

SENIOR RESEARCH: SOME FINAL THOUGHTS

Dr. Garrett Dancik

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 (may be specifically stated)
 - Results
 - Discussion
 - Etc
- Follow instructions and do not make any spelling or grammatical mistakes!

What did you guys learn?

- Machine Learning
 - *Using a Neural Network to Detect Alzheimer's Disease in Genetic Expression Data*
 - *Comparing Machine Learning Algorithms for Musical Key Recognition*
- Data Mining
 - *Mining for Jobs*
- Modeling and Simulation
 - *Evaluating Boarding Strategies for Two-Lane Commercial Airlines using Agent-Based Simulation*
 - *A Cellular Automata Random Number Generator*

What did you guys learn (continued)?

- Algorithms
 - *Implementation of Authentication Algorithm for Improving Security within a Radio Frequency Identification (RFID) System*
 - *Generalized Quantum Algorithm on Linear Systems*
- Virtual Reality
 - *A framework for memory testing with virtual reality*
- Method/Model/Framework comparisons
 - *Researching Which Database is better in Finding Gene types looking at MySQL Database and HBase*
 - *Comparison of Performance and Ease-of-Use for Different Web Development Environments*

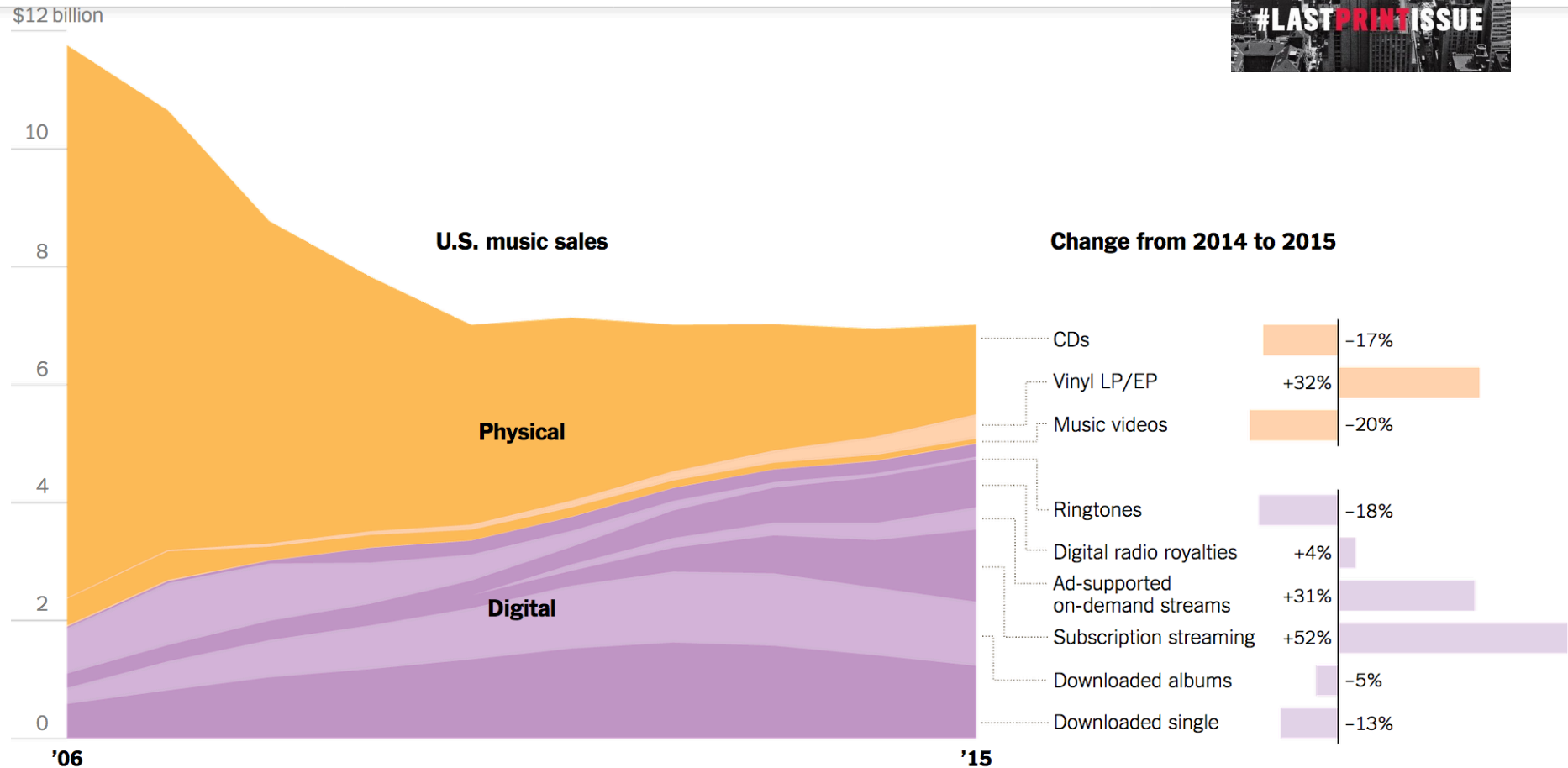
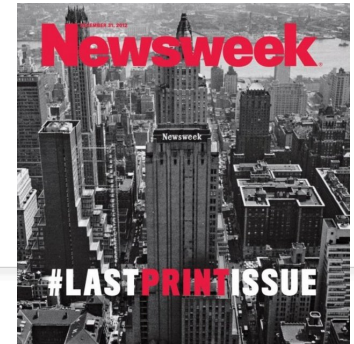
CS and the Future: Random Thoughts

- 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/>
- The future of fake news?
 - <http://futureoffakenews.com/>

CS and the Future: Random Thoughts

- 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>
- 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
 - Does the government need a warrant to access cell phone location information (Carpenter v. U.S.) (will be decided this term)
 - <https://www.npr.org/2017/11/29/567348000/justices-may-impose-new-limits-on-government-access-to-cellphone-data>

Information wants to be free



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.