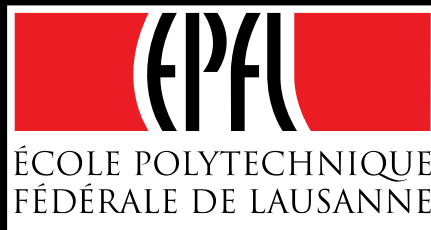


Introduction to PCML

Mohammad Emtiyaz Khan

pcml.epfl@gmail.com

EPFL, Lausanne





PCML 2014

190 students

Rating 5/6

176 took exam

72% passed



Pedro

Excellent introductions! MT did a great presentation

August 26



Francesco C.

I agree with a previous comment, "limited time well used". I teach, as an adjunct professor, a full course in Italy on a similar topic, and I really appreciate how Emte has been able to explain all the fundamental concepts in a clear and funny way in such a limited time. Well done!

👍 1 · August 26

Intro to ML

Short course (3hrs)
In Zurich (Aug 2015)
200+ registered
120+ attended

Pattern Classification and Machine Learning

Machine Learning

What is Machine Learning?

Take 1 minute and
write you own definition

What is Machine Learning?

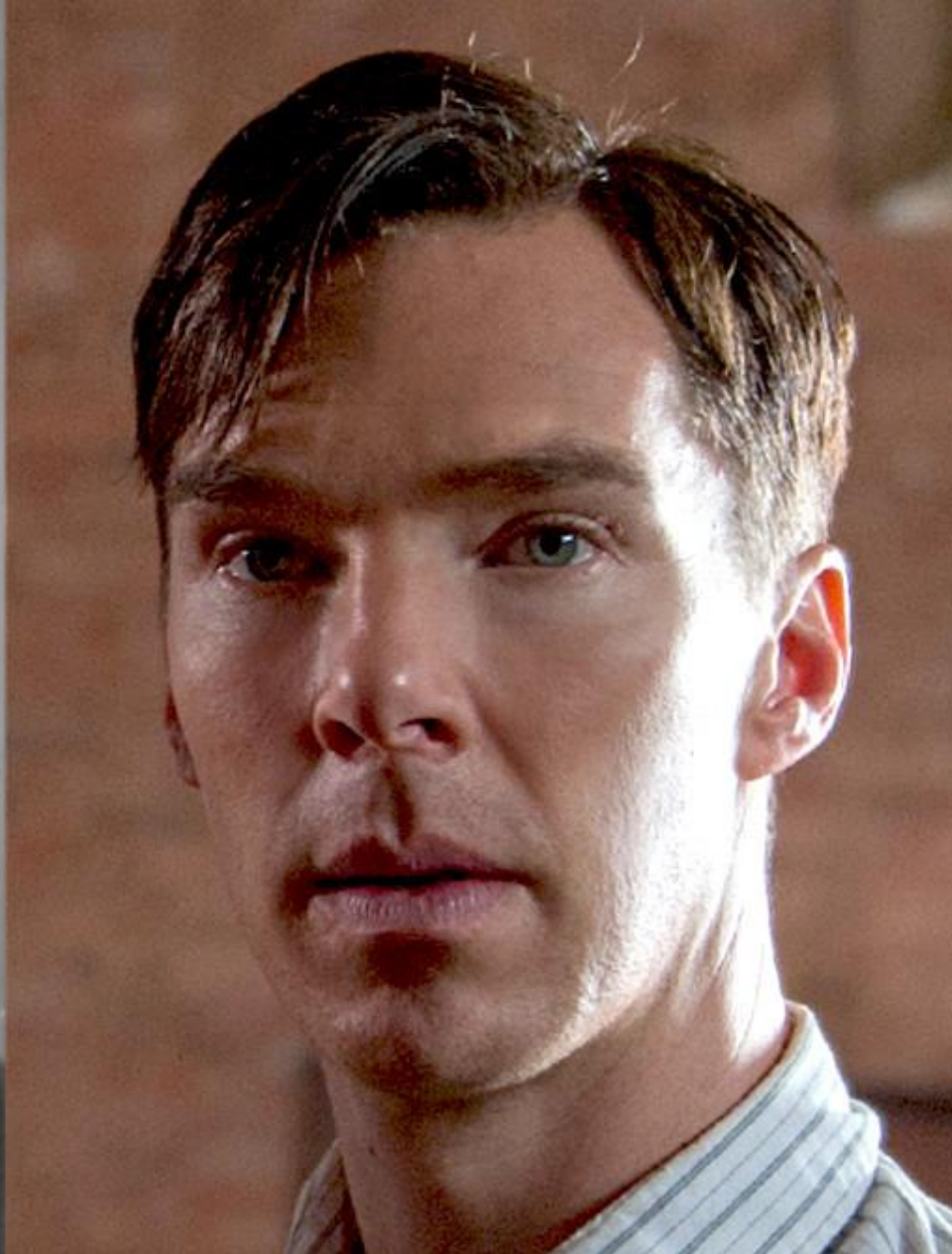
Making a computer **intelligent**
without **explicitly** programming it

