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 explicitly stated)
  - Results
  - Discussion
  - Etc
- Follow instructions and do not make any spelling or grammatical mistakes!

What did you guys learn?

- Artificial Intelligence
  - *Image Recognition Using the MNIST Dataset of Handwritten Digits*
  - *Comparison of neural network and supervised learning for image classification*
  - *Measuring the Accuracy of Code Generated by ChatGPT in Python3*
  - *Investigating ChatGPT Bias*
  - *Unraveling the Perceptions of Artificial Intelligence*
  - *Surveying ECSU Computer-Science Students on Artificial Intelligence in Employment*

- Bioinformatics
  - *Analyzing Science Articles: Identifying Genes Associated with Brain Tumors*
  - *What Makes Extremophiles So Extreme?*

What did you guys learn?

- Computer Science Internships & Jobs
  - *Entry-Level Computer Science Job Postings in New York, Massachusetts, and Connecticut: A study on Job Requirements and Salary Trends*
  - *A Survey of Eastern Connecticut State University Student Experience with Computer Science Internships*
  - *Changes in Working Locations*
- Cybersecurity
  - *Mock Antivirus Software With Signature-Based Detection and the Impact of Obfuscation*
  - *Comparison of Bcrypt and MD5 Encryption*

What did you guys learn?

- Data Analytics
  - *Determining Whether NFL Combine Data is Indicative of League Success*
  - *YouTube Statistics for 2023: Using Data Mining Techniques to Understand the Current Use and Status of YouTube*

- Video Games
  - *Idle Game to Test True Spending Awareness in Abstracted Versus Non-Abstracted Microtransactions*

What did you guys learn?

- Databases
  - *Comparative Analysis of RESTful and GraphQL API Architecture Types on Standard CRU Web Operations*
  - *Database Comparison: MongoDB vs MySQL*

- Software Engineering
  - *A Comparative Analysis of App Launch Time Performance Between Native and Cross-Platform Applications*
  - *Performance Comparison of MongoDB vs MySQL Databases*
  - *Investigating the Power Efficiency of OpenFaaS*

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
  - https://www.nytimes.com/2020/01/18/technology/clearview-privacy-facial-recognition.html
  - 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?
  - https://www.youtube.com/watch?v=AmUC4m6w1wo
  - https://www.businessinsider.com/dangerous-deepfake-technology-spreading-cannot-be-stopped-2019-7
  - Watermarks may not help: https://www.cs.umd.edu/article/2023/10/researchers-say-current-ai-watermarks-are-trivial-remove

CS and the Future: Random Thoughts

- Digital privacy rights
  - 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

  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.scotusblog.com/2018/06/opinion-analysis-court-holds-that-police-will-generally-need-a-warrant-for-cellphone-location-information/
  - Geofence warrants: https://www.wired.co.uk/article/fbi-google-geofence-warrant-january-6

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/

The end of programmers?

- GPT-3 is a neural network language trained on Common Crawl (over 3.25 billion web pages), and all of English language Wikipedia. The model has 175 billion parameters
  - https://arxiv.org/abs/2005.14165
- It has many applications, including Q&A, language translation, and code generation
  - https://platform.openai.com/examples/%20SQL%20generation
  - https://twitter.com/sharifshameem/status/1282676454690451457?s=20
- Many experts do *not* believe that ChatGPT replacing programmers
  - https://www.businessinsider.com/will-chatgpt-replace-programmers-engineers-developers-tech-jobs-easier-2023-3