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 & Data science
  - *A comparison of CNN and k-NN's performance in speed and accuracy for the image recognition of Pokémon cards*
  - *Convolutional Neural Network and k-Nearest Neighbor in the Typing of Skin Cancer*
  - *Using Machine Learning Algorithms to Analyze the Predictability of Song Popularity*
  - *Sentimental Analysis for Aggressive Speech and Bot Network Detection on Twitter*
  - *Twitch Analytics: Streaming Trends*
  - *Using Metadata and Search Volume Data to Create A Box Office Prediction Model*

What did you guys learn (continued)?

- Digital privacy and computer security
  - *Comparison of Advertising Networks and Trackers Across Different Websites*
  - *Hidden in Plain Sight: Analyzing Web Trackers and Their Affiliations*
  - *Third party cookies*
  - *Security competency survey*
  - *Developing a Permissioned Blockchain Voting Application*
- Software applications
  - *Improving the Efficiency of a Cam Profile with Computer Analysis & Design Software*
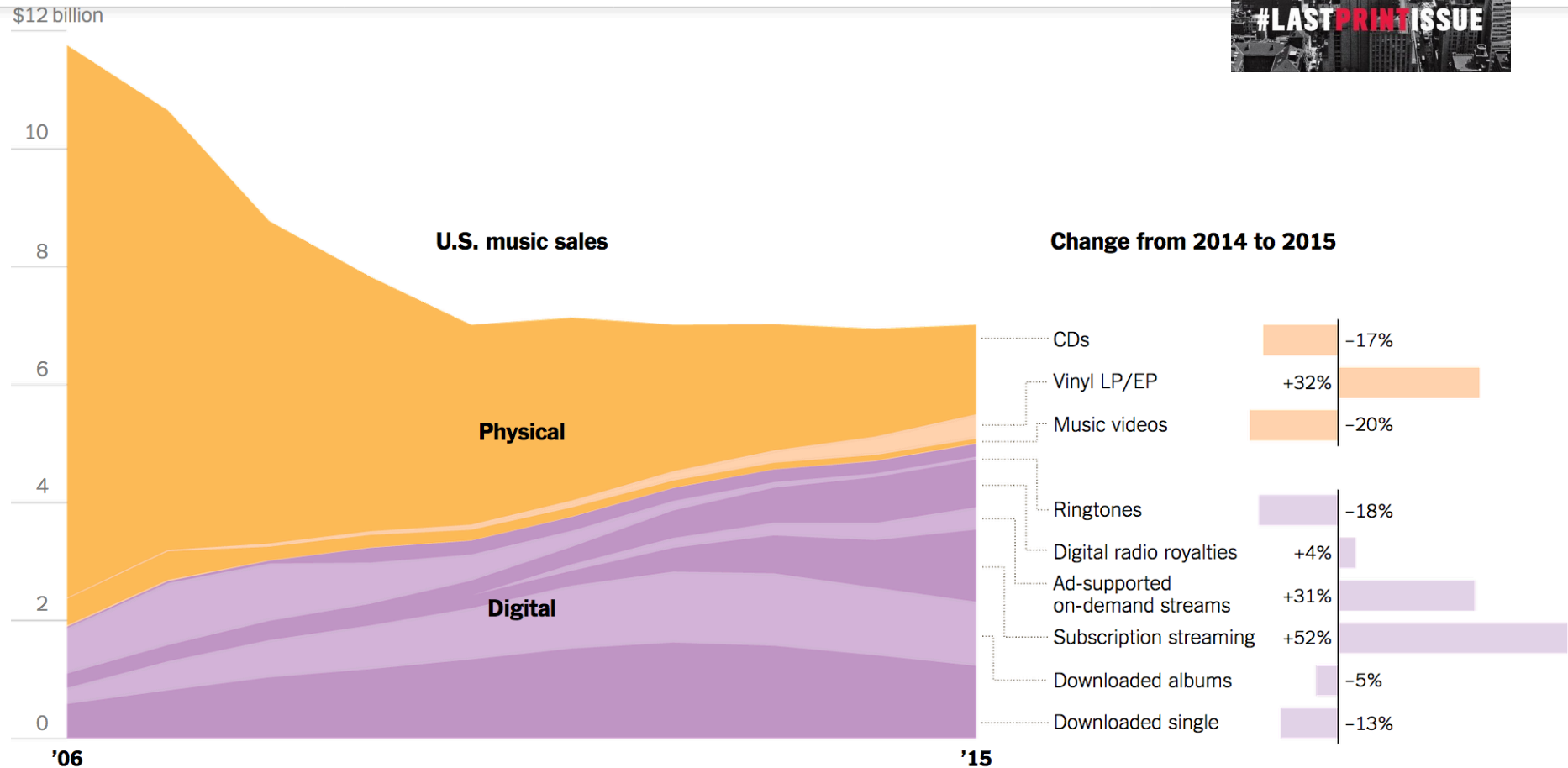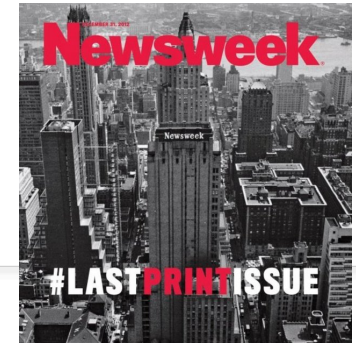 - *A comparison of programming languages using Bioinformatics*

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=4pbAI40dK0A

- 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

U.S. music sales, 2006 to 2015, and change from 2014 to 2015:

	Change from 2014 to 2015
CDs	−17%
Vinyl LP/EP	+32%
Music videos	−20%
Ringtones	−18%
Digital radio royalties	+4%
Ad-supported on-demand streams	+31%
Subscription streaming	+52%
Downloaded albums	−5%
Downloaded single	−13%

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/