Microsoft's John Platt Talks About Artificial Intelligence



AI is “software trying to emulate human minds”

ML is to “create that software from data”



60's Computer Revolution

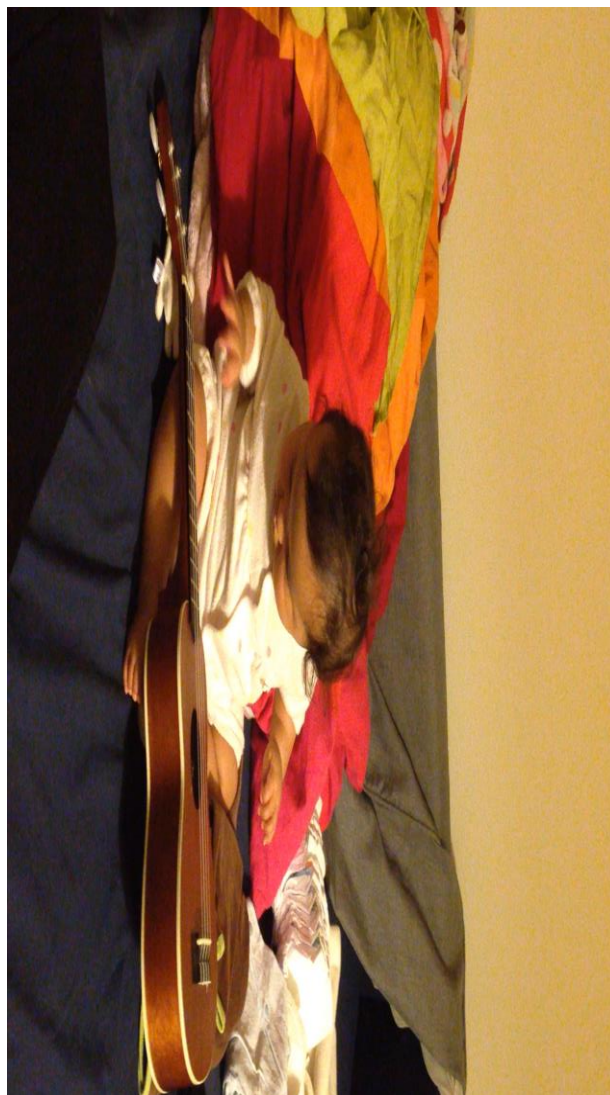
AI brought a lot of hope

If-then-else = Intelligence

If-then-else << Intelligence

“Learn” to generate
“intelligent” software

Learn from Experience



What is Machine Learning?

Making a computer **intelligent**
without **explicitly** programming it

ML is part of a scientific quest

Physics

Biology

A quest to understand
Intelligence
The human brain
Living beings

How do our brains
Represent,
Store,
Process,
Modify,
Information about the world?

Neuroscience

Psychology

Econometrics

Social science

ML is part of a scientific quest

But wait...., is it new?

