Introduction to Machine Learning

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My Research

"To understand the fundamental principles of learning from data and use them to develop algorithms that can learn like living beings."

Bridging the gap between
"algorithms" and "living-beings".

Goal of “Intro to ML”

- By the end of this part, you should be able to
  - Define ML and discuss some of its goals
  - Learn a few success cases of ML application
  - Learn a few examples where ML fails

Machine learning

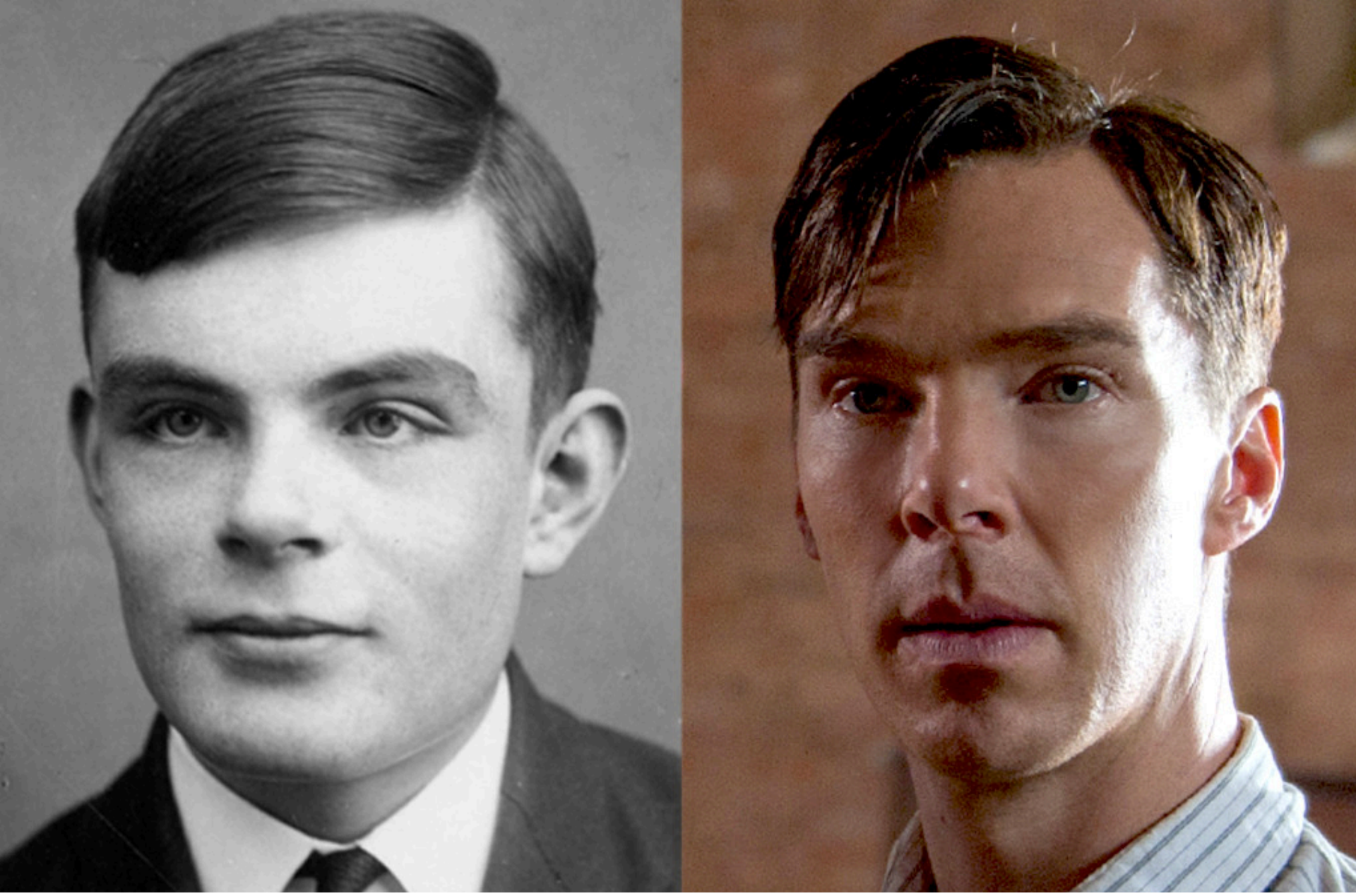
Making a computer intelligent
without explicitly programming it

