CSCI 15: AN INTRODUCTION TO THE MODERN INTERNET

Lecture 11: AI and Deep Learning

ADMIN

- Email me your final paper by midnight tomorrow

- Questions?

TODAY

- Lots of information about you online

- Questions about privacy

- How does a computer analyze you? Analyze the content you upload?

IS IT A TREE?

- How can a computer figure out if a picture is of a tree?

IS IT A TREE?

- How can a computer figure out if a picture is of a tree?
  - If no green pixels: not tree

IS IT A TREE?

- How can a computer figure out if a picture is of a tree?
  - If no green pixels: not tree

IS IT A TREE?

- How can a computer figure out if a picture is of a tree?
  - If no green pixels: not tree
  - If green pixels are spread out: not tree
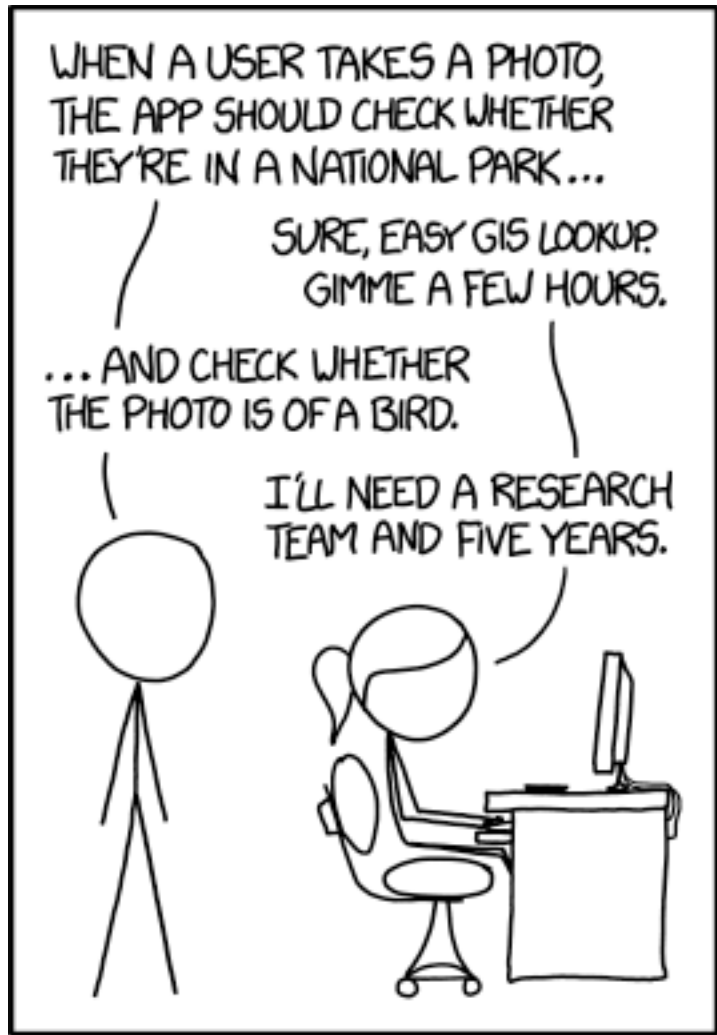
IS IT A TREE?

- How can a computer figure out if a picture is of a tree?
  - If no green pixels: not tree
  - If green pixels are spread out: not tree
  - If clump of greenish pixels: tree

IS IT A TREE?

- This is never going to work.

[paraphrasing]
Computers can't really analyze what's in an image

xkcd.com Sep 24, 2014

CLASSICAL ALGORITHMS

- Sequence of steps to solve a problem

- Works well for "computer"-y tasks

- The social web is "human"-y

IDENTIFYING TREES

HOW DO YOU IDENTIFY A TREE?

- Sequence of somewhat-unclear steps
- "Fuzzy" view of the image

HOW DID YOU LEARN TO DO THIS?

- Looked at a lot of things
- Someone told you if they were "tree" or "not tree"

Not tree.

CAN MACHINES LEARN LIKE PEOPLE?

- Hard to "describe" things to a machine

- Lots and lots more information
  - Can look at billions of pictures with millions of pixels

UNSUPERVISED LEARNING

- Machine does something

- Learns if it "won" or "lost"

UNSUPERVISED LEARNING

- If properly done(!)

- With very little input, can learn things that computers would never be able to do otherwise

ALPHAGO

- In 2016, first computer to beat a professional human player in a regulation match

REACTION

- "AlphaGo seems to have totally original moves it creates itself."

- AlphaGo trained on human games. Is that fair? Or is it just copying human moves with perfect memory?

ALPHAZERO

- Successor to AlphaGo

- Did not use human games to train
  - Played against itself, "win" or "lose" after each game
  - Played for three days

- Beat AlphaGo 100 games to 0.

WHAT CAN THESE COMPUTERS LEARN?

- Games

- Content of a picture

- Information about you!
  - Social network
  - Internet activity
  - Searches, etc.
  - Differential privacy is important!

WHY NOW???

- Couldn't we have done this in like 1992? Why is this revolution in the last 3 years?

- Better methods

- Hardware insights

DOWNSIDES OF THIS APPROACH?

- Computer cannot "explain" what it is doing

- Nor can we

- Problems?
  - Is the answer correct? When?
  - What about bias?

BIAS

QUARTZ

LATEST   OBSESSIONS   FEATURED

EMAILS   EDITIONS   BECOME A MEMBER

ROBOT INDEMNITY

Companies are on the hook if their hiring algorithms are biased

October 22, 2018

By **Dave Gershgorn**
Artificial intelligence reporter

HOW CAN A COMPUTER LEARN LIKE A HUMAN?

- https://www.youtube.com/watch?v=aircAruvnKk

WRAPUP

- Thanks for participating!

- Please fill out course survey (for me)
  - Help in deciding what I should change for the future

- Not in form: please address technical content
  - More? Less?