Artificial Intelligence

Machine Learning

**Reinforcement
learning**

Learning theory

**Machine
translation**

Data Mining

Robotics

Computer Vision

**Computational
Statistics**

What is the difference between Artificial Intelligence, Data mining, Statistics, Machine Learning?

Discuss with your neighbors

Artificial Intelligence

Let's create intelligent software!

Data Mining

Let's find patterns in the data!

Statistics

Let's “describe” the data!
(using mathematics)

Machine Learning

Let's learn from data to do all that!

Artificial Intelligence

Let's create intelligent computers!

Data mining

Let's find patterns in the data!

Statistics

Let's describe the data!

Machine Learning

Let's learn from experience to do all of that!

Success Stories!

Google's Artificial Brain Learns to Find Cat Videos

BY WIRED UK 06.26.12 | 11:15 AM | [PERMALINK](#)

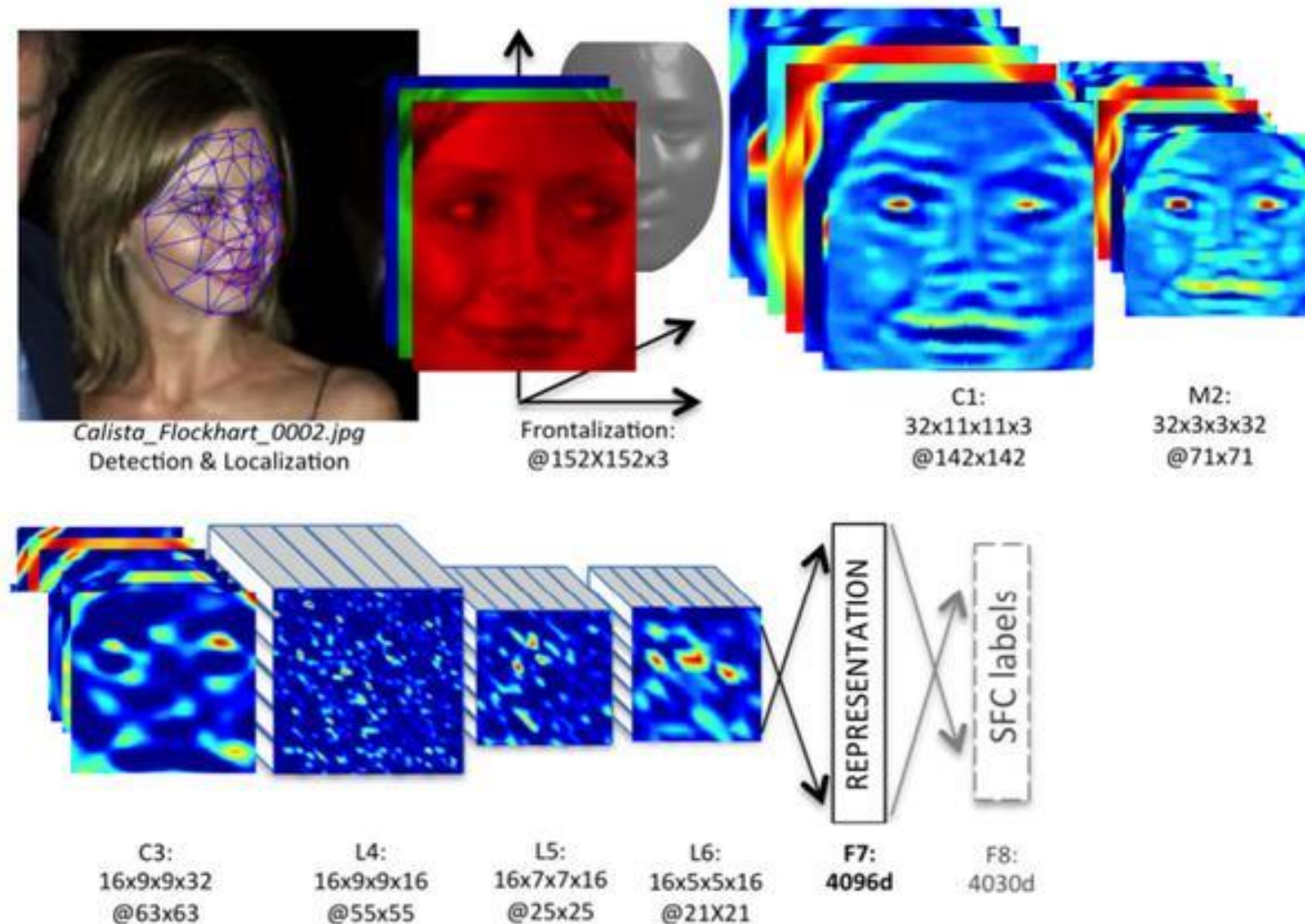


http://research.google.com/archive/unsupervised_icml2012.html

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





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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g+1

865

 Share

More ▾

Project Wing Test Footage



00:00

00:22

AUTO ▾



Customers Who Bought This Item Also Bought



30 Rock: Seasons 1-3
DVD ~ Tracy Morgan

★★★★★ (7)

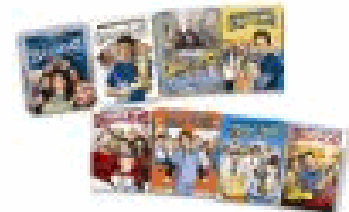
\$60.49



Desperate Housewives: The Complete Seasons 1-5
DVD ~ Teri Hatcher

★★★★☆ (2)

\$179.99



Scrubs: The Complete Seasons 1-8
DVD ~ Zach Braff

★★★★★ (2)

\$148.49

NETFLIX



DOMO SAFETY

Smart home care service designed with the seniors in mind and aiming at enhancing care given by the caregivers, family and providers





KINECT
SPORTS



TGBUS.com
© 2010





the signal and the noise
and the noise and the noise
and the noise and the noise
and the noise and the noise
why most noise
predictions fail
