September 20th-22nd, 2022

MTech Users Conference

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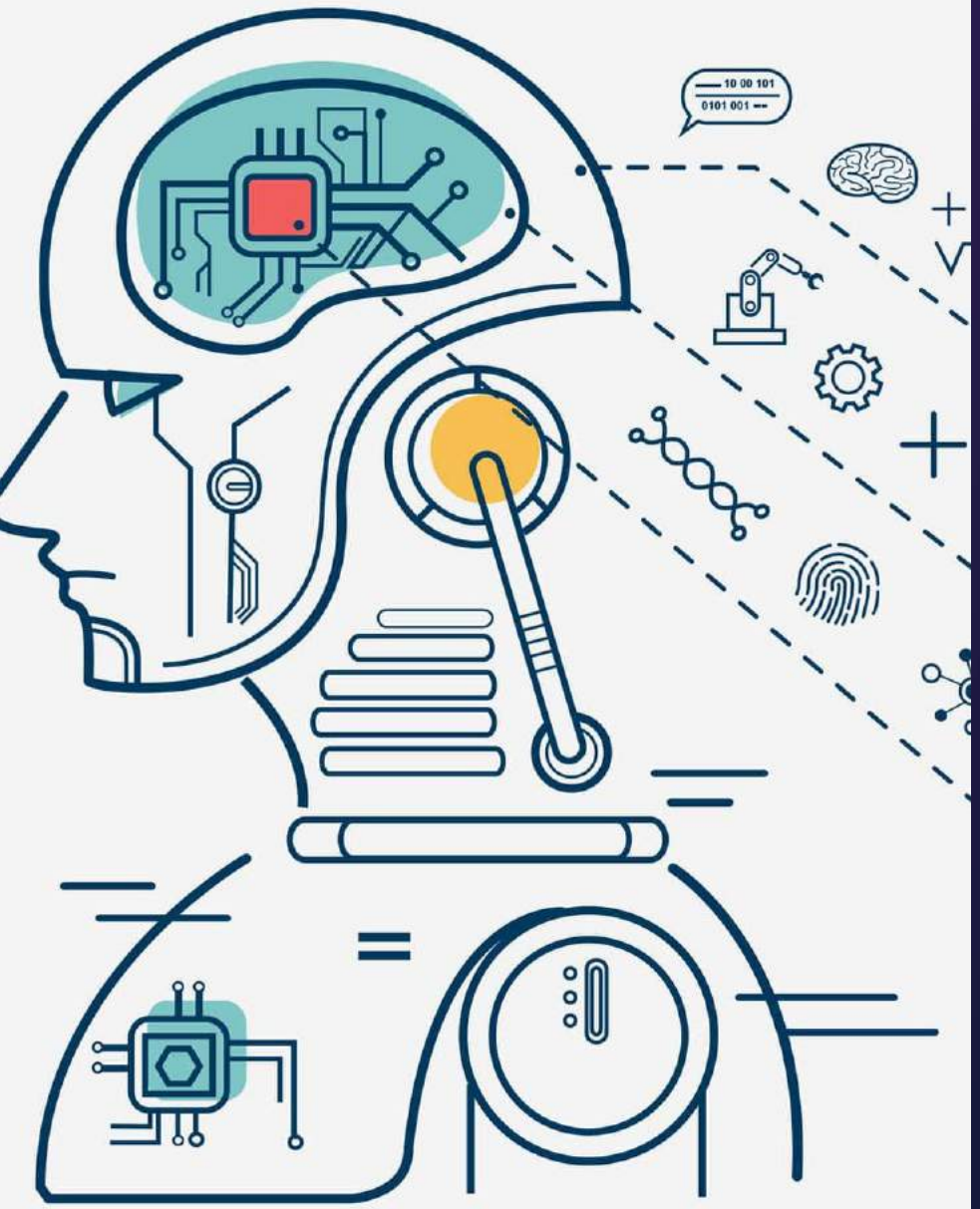
Evan Sadlon – Data Science Manager

