Introduction to AI
Basic concepts

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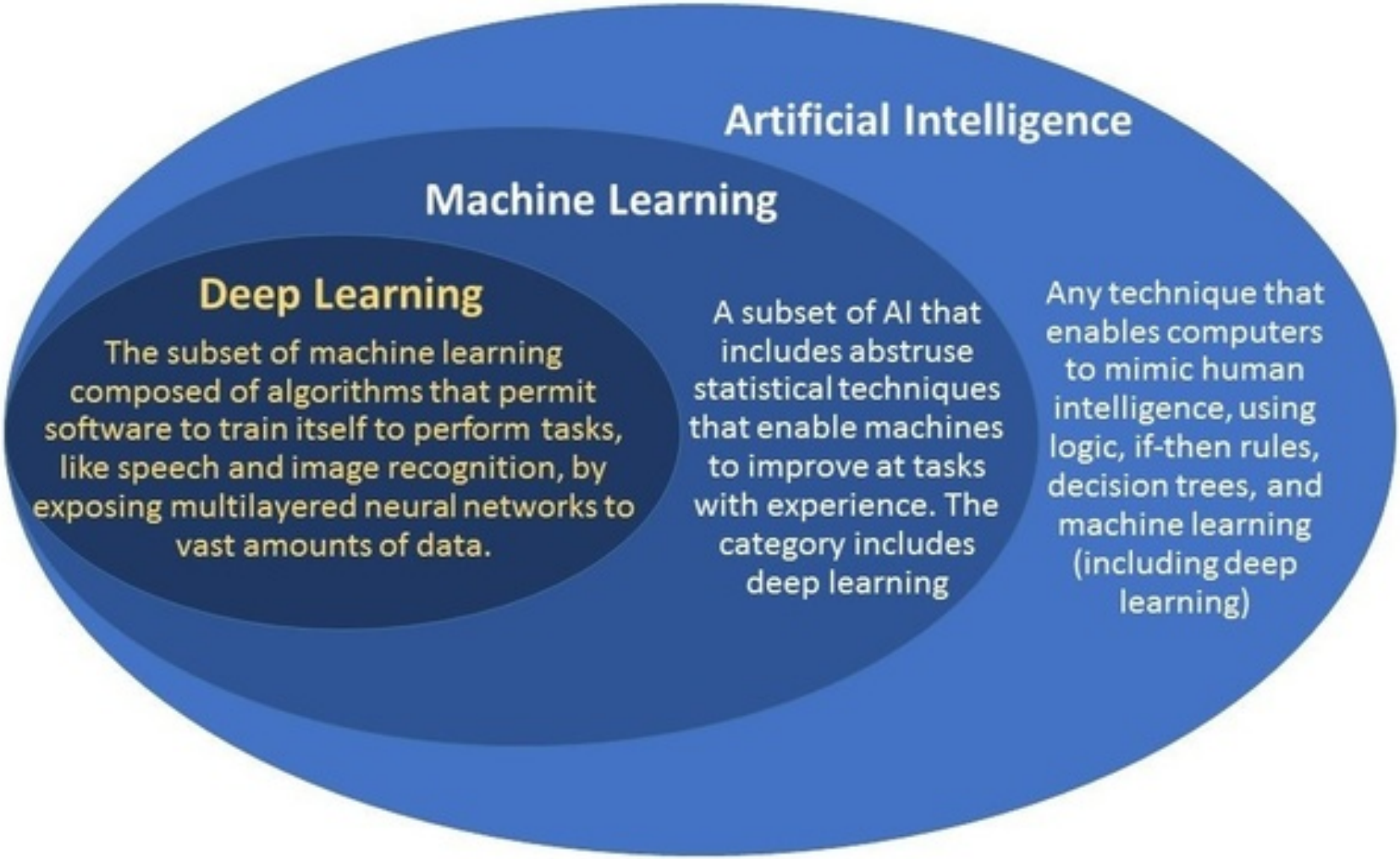
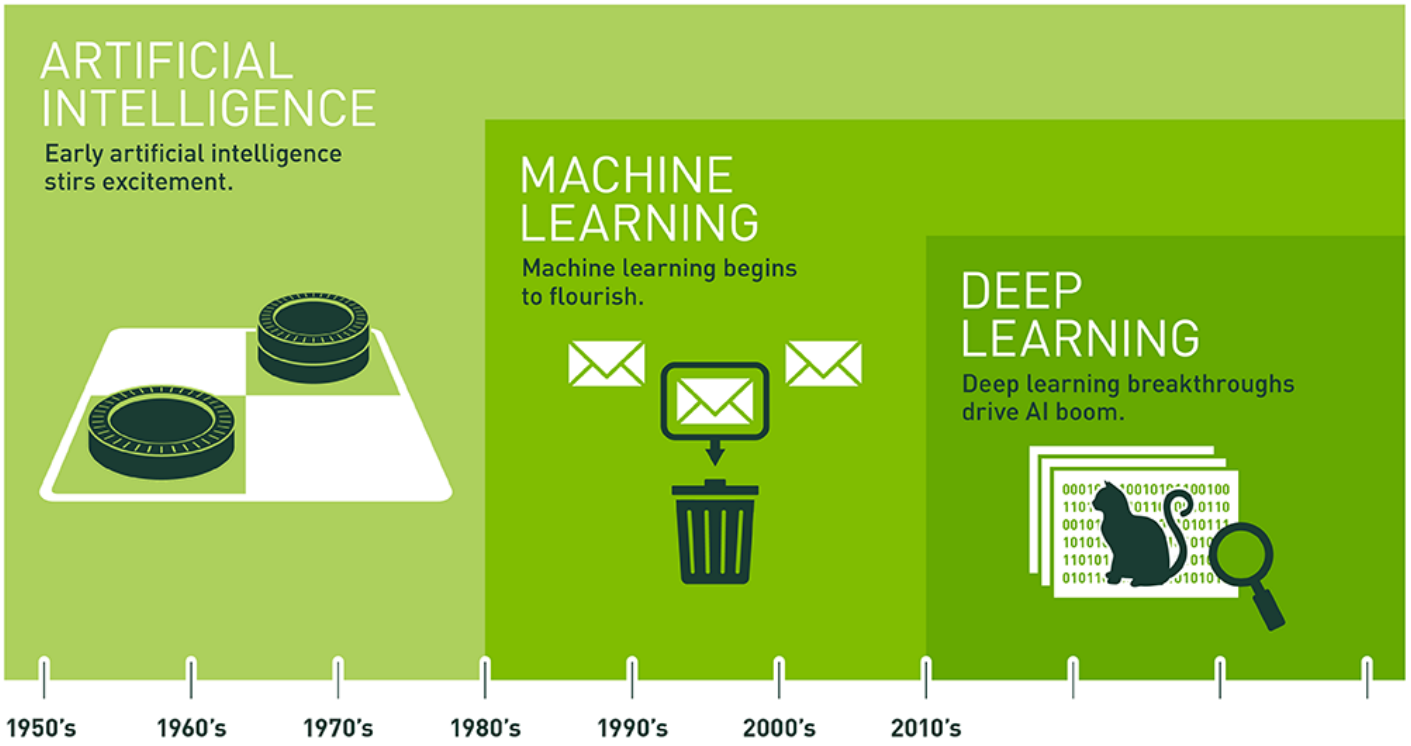
What is AI?