but some don't
and the noise and the noise
and the noise and the noise
nate silver noise



The man you can count on: The poker-playing numbers expert who predicted Presidential election outcomes with incredible accuracy

- Nate Silver, 34, used an elaborate series of calculations to correctly call the outcome in all 50 states
- He ran thousands of computer calculations based on innumerable factors such as polling results and voting outcomes in previous elections
- Gave Barack Obama a 90.9 per cent chance of success, attracting widespread ridicule from traditional pundits in what was regarded as the closest race in years
- His achievement opens the door for a more statistics-based approach to polling, say experts

Failures

The Harry Potter Problem

If you like X you might like Harry Potter

Powell's Recommendations

If you enjoyed [Java RMI](#) by William Grosso, you might also enjoy the following titles:



\$29.95

New Trade Paper

[ADD TO CART](#)

[add to wishlist](#)

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



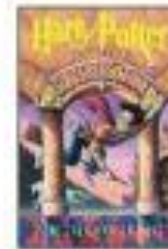
\$41.00

Used Hardcover

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



\$14.95

Used Hardcover

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[add to wishlist](#)

**Harry Potter #01: Harry
Potter and the Sorcerer's
Stone**
J K Rowling

Read more about this at
[http://musicmachinery.com/2009/03/26/
/help-my-ipod-thinks-im-emo-part42/](http://musicmachinery.com/2009/03/26/help-my-ipod-thinks-im-emo-part42/)

Data bias
=
Racial bias



Skyscrapers



Airplanes



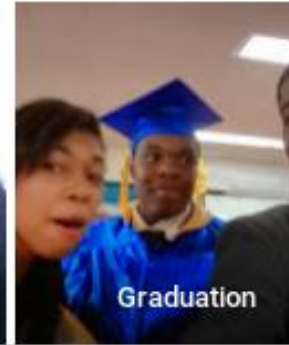
Cars



Bikes



Gorillas



Graduation



Read more about this at
<http://fusion.net/story/159736/google-photos-identified-black-people-as-gorillas-but-racist-software-isnt-new/>

Spam Failures

échange auditoire CE 1 <-> CE 4 mardi le 20.10. ?



