

Life After CS106A

Lecture 26

CS106A, Summer 2019

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With inspiration from slides created by Keith Schwarz, Mehran Sahami, Eric Roberts, Stuart Reges, Chris Piech & others.



Announcements

- Assignment 6 due Tuesday at 10AM
 - No late days may be used
- No section next week, but still Office Hours & LaIR
- Final Exam
 - next Saturday, August 17th 8:30-11:30AM
 - Monday & Tuesday lectures: **Final Review**
- **Blank code for today is on the website!**

Plan for Today

- Next Classes & Resources
- Programming Languages
- Automation
- Machine Learning & NLP



Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

Computational
Biology

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

The Internet

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

ML / AI

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

Datascience

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

Human-Computer
Interaction

Next Classes at Stanford

CS106A



CS106B



CS109 +
CS103



Further Study

And More!

Disclaimer

All of the following non-Stanford resources and recommendations are personal recommendations of the instructors and do not necessarily represent the opinions of Stanford University.

Non-Stanford Resources

A Few Free Online Programming Classes:

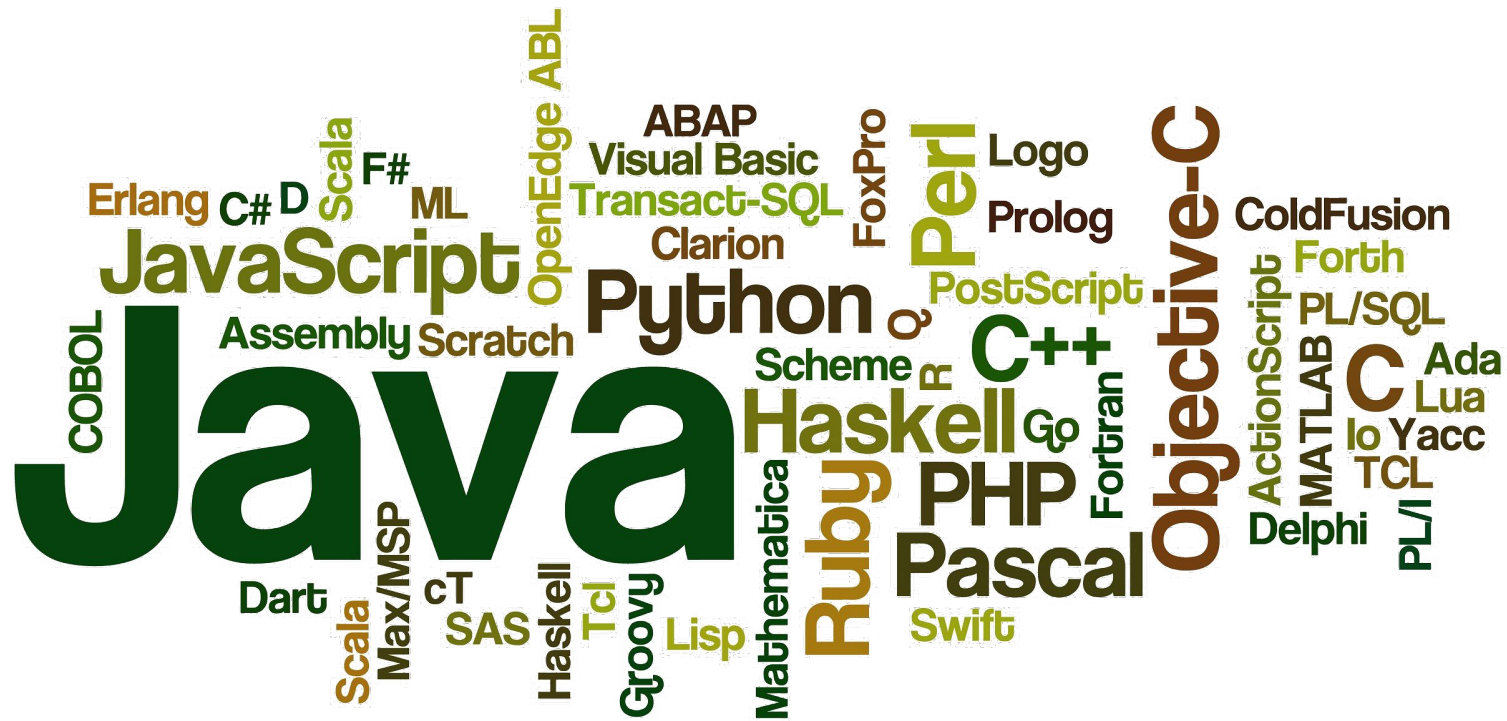
- [Codecademy](#)
- [Khan Academy: Computing Lessons](#)