Microsoft's John Platt Talks About Artificial Intelligence

AI is “software trying to emulate human minds”

ML is to “create that software from data”

Video link http://channel9.msdn.com/Series/Microsoft-Research-Luminaries/John-Platt-on-AI-Cortana-and-Project-Adam



60’s Computer Revolution

AI brought a lot of hope

If-then-else == Intelligence

If-then-else << **Intelligence**

“Learn” to generate “intelligent” sofware

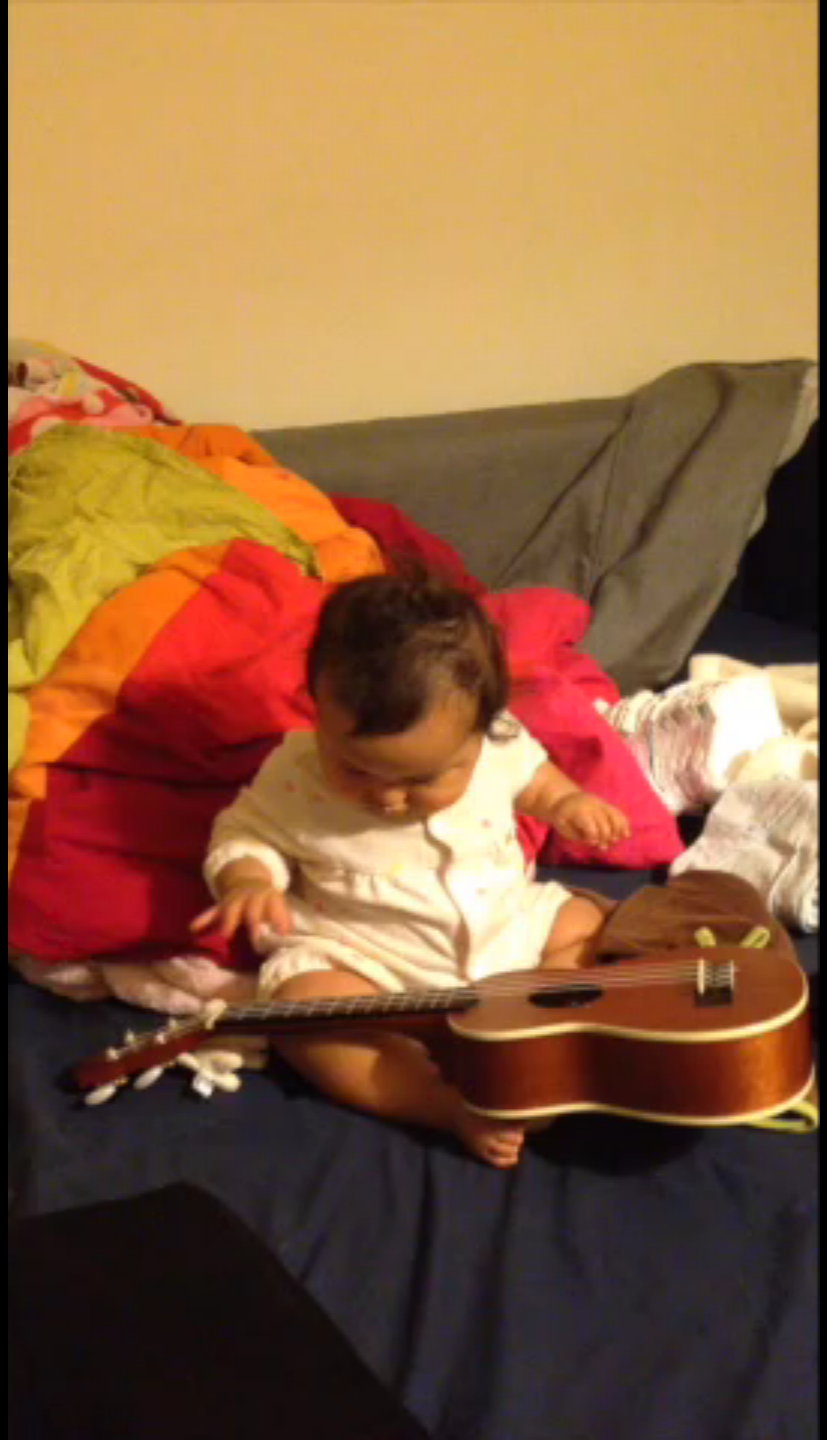
Making a computer intelligent
without explicitly programming it