Spam



emtiyaz.khan@epfl.ch



Gruetter Rolf <rolf.gruetter@epfl.c

10:46 AM (2 hours ago) ☆



to Khan, Fuerbringer, Wets ▾



Why is this message in Spam? It's similar to messages that were detected by our spam filters. [Learn more](#)



French ▾



English ▾

[Translate message](#)

[Turn off for: French](#) ×

Bonjour

Pour mon cours de physique générale I, j'ai besoin de l'auditoire CE 1 pour expérience qui ne se fait que là.

Seriez-vous d'accord de faire un échange entre votre auditoire (CE 1) et le mien (CE 4, 220 places). Avec cet échange il sera disponible pour le temps de vos cours.

Merci d'avance!

Bien cordialement

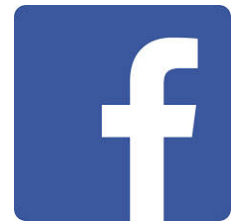
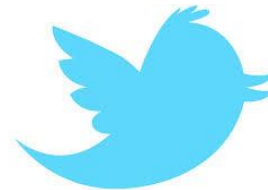
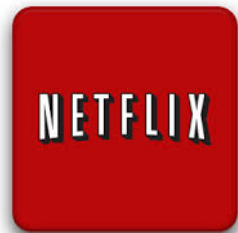
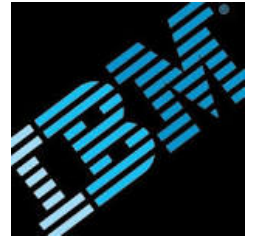


On 20th Oct, please come to CE-4

Why should you learn?

Bad Reasons

Everybody is doing it!



Demand



British chess prodigy sells artificial intelligence software firm to Google for £242million





From left: Ilya Sutskever, Alex Krizhevsky and University Professor Geoffrey Hinton of the University of Toronto's Department of Computer Science. *(photo by John Guatto, University of Toronto)*

Good Career

Taken from this [blog](#)



Good Reasons

Challenging

Make a difference

See results quickly

Theory and application, both

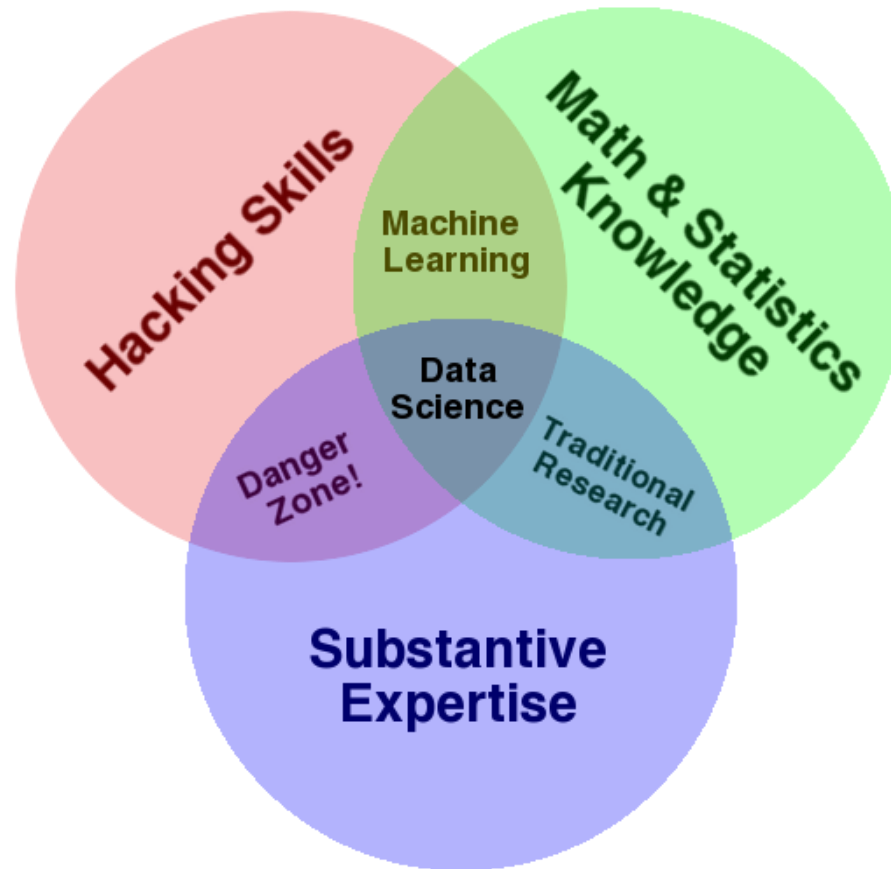
Lot of fun! [article](#)