A Few Free Coding Challenge Websites:

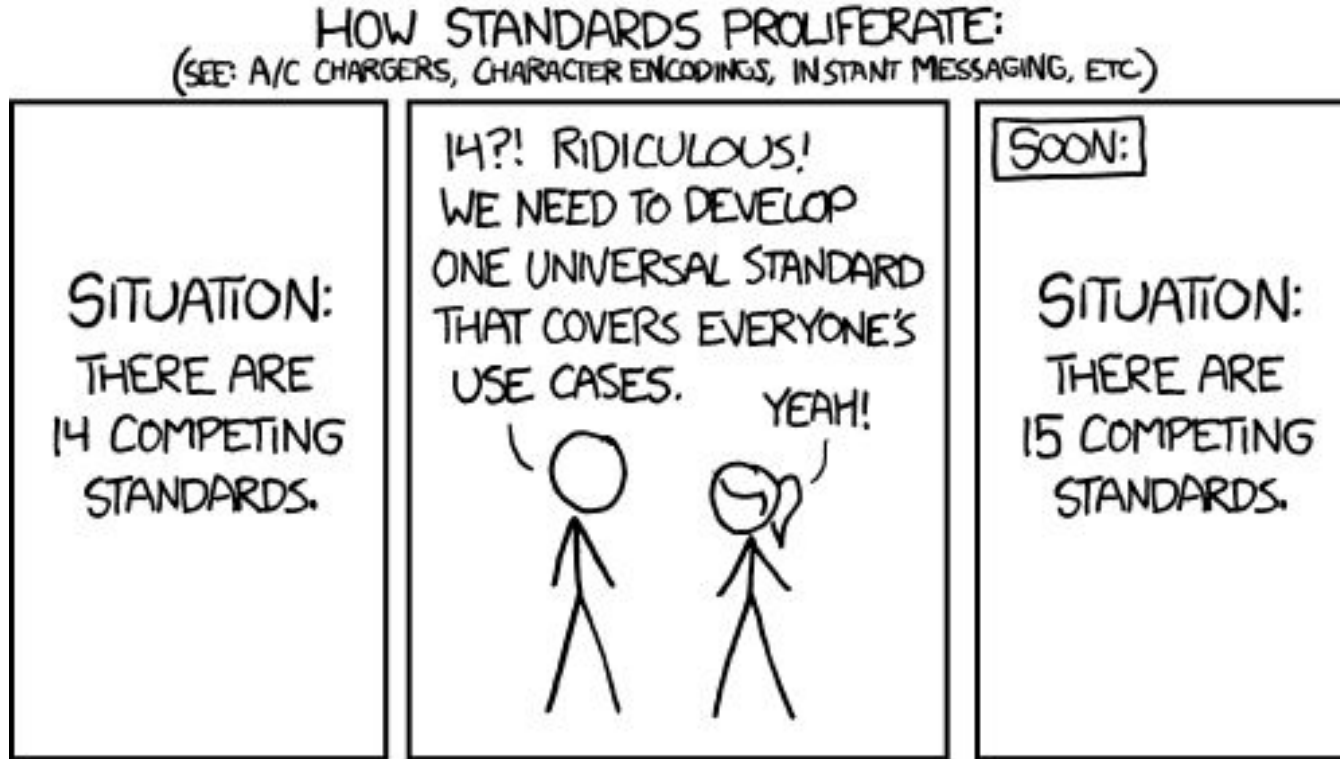
- [CodeStepByStep](#)
- [edabit](#)
- [Project Euler problems](#)

*And even more... explore on your own and see what you find!

Programming Languages



Programming Languages



Java

```
ArrayList<Double> evens = new ArrayList<>();  
for(int i = 0; i < 100; i++) {  
    if(i % 2 == 0) {  
        evens.add(i);  
    }  
}  
println(evens);
```

Prints [0, 2, 4, 6, 8, 10, 12, ...]