Inspired by the learning process of living beings

From humans… to crows…

to rats… to cockroaches

6 months old, learning about ukulele



At the age of

12 months,

finished learning.

At 14 months, learning about guitars.

Learning from experience

Learning from ~~experience~~ data

Success Stories

amazon.com

Customers Who Bought This Item Also Bought

[30 Rock: Seasons 1-3](#) DVD ~ Tracy Morgan

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$60.49

[Desperate Housewives: The Complete Seasons 1-5](#) DVD ~ Teri Hatcher

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[Scrubs: The Complete Seasons 1-8](#) DVD ~ Zach Braff

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$148.49

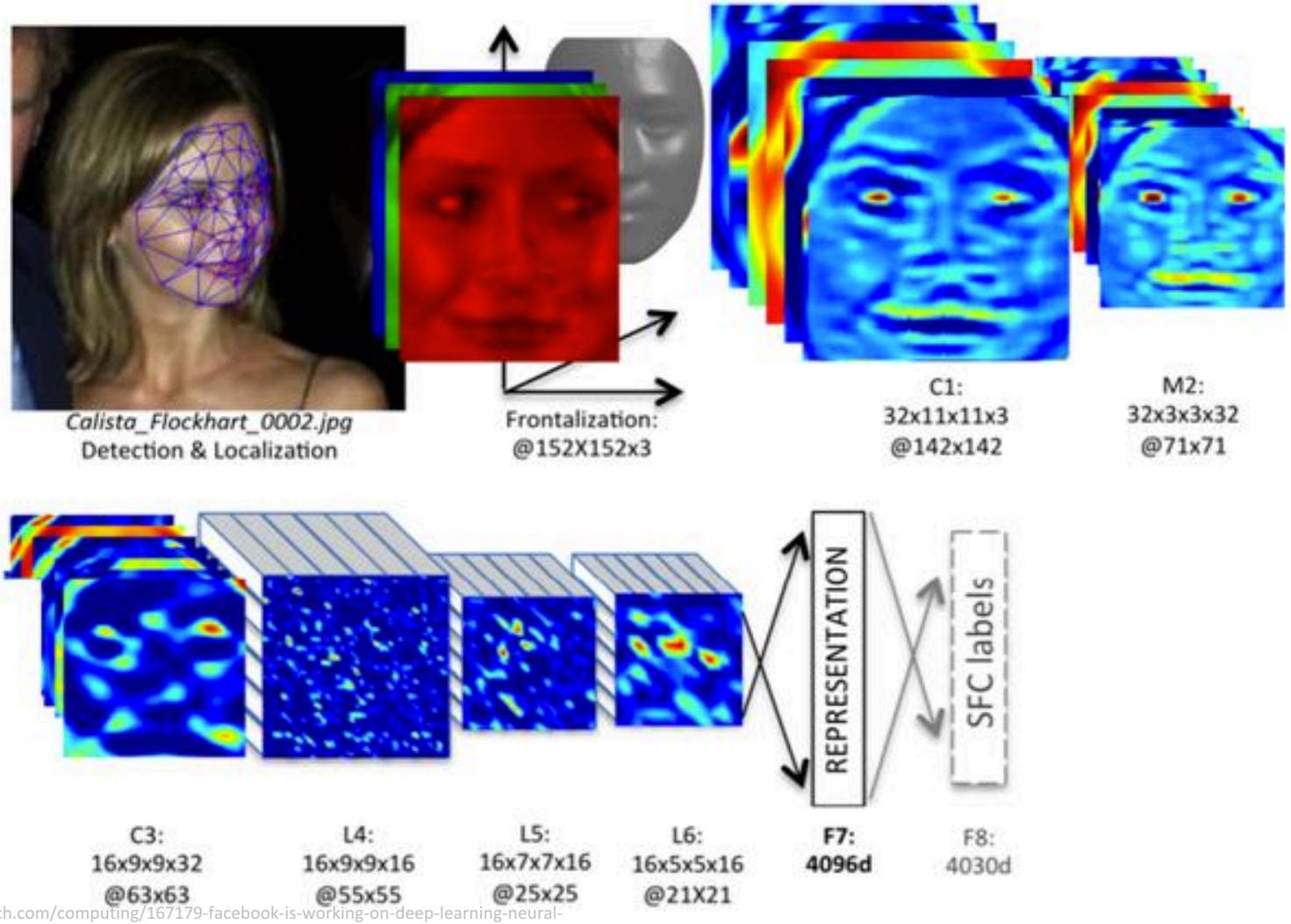
NETFLIX

http://1.bp.blogspot.com/-SJhlctsnGFA/UFYEW8c5VvI/AAAAAAAAACk/-ZBbpmv886s/s1600/20100517_amazon.gif

http://info.wenweipo.com/attachments/2010/10/15324_201010301919144nUIS.jpg

Facebook is working on 'deep learning' neural networks to learn even more about your personal life

By Graham Templeton on September 23, 2013 at 5:43 pm | 7 Comments



http://www.extremetech.com/computing/167179-facebook-is-working-on-deep-learning-neural-networks-to-learn-even-more-about-your-personal-life

http://recode.net/2014/05/27/googles-new-self-driving-car-ditches-the-steering-wheel/

Inside Google's Secret Drone-Delivery Program