Summary

- Machine learning is about making a computer intelligent without explicitly programming it
- Machine learning is part of a scientific quest
- Machine learning is related to many areas.
- Machine learning is very popular and useful, but one has to be careful as well.
- There are many good reasons to learn it.

Self Assessment

Thinking about ML, what comes to your mind?



What is your ML Profile?

- A. Statistics and numerical optimization
- B. Scientific computing languages
- C. Expertise in a data-domain
- D. Data visualization
- E. Technical communication

Based on the book “doing data science”

Things to Think

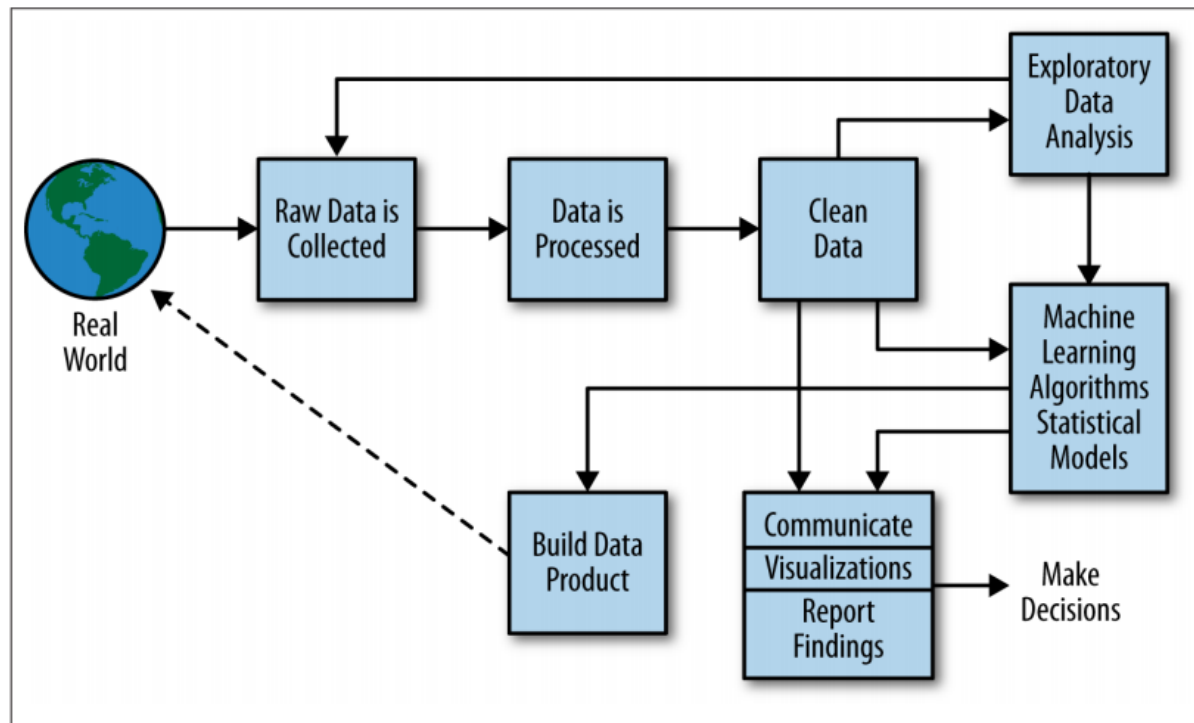
- What is your ML profile?
- During the course, which areas would you want to improve?
- What would your ideal teammates profile look like (for the projects)?