C++

```
Vector evens;  
for(int i = 0; i < 100; i++) {  
    if(i % 2 == 0) {  
        evens.add(i);  
    }  
}  
cout << evens << endl;
```

Prints [0, 2, 4, 6, 8, 10, 12, ...]

Python

```
evens = []  
for i in range(100):  
    if i % 2 == 0:  
        evens.append(i)  
print(evens)
```

Prints [0, 2, 4, 6, 8, 10, 12, ...]

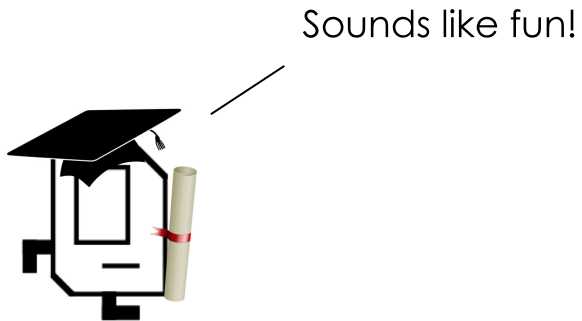
Javascript

```
var evens = []  
for(var i = 0; i < 100; i++) {  
    if(i % 2 == 0) {  
        evens.push(i)  
    }  
}  
console.log(evens)
```

Prints [0, 2, 4, 6, 8, 10, 12, ...]

What Else is Out There?

We wanted to show you some other super cool examples of what code can do!



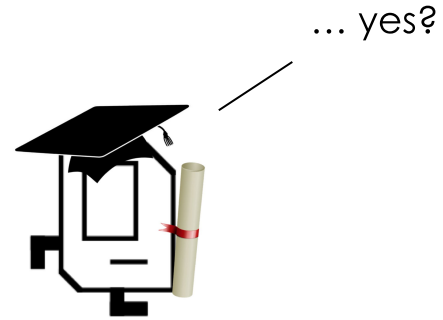
Automation

Many things are automated as to minimize the need for human intervention!

Can automation help a customer?

Can automation clean your room?

Can automation open and edit files on your computer?



Demo

PyAutoGui (Python) Hello Code

```
import pyautogui

# Enables failsafe
pyautogui.PAUSE = 1
pyautogui.FAILSAFE = True

pyautogui.click()

# Use spotlight to open Chrome
pyautogui.hotkey('command', ' ')
pyautogui.typewrite('Hello World!', interval=0.1)
```

Automation with PyAutoGui

PyAutoGui is a python library that allows you to automate different computer actions!

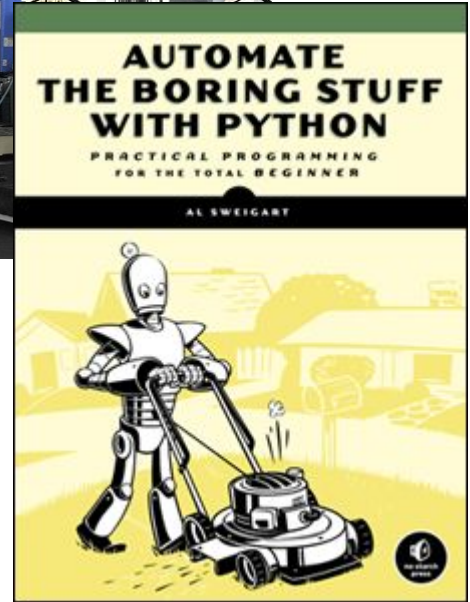
Using a few lines of code, you can automate clicks, typing, keyboard shortcuts, and more!

[Installation Instructions here](#)

[“Cheat Sheet” here](#)

Demo++

What Else Do We Automate?



Machine Learning

What is Machine Learning?



Machine Learning

The art & science of developing intelligent agents.

Machine Learning

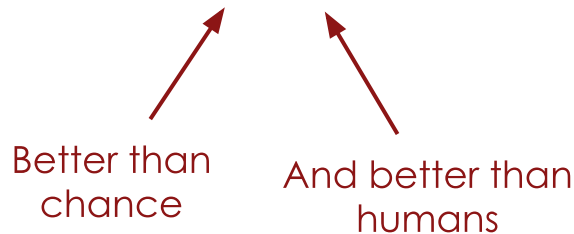
The art & science of developing intelligent agents.



