

# Machine Learning

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# Hype

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**Andrew Ng**

@AndrewYNg



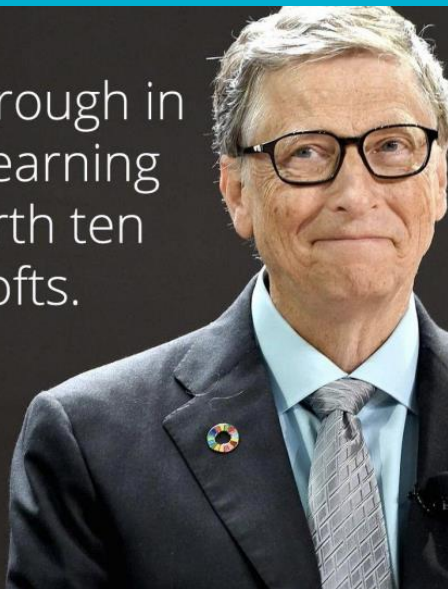
Following

"AI is the new electricity!" Electricity transformed countless industries; AI will now do the same.

“A Breakthrough in Machine Learning will be worth ten Microsofts.

~ Bill Gates

Carnegie Mellon University  
Machine Learning



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cOoL

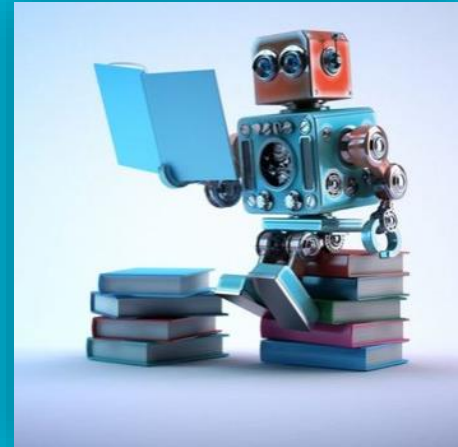


# What is ML?

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Machine learning is a way of using algorithms to interpret and model data. We can use these models to make future predictions about our data!

(Spoiler alert: algorithms + models = math)



# Roadmap To Machine Learning

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1. Data
2. What kind of problem am I solving? (regression/classification/clustering)
3. Picking a model to solve the problem (i.e. KNN, Neural Network, etc)
4. Train your model using part of your data
5. Use the model to solve your problem!

# Types of ML Models

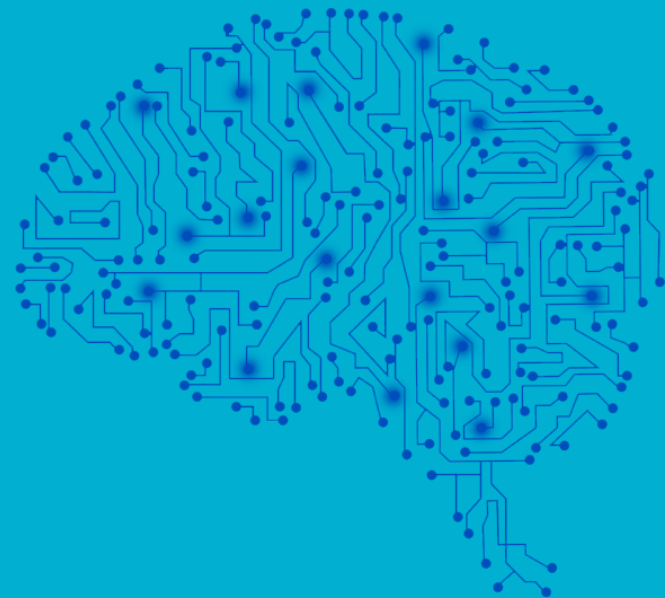
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- Regression - predicting numerical values
  - e.g. predicting stock prices, weather forecasting, etc
- Classification - given an input, decide what it is
  - e.g. restaurant recommendations, spam filter, character recognition (OCR), etc
- Clustering - grouping a sets of similar objects (data points) together
  - e.g. marketing, social network analysis for communities

# How You Can Use ML in Your TP

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- Main part of your project (risky)
  - ML concepts have a big learning curve
  - You *must* implement a lot of it by yourself
- Cool additional feature of your project (yay)
  - Still some learning overhead
  - But, you don't have to learn underlying details!
- Sample projects/features using ML:
  - See next slide~



# Vacation Planner + Restaurant Suggestions!

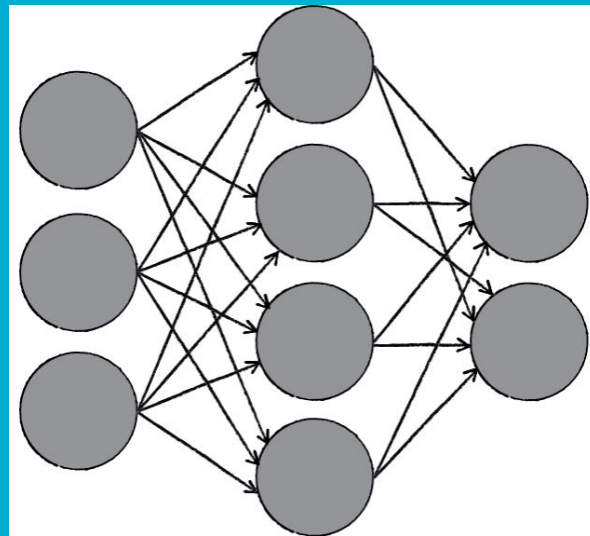
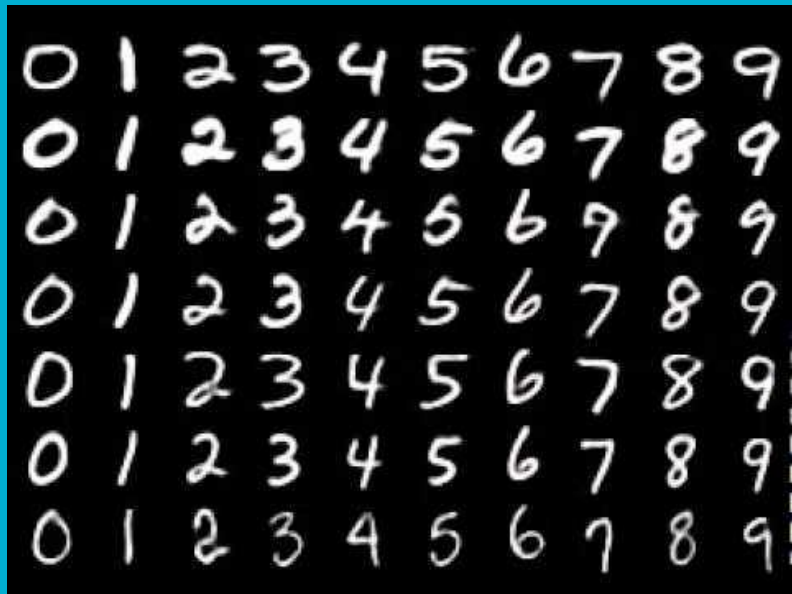
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@Kyra