Myths and FAQs about Machine Learning and about this course

Myth

“After this course, I will be a data scientist”

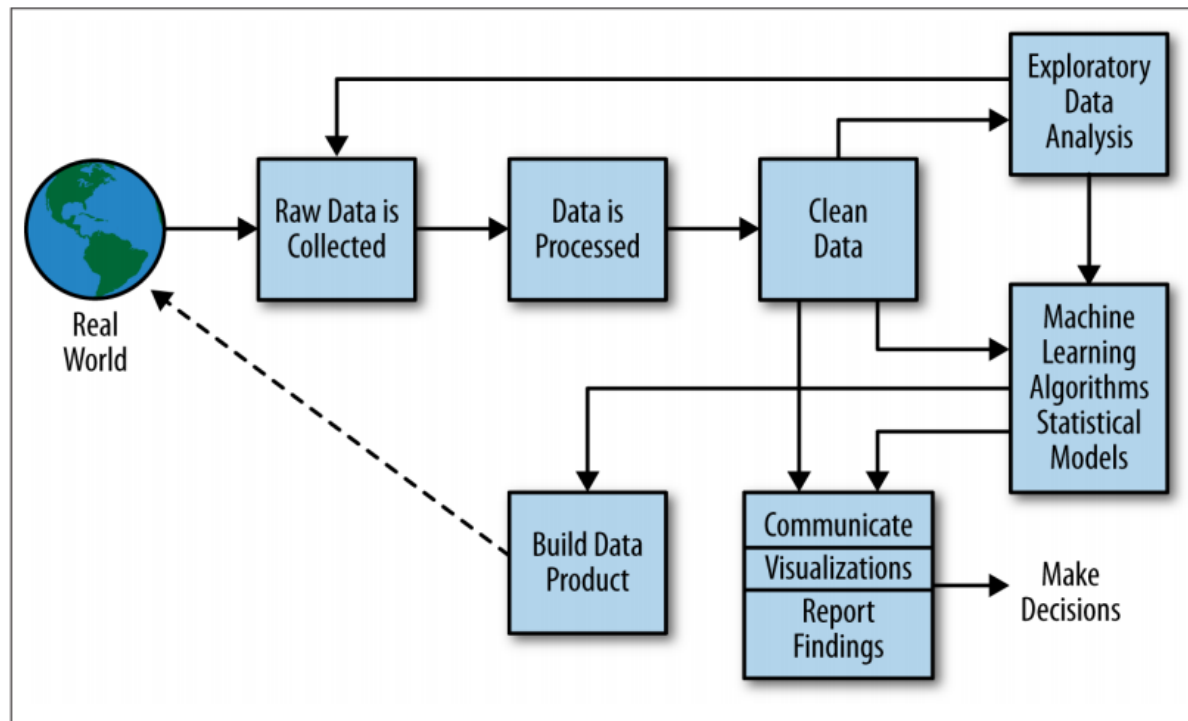
Sorry, not even close!



Myth

“When my code runs, I am done”

Actually this is where you start ML!



FAQ

“Why are you teaching me linear regression. I need to learn advanced ML methods”

No, you need to learn fundamentals.

Why are very few schools involved in deep learning research? Why are they still hooked on Bayesian methods?

6 Answers

http://www.quora.com/Why-are-very-few-schools-involved-in-deep-learning-research-Why-are-they-still-hooked-on-Bayesian-methods?share=1&fb_action_ids=10152957116977143&fb_action_types=og.shares

FAQ

“If I know numerical-optimization, what else do I need to know to know ML?”

There are fundamental differences between the two areas and if you don't understand that, take this course.

Myth

“I need complete course notes to learn”

No, you don't. Research suggests that interactive-notes help retain long-term memory

My advice

Get used to it because you are going to do this all your life.

FAQ

“I want course notes. I don’t want to look up 50 different books and papers. GIVE ME COURSE NOTES”

Again, get used to this.

FAQ

“I don’t need to come to the class, I can learn from Andrew Ng’s class, right?”

Great!