Better than
chance

Machine Learning

The art & science of developing intelligent agents.



Machine Learning



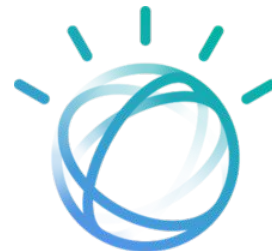
Milestones & Applications



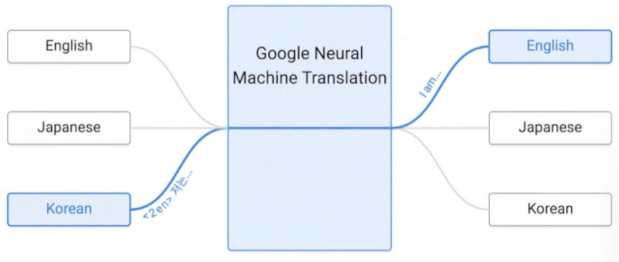
Deep Blue (1997)



Email Spam Filtering



Watson (2011)



Neural Machine Translation (2016)

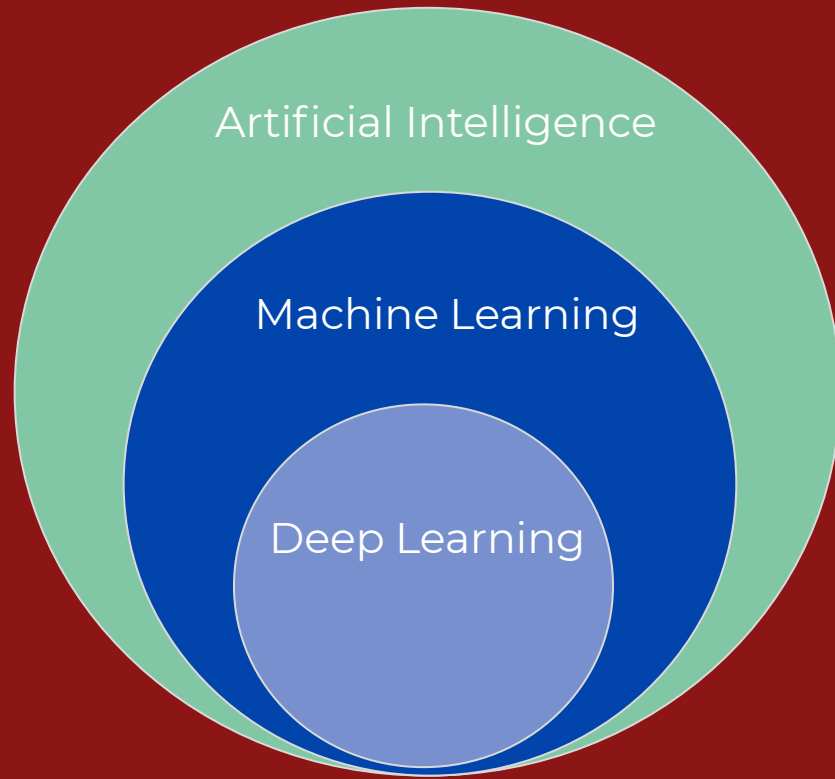


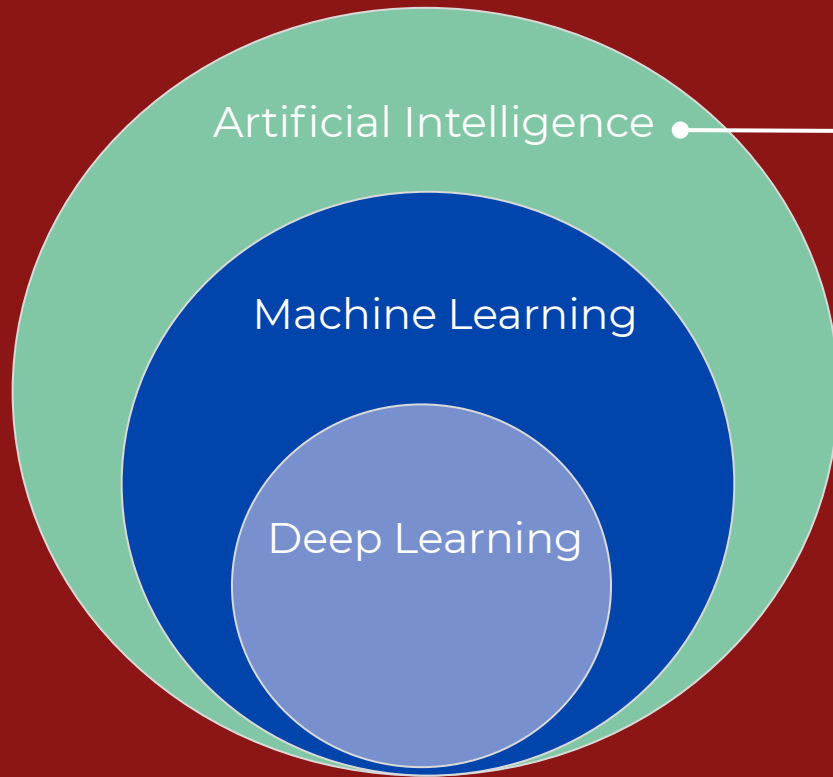
Alpha Go (2015-16)