- AI is any form of intelligence exhibited by machines.
- An "intelligent agent" is any device that perceives its environment and takes actions that maximize its chance of success at some goal.
- intelligent agents are capable of **planning** sequences of decisions, **reasoning** about the world around them, and **learning** from experience.

AI vs Machine Learning vs Deep Learning



Timeline

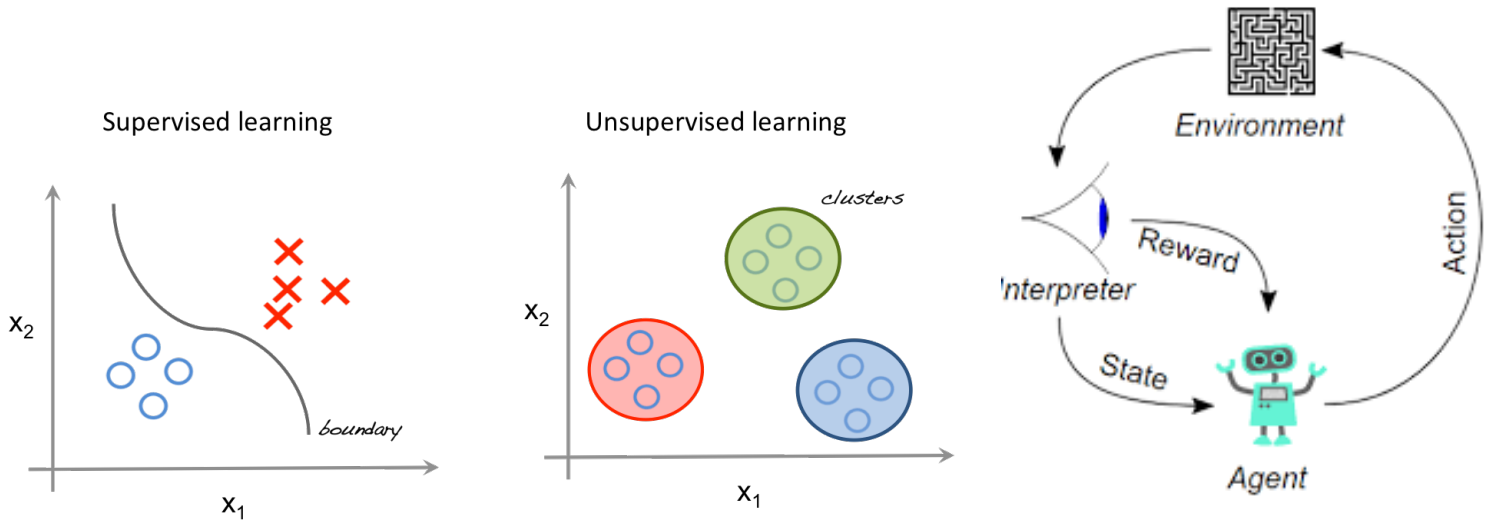


Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

3 Main Types of Machine Learning

- **Supervised** learning: give lots of data, find model that allows you to generalize the data and predict or classify a new piece of data never seen before
  - input data has many parameters (features) and the answer (label)
  - Mathematical models to extrapolate from this data (e.g., line of best fit or linear regression, k-nearest-neighbours)
- **Unsupervised** learning: give lots of data, try to similarities in data
  - input data is not labelled, trying to find classifications/clusters/similarities based on the features
- **Reinforcement** learning: give the algorithm rewards if it wins, let it try by trial and error and learn from its mistakes