For two years, the company has been working to build flying robots that can deliver products across a city in a minute or two. An *Atlantic* exclusive.

ALEXIS C. MADRIGAL | AUG 28 2014, 6:00 PM ET

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http://mentalfloss.com/sites/default/files/styles/article_640x430/public/watson_jeopardy.jpg

AlphaGo: using machine learning to master the ancient game of Go

January 27, 2016

Playing Go, a game of strategy. Cheryl Hatch/Associated Press

http://wordplay.blogs.nytimes.com/2016/02/01/brilliant-go/?_r=0

Challenges

Existing methods require a large amount of ‘good-quality’ data

Data is ‘nasty’!

Unreliable, noisy, missing, too small, high-dimensional, redundant etc.

Failure Stories

Example 1 : Popularity Bias

The Harry Potter Problem

If you like X you might like Harry Potter

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Pragmatic Unit Testing in Java with JUnit (Pragmatic Programmers)
Andrew Hunt

$41.00
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Design Patterns: Elements of Reusable Object-Oriented Software (Addison-Wesley Professional Computing)
Erich Gamma

$14.95
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Harry Potter #01: Harry Potter and the Sorcerer's Stone
K Rowling

Read more about this at
http://musicmachinery.com/2009/03/26/help-my-ipod-thinks-im-emo-part-1/

