

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

What did you guys learn?

- **Data Mining / Machine Learning / AI**

- *Predicting NHL Teams Winning Percentage Using Data Mining*
- *Developing a Neural Network for Image Classification to Break Image Selection reCAPTCHA Programs*
- *Plugging the Leaks: An Exhibition About the Dangers of Data Leakage*
- *Condition “Predicting” Prototype*

- **Algorithms**

- *A Comparison of Sorting Algorithms Performance when given Unusual Datasets*
- *Comparison of Shortest Path Algorithms for Network Routing Problems*

- **Imaging and Simulation**

- *Collision Detection Limitations in Modern Day 3D Video Games*
- *Image Scaling*
- *Using Cellular Automata to Model Evacuation and Locate Ideal Door Placement*

What did you guys learn?

- **Education and Information Technology**

- *Development of an Educational Computer Science Game Focused on Teaching Loop Structure and Functions*
- *The Development of a Field Simulator and Gravity Module*
- *A web-based learning system for students*
- *Experience Report for Microsoft's Quantum Katas without Explicit Guidance*
- *Feedback on information technology services at Eastern*

- **Database and Security**

- *Comparison of Query Performance between Two RDBMSs*
- *Is There a Major Advantage to Storing/Retrieving Data in a Database Rather than R?*
- *The Effects of a Virtual Private Network on Network Packets while interacting with Geo-Blocked Content*

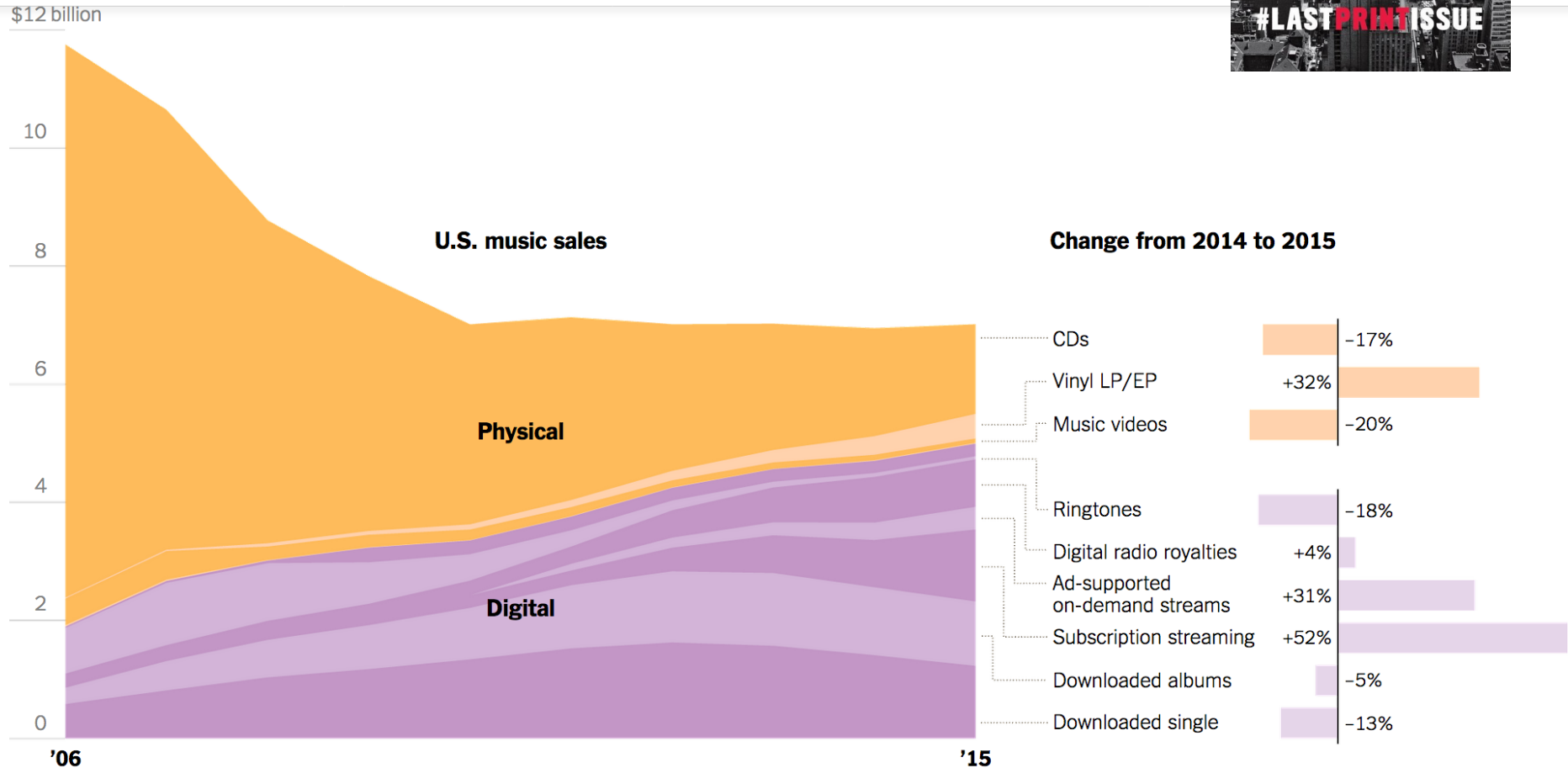
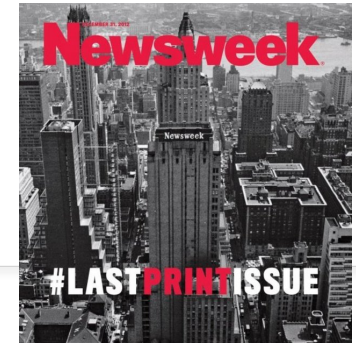
CS and the Future: Random Thoughts

- 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/>
 - Video: <https://www.youtube.com/watch?v=4pbAl40dK0A>
- Deep fakes and the future of fake news?
 - <http://futureoffakenews.com/videos.html>
 - <https://www.businessinsider.com/dangerous-deepfake-technology-spreading-cannot-be-stopped-2019-7>

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>
 - <https://www.theguardian.com/world/2019/nov/28/german-court-backs-murderers-right-to-be-forgotten-online>
- 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
 - A warrant is needed to access cell phone location information (Carpenter v. U.S.)
 - <https://www.newyorker.com/news/daily-comment/in-carpenter-the-supreme-court-rules-narrowly-for-privacy>

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.