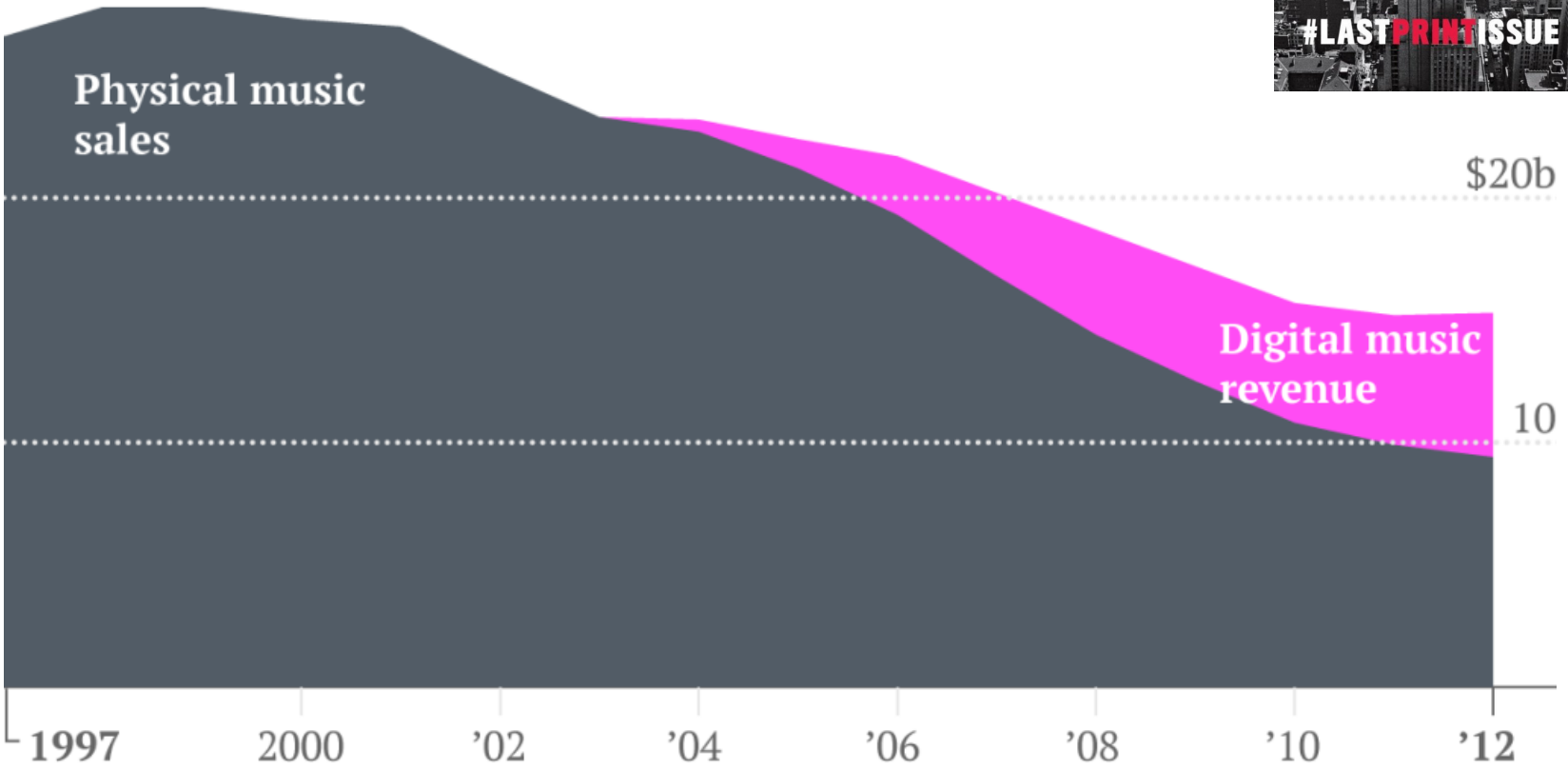
What did you guys learn (continued)?

- Algorithms
  - Cloud Based RNA Sequencing with IsoDE
  - Efficiency of Java hashcode algorithm
  - Edge Detection
  - Reverse Image Searching
  - Real-Time Dynamic Traffic Lights Control System
  - Comparing Different Improvements to Dijkstra's Shortest Path Algorithm
- Security
  - Cyber Security Awareness
  - Comparing the crack time for different encryption
  - What kind of data can you possibly intercept through a wireless network?
- Simulation
  - Real-Time Dynamic Traffic Lights Control System

CS and the Future: Random Thoughts

- How will facial recognition technology and self-driving cars impact our society?
  - http://www.npr.org/sections/alltechconsidered/2013/07/21/203273764/high-end-stores-use-facial-recognition-tools-to-spot-vips
  - http://www.citylab.com/tech/2012/03/what-intersections-would-look-world-driverless-cars/1377/
- What digital privacy rights do we have?
  - Do we have the "right to be forgotten?"
    - http://www.theguardian.com/technology/2015/feb/19/google-acknowledges-some-people-want-right-to-be-forgotten
- Recent Supreme Court cases:
  - Cell phone searches require a warrant (Riley vs. California)
    - http://www.cnn.com/2014/06/25/justice/supreme-court-cell-phones/
  - GPS tracking requires a warrant (U.S. vs. Jones)
    - http://www.washingtonpost.com/politics/supreme-court-warrants-needed-in-gps-tracking/2012/01/23/gIQAx7qGLQ_story.html

Information wants to be free



Note: Digital music revenue incldues downloads, subscription services, and advertisting revenue from free media-hosting sites such as YouTube. Revenue from concerts not included. All values in 2012 US dollars.

Ritchie King | Quartz

Data: International Federation of the Phonographic Industry

The end of code?

In traditional programming, an engineer writes explicit, step-by-step instructions for the computer to follow.

With machine learning, programmers don't encode computers with instructions. They *train* them.

If you want to teach a neural network to recognize a cat, for instance, you don't tell it to look for whiskers, ears, fur, and eyes. You simply show it thousands and thousands of photos of cats, and eventually it works things out.

If it keeps misclassifying foxes as cats, you don't rewrite the code. You just keep coaching it.

Above excerpt from: https://www.wired.com/2016/05/the-end-of-code/