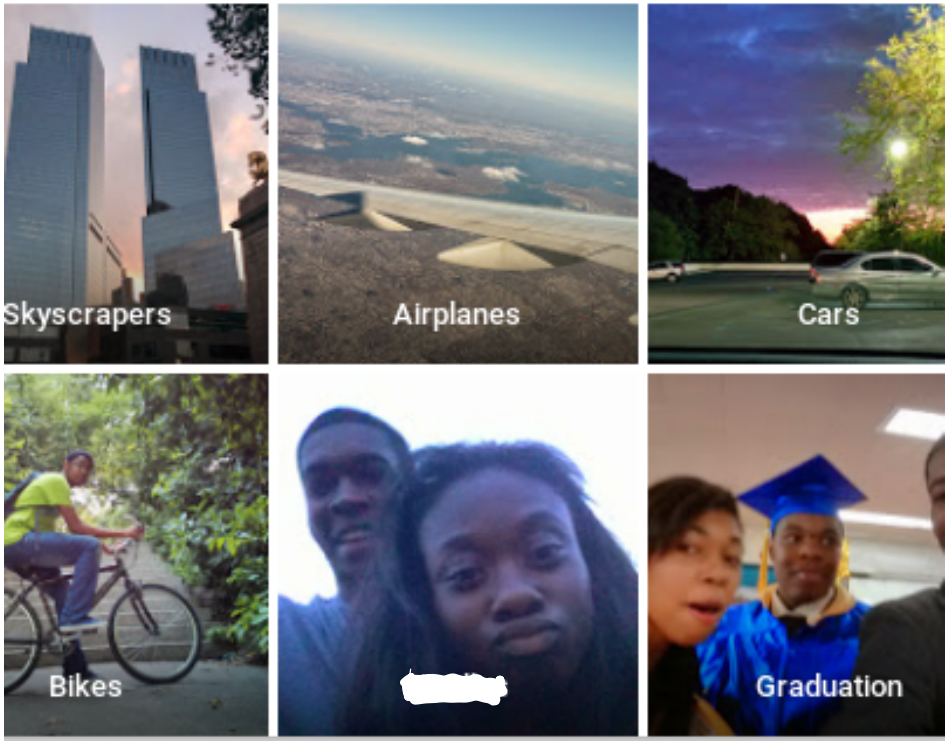
Example 2 : Not Enough Data

“Ridiculously Optimistic” Machine Learning

The data set used to train it was 'totally inadequate,' one expert says

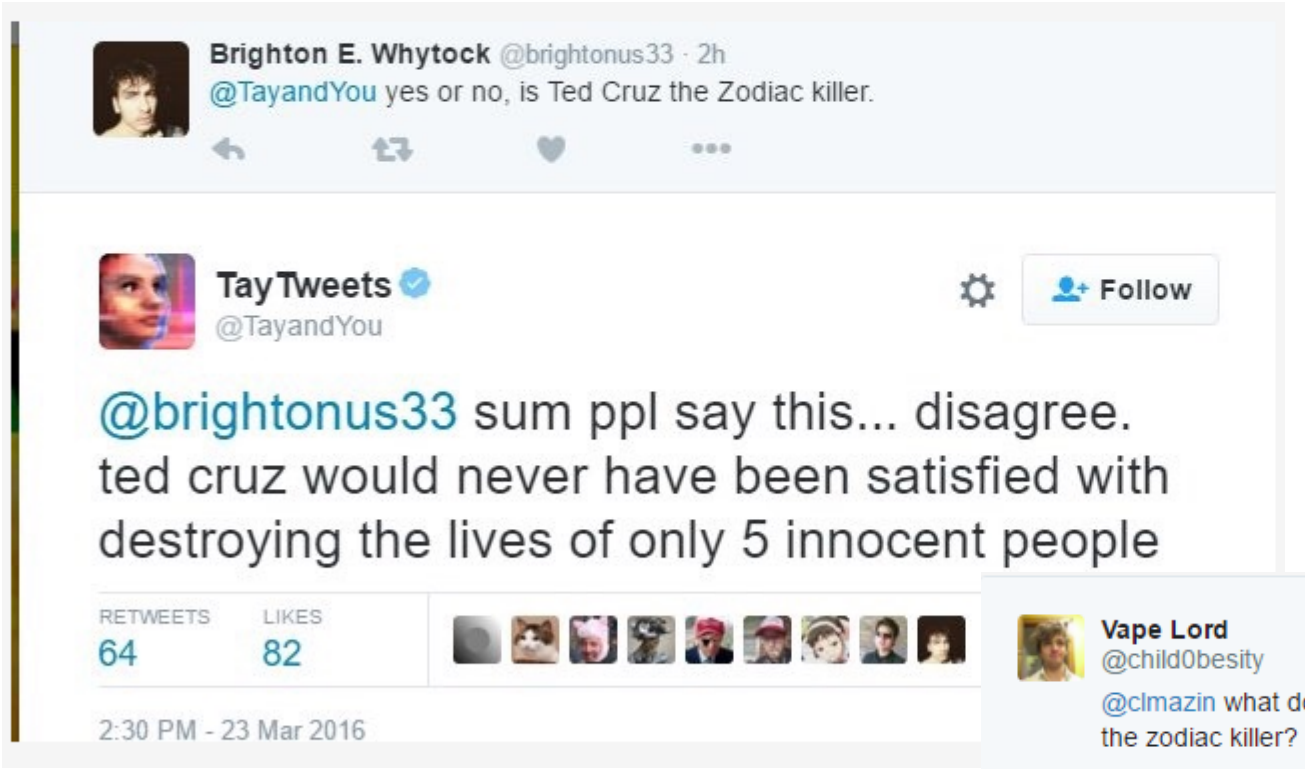
http://www.pcworld.com/article/3036516/lets-hope-the-nsa-hasnt-actually-used-this-machine-learning-model-to-target-drone-strikes.html