Artificial Intelligence

Machine Learning

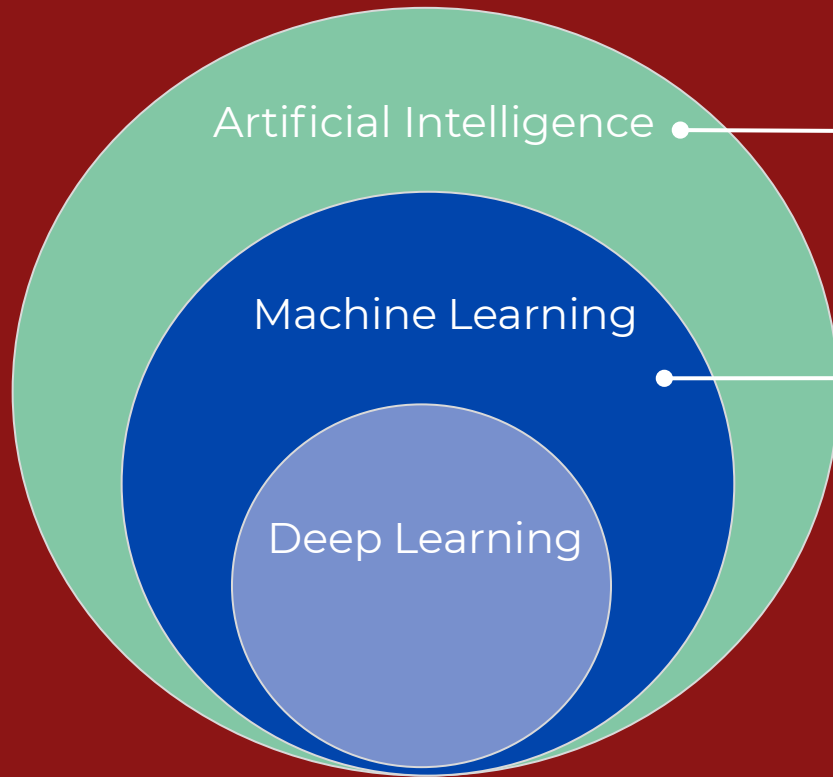
Deep Learning





Techniques which enable computers to mimic human behavior

→ *Deep Blue chess computer*



Artificial Intelligence

Techniques which enable computers to mimic human behavior

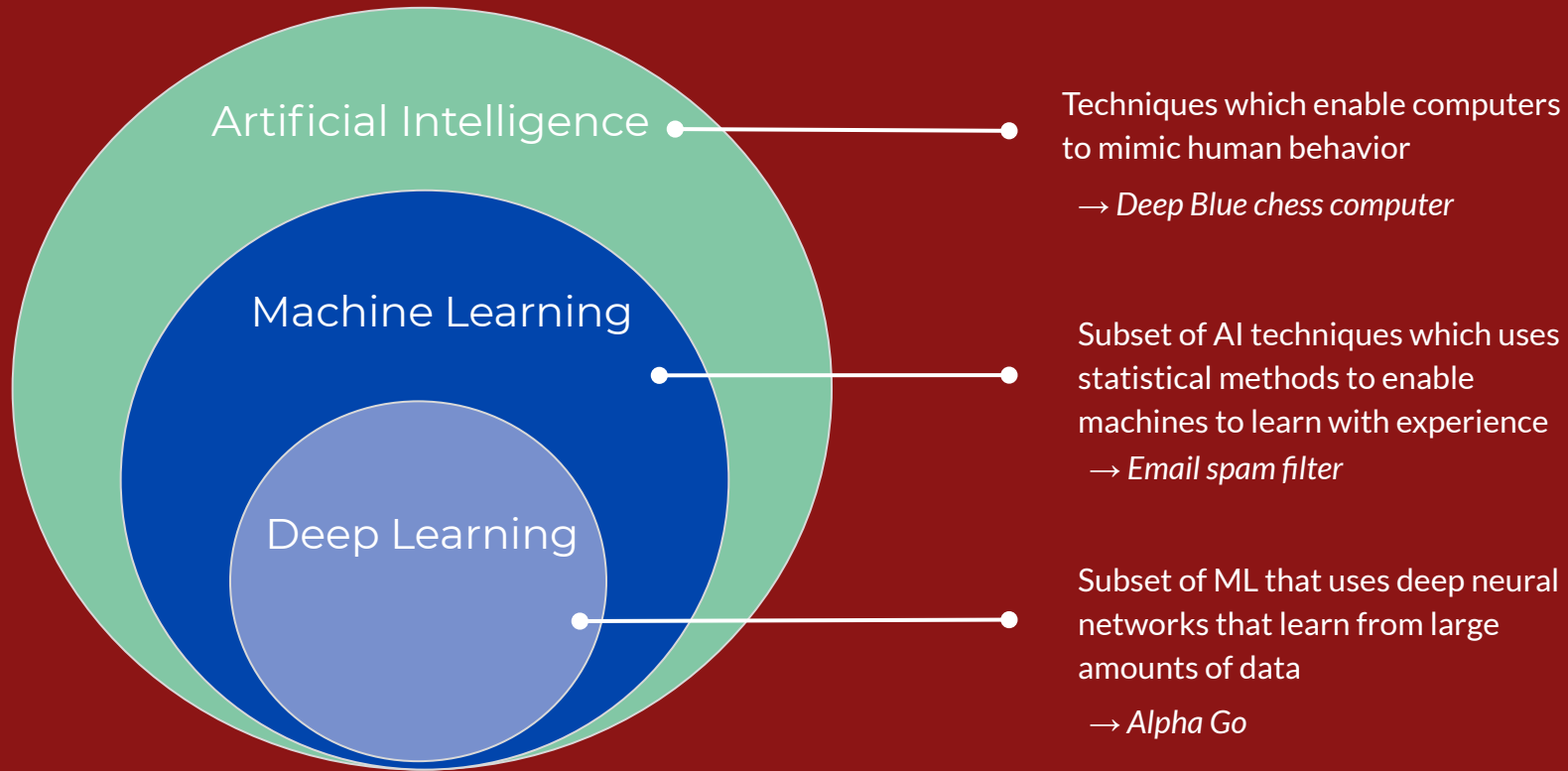
→ *Deep Blue chess computer*

Machine Learning

Subset of AI techniques which uses statistical methods to enable machines to learn with experience

→ *Email spam filter*

Deep Learning



Why Not ML and AI ALL the Time?

Sounds good to me... <3



Why Not ML and AI ALL the Time?



Oh... :((



Why Not ML and AI ALL the Time?

Amazon scraps secret AI recruiting tool that showed bias against women

Jeffrey Dastin

8 MIN READ



SAN FRANCISCO (Reuters) - Amazon.com Inc's ([AMZN.O](#)) machine-learning specialists uncovered a big problem: their new recruiting engine did not like women.

Why Not ML and AI ALL the Time?

Computer Science > Computation and Language

Man is to Computer Programmer as Woman is to Homemaker? Debiasing Word Embeddings

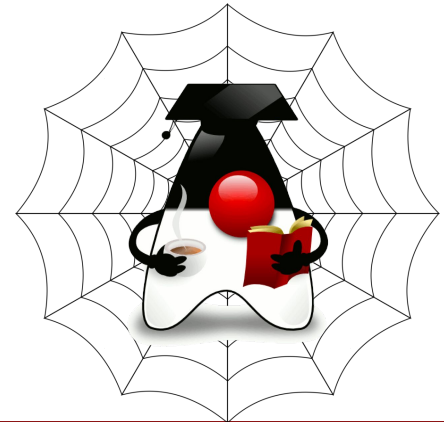
Microsoft is deleting its AI chatbot's incredibly racist tweets

What does this mean?