Demystifying AI



Goals for Talk

Understand the difference between learning types

- Supervised
- Unsupervised

Understand the difference between learning methods

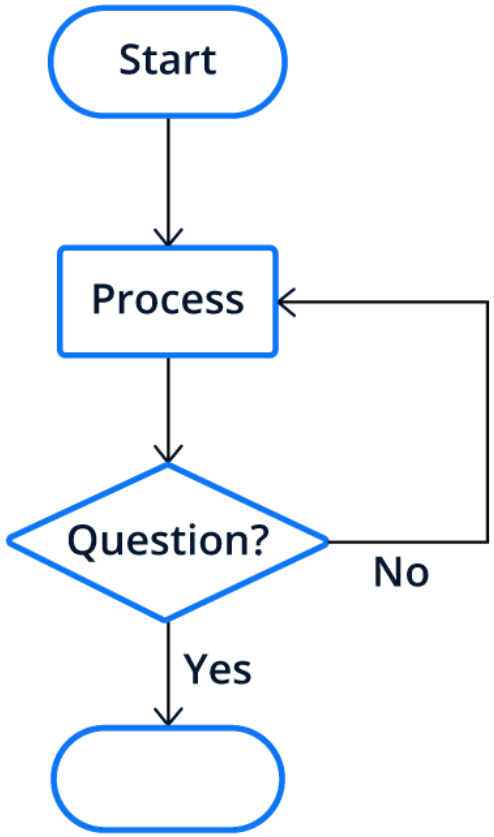
-Regression
-Decision Tree
-Neural Network
-Clustering

Understand the difference between

-Artificial Intelligence (AI)
-Machine Learning (ML)
-Deep Learning (DL)