Supervised vs Unsupervised vs Reinforcement



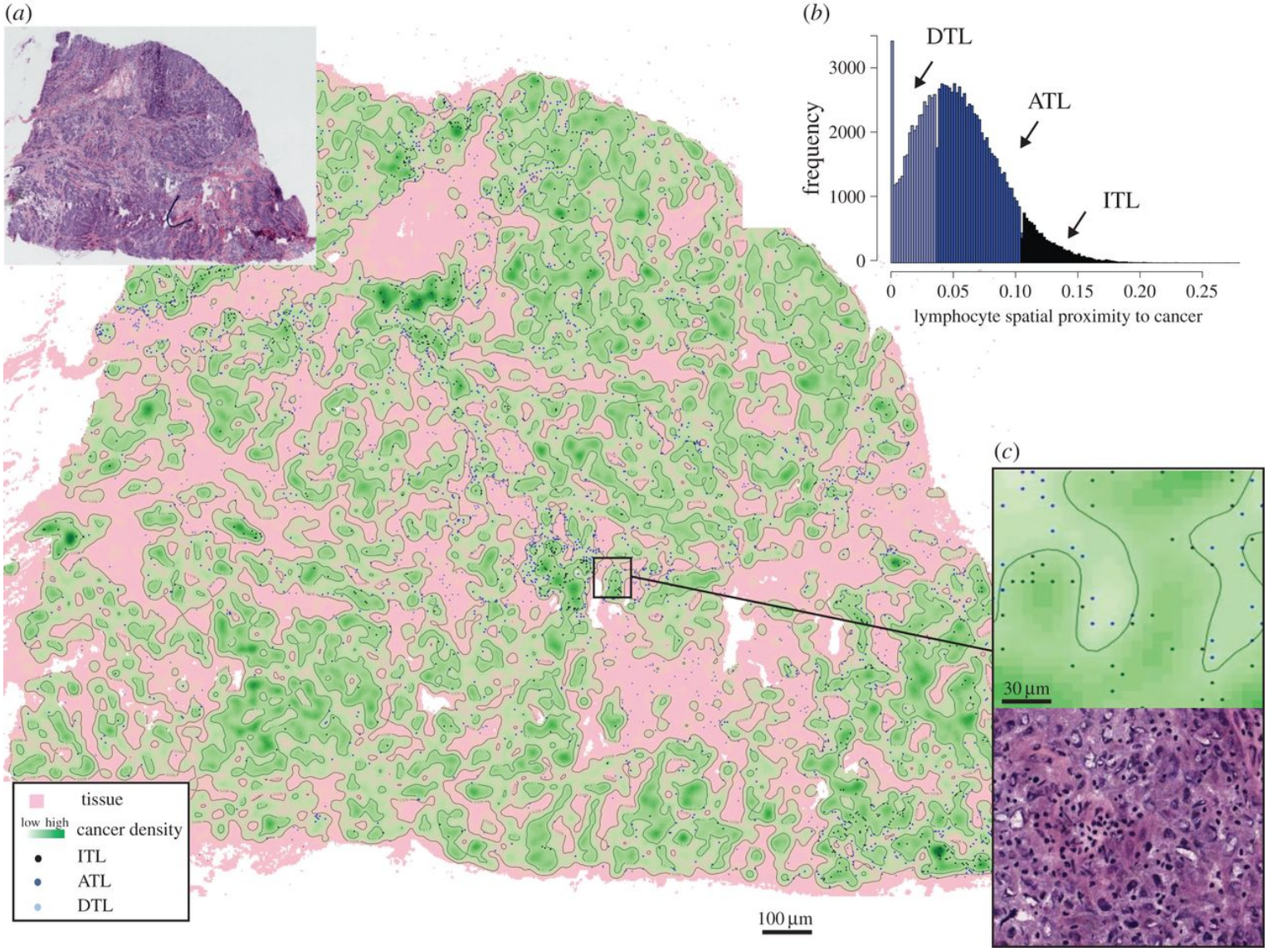
Source: http://beta.cambridgespark.com/courses/jpm/01-module.html
Source: http://enhancedatascience.com/2017/07/19/machine-learning-explained-supervised-learning-unsupervised-learning-and-reinforcement-learning/

Quiz: Supervised or Unsupervised or Reinforcement?

Facial recognition

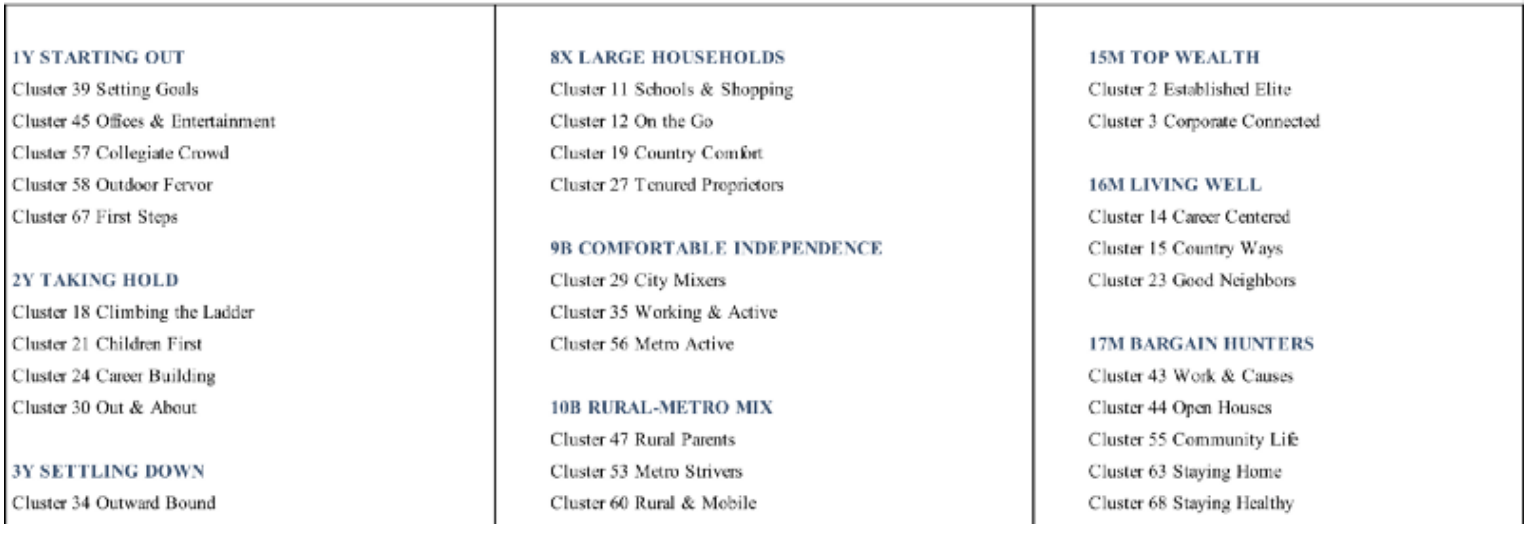
Quiz: Supervised or Unsupervised or Reinforcement?