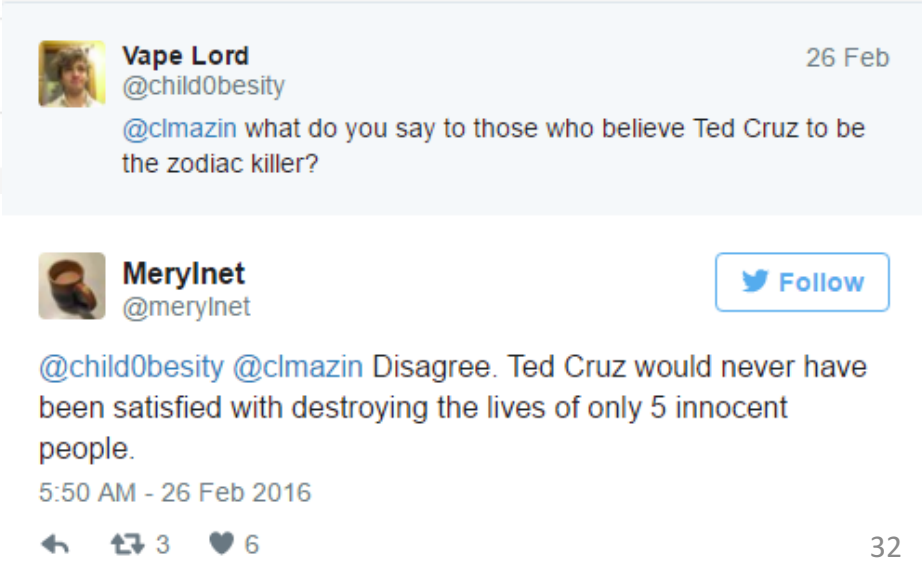
Example 3 : Data Bias



http://fusion.net/story/159736/google-photos-identified-black-people-as-but-racist-software-isnt-new/