What is Machine Learning

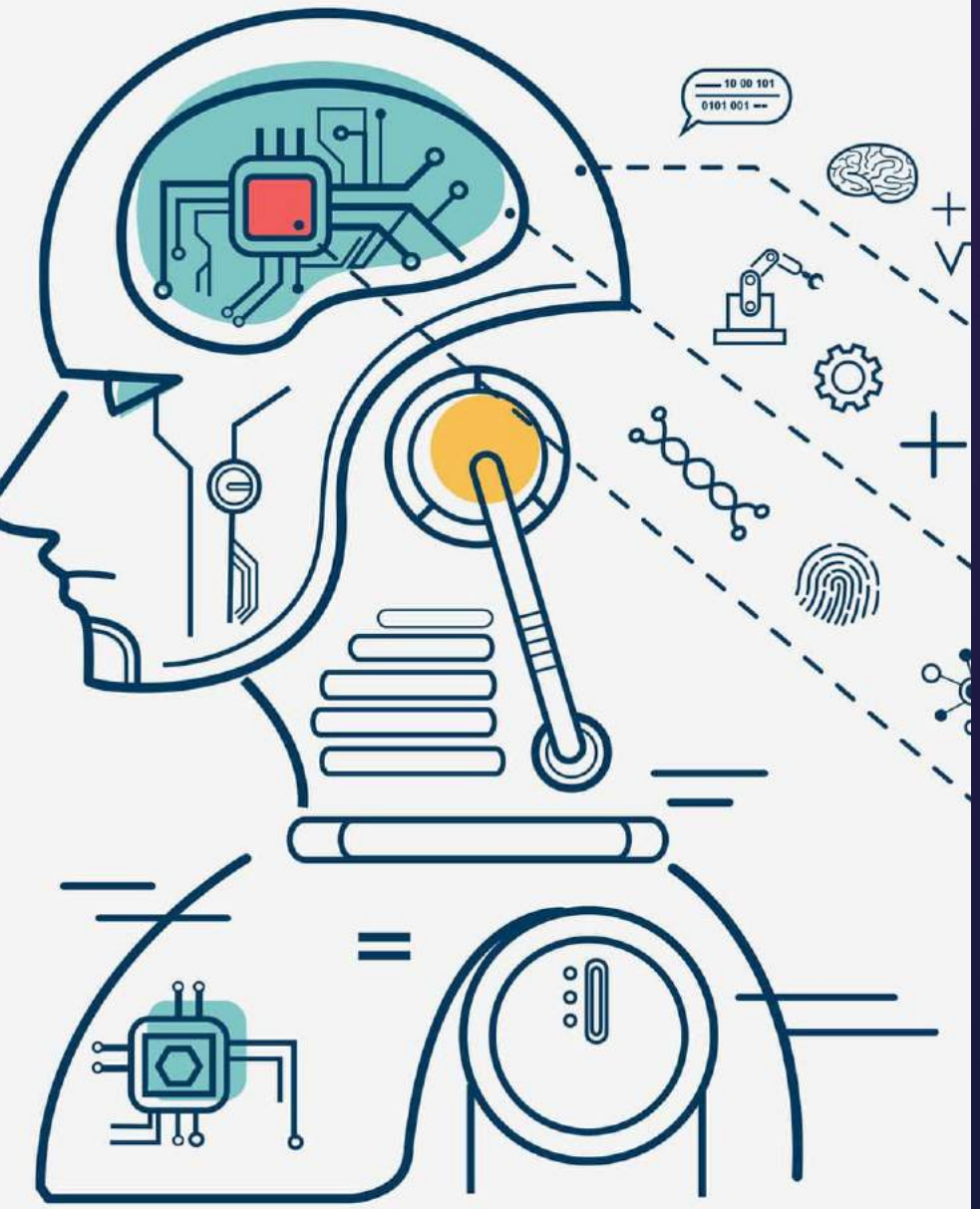
Math Primer



Algorithm - Series of steps to solve a problem

- How to make a sandwich
  - Step 1 Gather bread and toppings
  - Step 2 Put toppings on bread
  - Step 3 Close sandwich
- How to get Evan to stop his presentation
  - Step 1 Ask a question
- How to solve a math equation $2x+1 = 7$
  - Step 1 Move like terms to same side ($2x = 6$)
  - Step 2 Get rid of coefficients ($x=3$)

What am I trying to solve?



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Supervised Learning

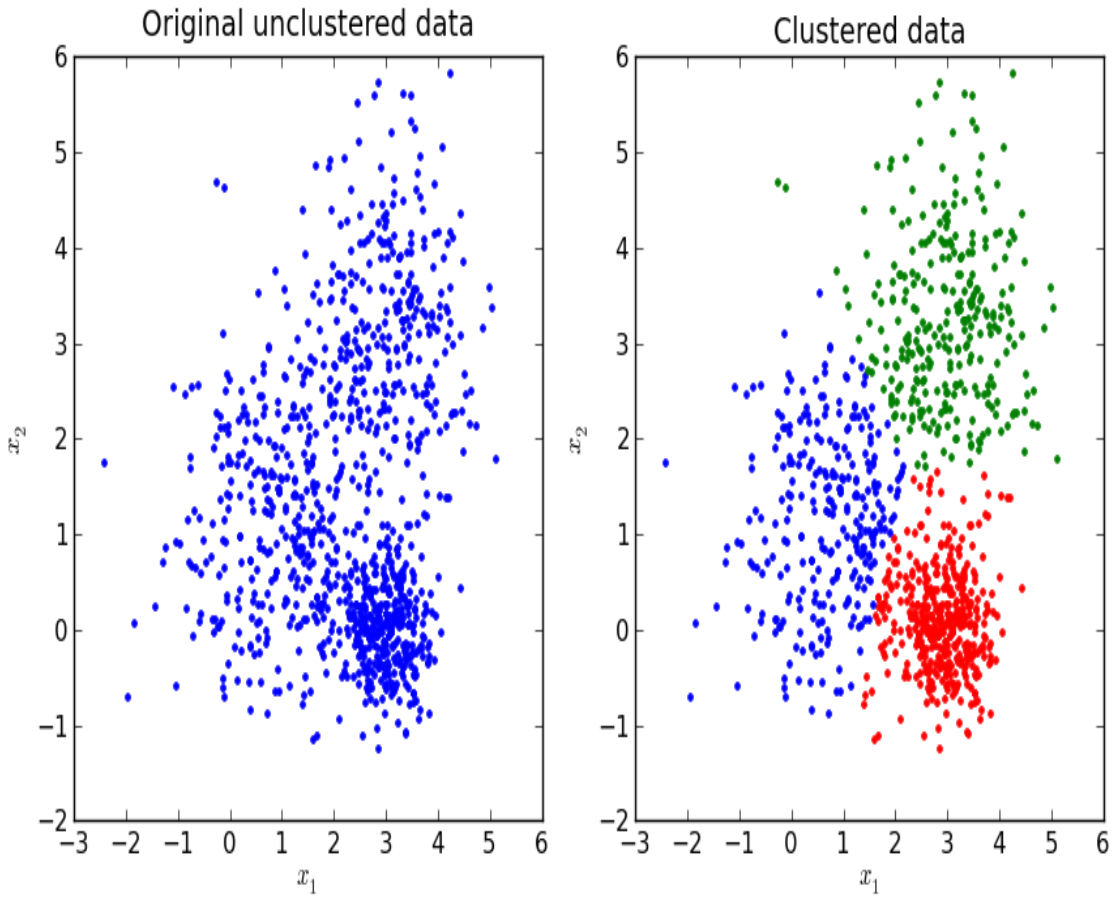
Loan Amount	Existing Debt	Income	Paid Back
100	0	400	Yes
210	30	950	Yes
900	100	400	No
200	900	950	No
100	0	950	??
100	900	400	??