What does this mean?

These are great tools, but “**with great power comes great responsibility**”.

It's important to be able to think critically about these technologies, especially if you're developing them!

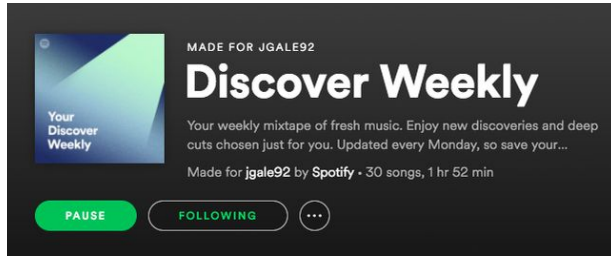


Introducing... NLP

Natural Language Processing (NLP) is a large branch of Artificial Intelligence.

Helps computers understand, interpret, and manipulate human language.

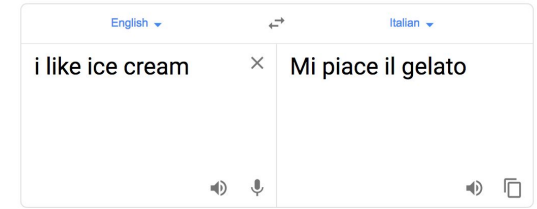
NLP



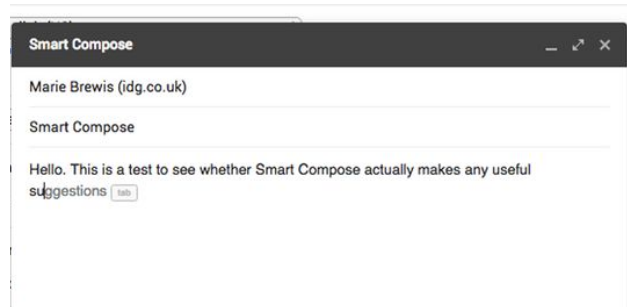
Recommendation Systems



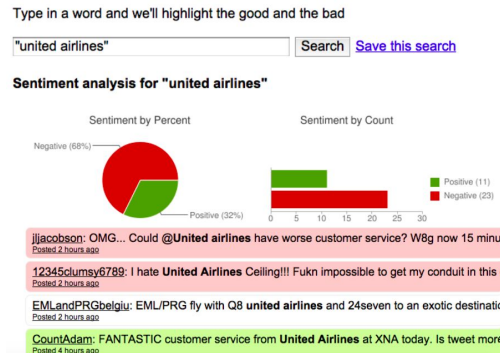
Question Answering



Translation



Text Generation



Sentiment Analysis



Digital Assistants 45

Chatbot Demo

TalkToMe Starter Code

```
import java.util.Scanner;
import java.util.regex.*;

public class TalkToMe{
    public static void main(String[] args) {
        // String to be scanned to find the pattern.
        String nameString = "[Mm]y name is ([a-zA-Z]+).?";
        Scanner console = new Scanner(System.in);

        System.out.println("Talk to me!");
        String line = console.nextLine();
        while(!line.equals("")) {

            // Create a Pattern object
            Pattern namePattern = Pattern.compile(nameString);

            // Now create matcher object to detect matches
            Matcher nameMatches = namePattern.matcher(line);
            if (nameMatches.find( )) {
                // .group(1) gives you the found name
                String name = nameMatches.group(1);
                System.out.println("Hello " + name);
            }else {
                System.out.println("Hmmm... okay.");
            }

            System.out.println("Talk to me!");
            line = console.nextLine();
        }

        console.close();
    }
}
```

Want to Learn More about Regexs?

Here's a website with lessons and challenges to create more complex regular expressions!

[RegexOne: Challenges and Lessons](#)

A Fun Machine Learning Example

Teachable Machine

Can we use Machine Learning to teach a computer the moves in Rock Paper Scissors?

<https://teachablemachine.withgoogle.com/>

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See you next week for the Review Lectures!