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
  - *Using AI for the Generation of XML/XSLT*
  - *Plastic Recognition using Neural Networks*
  - *Cross-project software defect prediction via Neural Network*
  - *Convolutional Neural Network Training with Computer Rendered images*
  - *Analysis of the Effect of Prompt Specificity on Github Copilot*
- Education
  - *The Perception of Intelligent Tutoring Systems in Computer Science: Exploring the Potential*
  - *Effects of Computer Science Coursework on Problem Solving*

What did you guys learn?

- Performance comparison
  - *A Comparative Analysis of Quick Sort and Bubble Sort Algorithms*
  - *Relational (SQL) vs Non-Relational (NoSQL) Databases: Which DB is most efficient for storing housing data?*
  - *Performance Test of MYSQL vs NOSQL Databases*
  - *Performance Comparison of Spectral Modeling Synthesis on GPU*
  - *Performance Comparison of the MEAN and MERN Technical Stacks*

What did you guys learn?

- Cybersecurity
  - *Testing a Computer Virus Detection Program*
  - *Exploring ways of Password Cracking: Different Techniques and Tools*
  - *Comparative Analysis of Ad-Blocker Effectiveness for Google Chrome*
  - *Comparing Hashing Algorithms with Password Cracking*
  - *Speed Comparison of Conventional Image Encryption Algorithms*

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

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://openai.com/blog/gpt-3-apps/
- SQL generation
  - https://blog.seekwell.io/gpt3
- HTML/CSS generation
  - https://twitter.com/sharifshameem/status/1282676454690451457?s=20