# Optical Character Recognition (OCR)

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# Disclaimer

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- Machine Learning is very hard to learn
- You will spend a lot of time learning it, and not have much code progress
- Your model may not work as well as expected
- SO be warned >:)
- (if you make it the main part of your project)

# ML Example:

**BuzzFeed**

[News](#)

[Videos](#)

[Quizzes](#)

[Tasty](#)

[As/Is](#)

[Reviews](#)

[More](#) ▾

PAID POST

## Which Breakfast Food Are You?

You know what kind of breakfast you like, but do you know what kind of breakfast you **ARE**? Find out and get started on your morning with the real fruits, real nuts, and wholesome multigrains of [Quaker Real Medleys](#).

Posted on March 4, 2014, at 5:34 p.m.



**Quaker**

Brand Publisher

# Data

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- Inputs (x):
  - “Feature Vector” of answers to questions!
- Labels (y):
  - Breakfast foods! (Waffle or Egg)



# Classification: K-Nearest Neighbors (KNN)

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- Given an input (answers to questions), we'll predict what breakfast food you're most likely to be
- What KNN does: given user input, this algorithm converts answers to numbers and calculates the distance between the input and the training data
  - It classifies the user based on the past/training data closest to it
- Note:
  - The following demo uses only binary values, but KNN works for scalar features and non-binary outputs!
  - (So you can add more breakfast foods to your KNN classifier!)

Questions!!

# Which shirt?

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0



1

# Do you like orange juice?

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No



Yes

0

1

Would you rather fight 100 chicken-sized horses or 100 horse-sized chickens?

100 chicken-  
sized horses

0

100 horse-  
sized chickens

1



# Which is the superior Marvel Chris?

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0



1

# Tacos or burritos?

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0



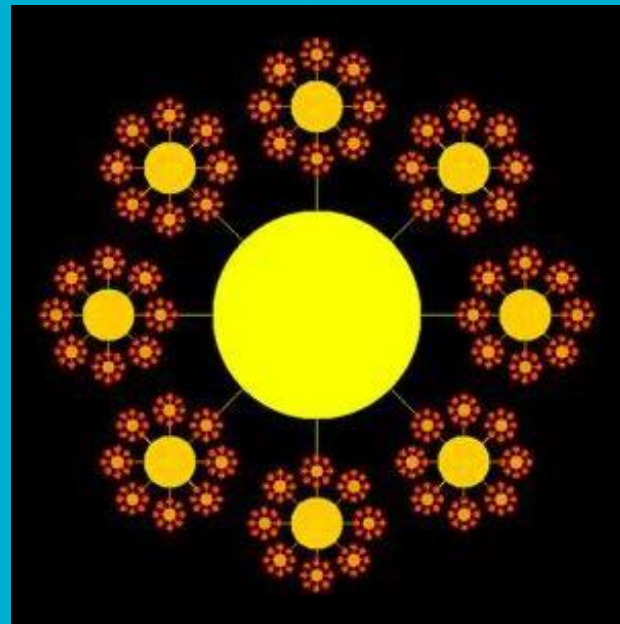
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# Which fractal?

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0



1

Do you consider flirting to be cheating? (bc  
BuzzFeed always hits us with those hard  
Q's)

No

Yes

S

0

1

# Training Data

shirt	oj	horse_chicken	chris	taco_burrito	fractal	flirting_cheating	decision
1	1	1	0	0	0	0	1
1	1	1	0	0	1	0	0
0	0	0	1	1	0	0	1
0	0	1	1	1	0	0	1
0	0	1	1	1	0	0	1
0	0	1	1	1	0	0	1
0	0	0	1	1	0	0	1
1	1	0	0	0	0	1	0
0	0	0	1	1	0	0	1
1	1	1	0	0	1	1	0
0	0	0	0	1	0	0	1
1	1	1	0	0	1	0	0
0	0	1	1	1	0	0	1
1	1	1	0	0	1	1	0
1	1	1	0	0	1	0	0
1	1	0	0	0	1	1	0
0	0	0	0	1	0	0	1
0	1	1	1	1	1	0	1
0	1	1	1	1	0	0	1
0	0	1	1	1	1	0	1

# Other Common ML Models & Terms

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- Decision Trees
- Hidden Markov Models
- Neural Nets
- Support Vector Machines
- Naive Bayes
- Reinforcement Learning
- Natural Language Processing (NLP)
- Deep Learning

Attendance!!