Classification of tissue samples



Quiz: Supervised or Unsupervised or Reinforcement?

Market segmentation



1Y STARTING OUT
Cluster 39 Setting Goals
Cluster 45 Offices & Entertainment
Cluster 57 Collegiate Crowd
Cluster 58 Outdoor Fervor
Cluster 67 First Steps

2Y TAKING HOLD
Cluster 18 Climbing the Ladder
Cluster 21 Children First
Cluster 24 Career Building
Cluster 30 Out & About

3Y SETTLING DOWN
Cluster 34 Outward Bound

8X LARGE HOUSEHOLDS
Cluster 11 Schools & Shopping
Cluster 12 On the Go
Cluster 19 Country Comfort
Cluster 27 Tenured Proprietors

9B COMFORTABLE INDEPENDENCE
Cluster 29 City Mixers
Cluster 35 Working & Active
Cluster 56 Metro Active

10B RURAL-METRO MIX
Cluster 47 Rural Parents
Cluster 53 Metro Strivers
Cluster 60 Rural & Mobile

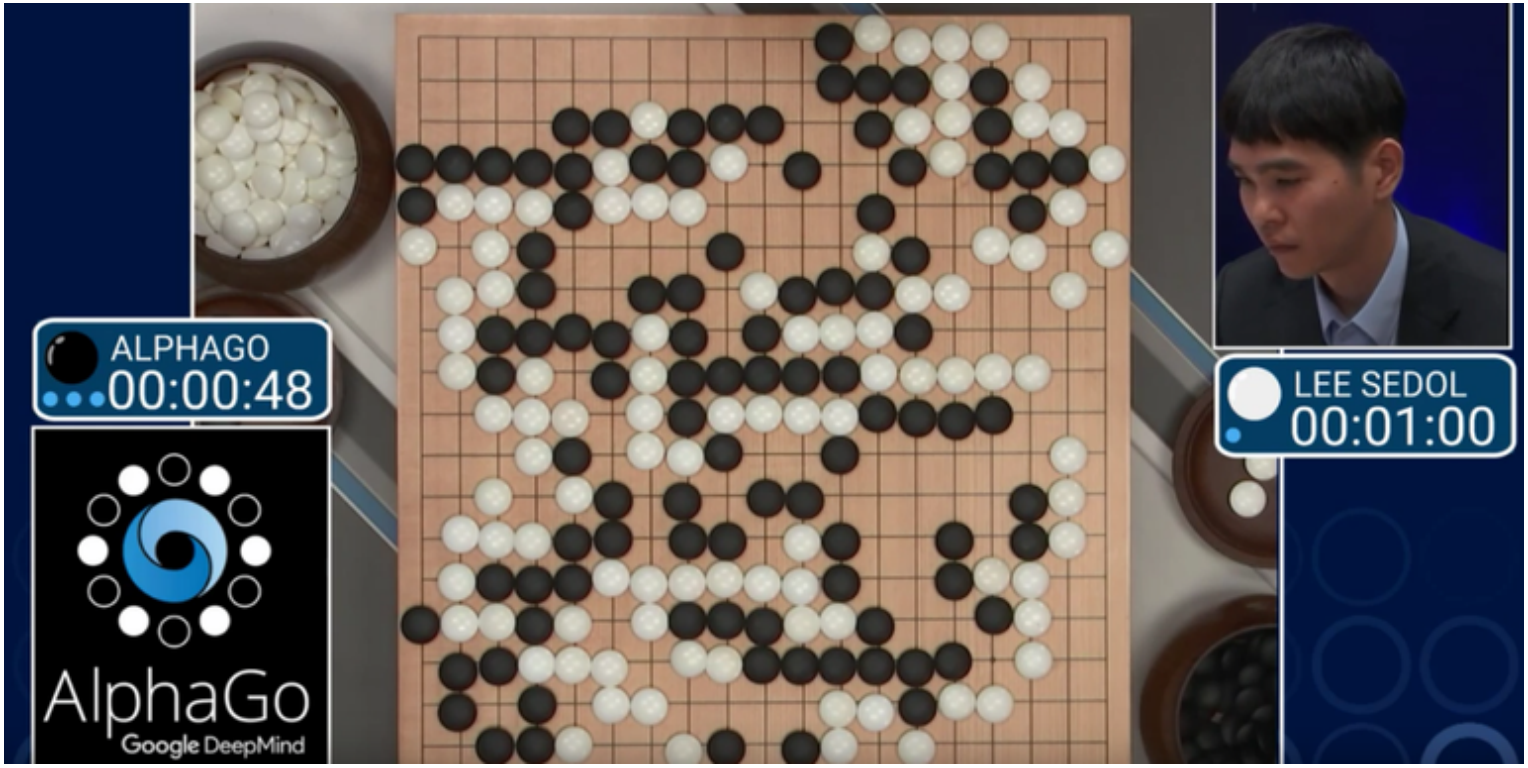
15M TOP WEALTH
Cluster 2 Established Elite
Cluster 3 Corporate Connected

16M LIVING WELL
Cluster 14 Career Centered
Cluster 15 Country Ways
Cluster 23 Good Neighbors

17M BARGAIN HUNTERS
Cluster 43 Work & Causes
Cluster 44 Open Houses
Cluster 55 Community Life
Cluster 63 Staying Home
Cluster 68 Staying Healthy

https://c.ymcdn.com/sites/dema.site-ym.com/resource/resmgr/Member_Resources/Lifestage_Clustering.pdf

Quiz: Supervised or Unsupervised or Reinforcement?



Source:
https://www.popularmechanics.com/technology/a19863/googles-alphago-ai-wins-second-game-go/

Why is AI everywhere?

- lots of data
- lots of compute power
- developments and breakthroughs in algorithms and research

Example application

How about an application that alerts the public to high crime areas?

- Montreal releases data about crimes and where the occur (the the nearest intersection)
- there are already visualization apps
- wouldn't it be in the public interest to provide a map that warns people if they enter a high crime area?

What could possibly go wrong?

ML is based on past data. What are some problems with using past data for predictive apps?

- any biases in the data will cause biased results
- always ask yourself: is my data correct and representative?
    - is the sample of data on which is train my models really representative?
    - is there inherent bias in my data?

Most importantly *can the bias cause harm?*

Example - Amazon

The team had been building computer programs since 2014 to
applicants' resumes with the aim of mechanizing the search
talent...
But by 2015, the company realized its new system was not ra
candidates for software developer jobs and other technical
in a gender-neutral way.

Source: https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G

What about our crime app?

- crime stats can be biased:
  `Despite roughly equal usage rates, Blacks are 3.73 times more likely than whites to be arrested f`
- "self-perpetuating": if people avoid all poor neighbourhoods, these neighbourhoods will become poorer

Sources: https://www.aclu.org/gallery/marijuana-arrests-numbers
https://machinelearnings.co/artificial-intelligence-perpetuating-discrimination-36-52687110db94

How to move forward?

- be aware of potential bias
- counteract the bias
- use tool like FairML to audit your algorithms

You have power as a developer! Please be prudent!