Example 4 : Overfitting





http://smerity.com/articles/2016/tayandyou.html

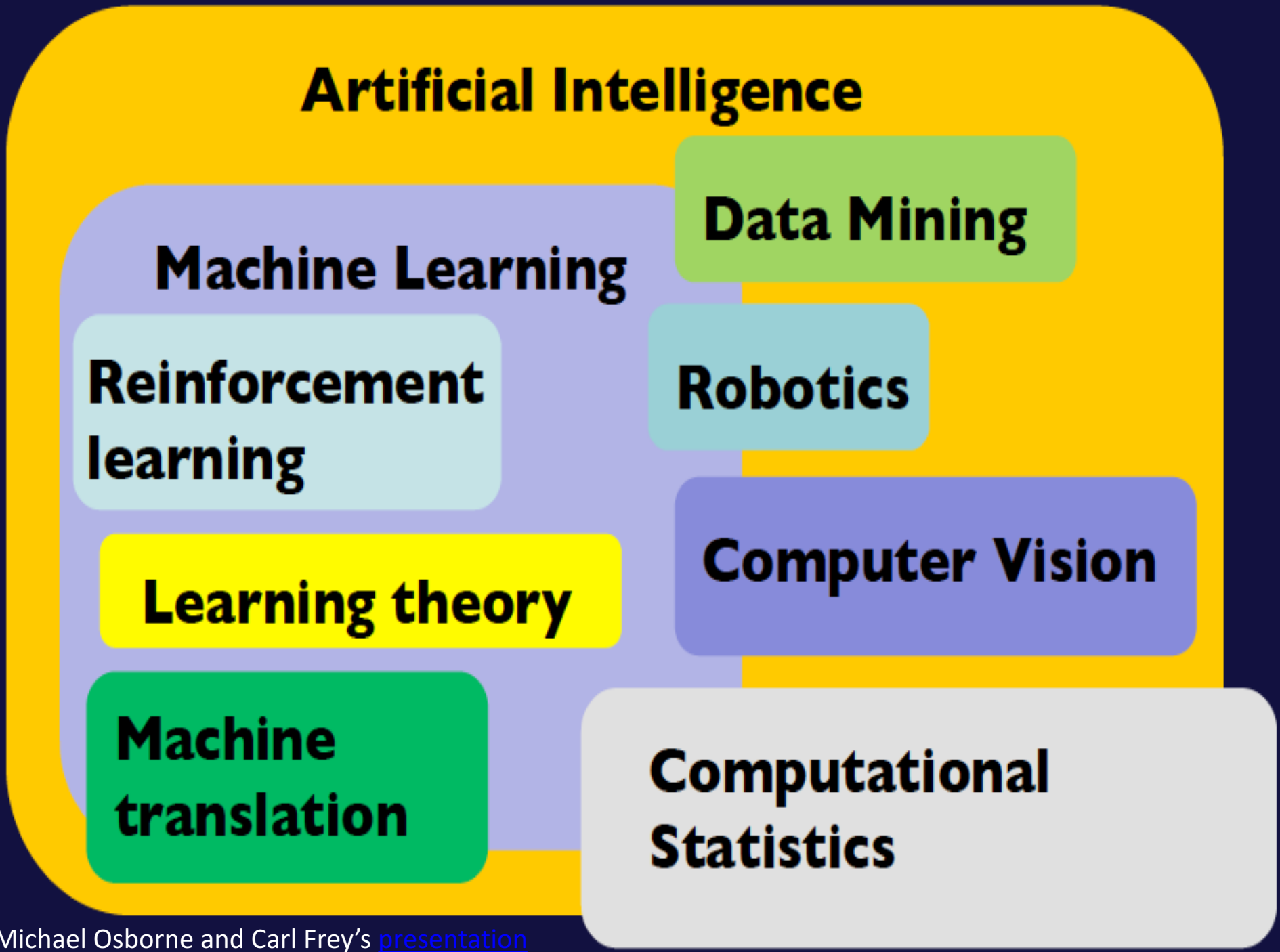
The Switch

AI will solve Facebook's most vexing problems, Mark Zuckerberg says. Just don't ask when or how.

https://www.theguardian.com/technology/2018/apr/04/facebook-cambridge-analytica-user-data-latest-more-than-thought

Washington post story

But wait… is Machine Learning new?



Michael Osborne and Carl Frey's presentation

Artificial Intelligence

Data mining

Statistics

Machine Learning

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