Based on previous experience, predict what will happen next

Use Cases:

- Based on temperature profile and feed+water consumed up to age 30, predict weight at 35
- Based on life of flock egg production, predict how many more eggs will be produced by week

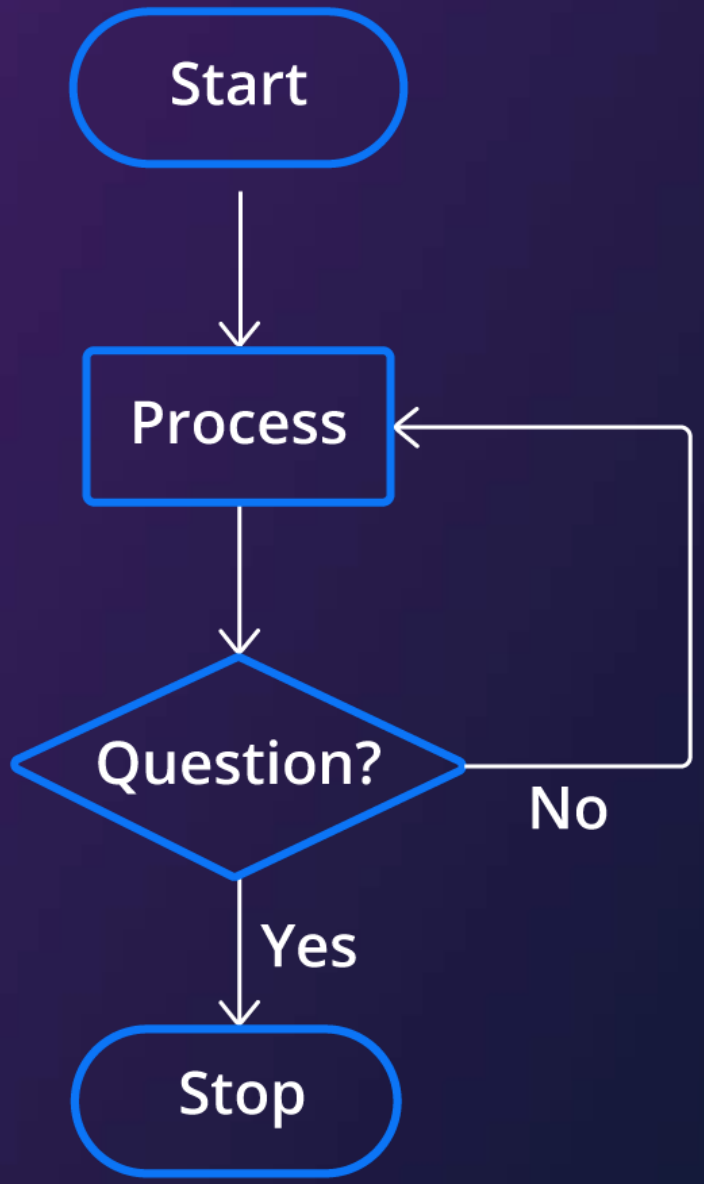
Unsupervised Learning



Group items to find interesting patterns or make predictions

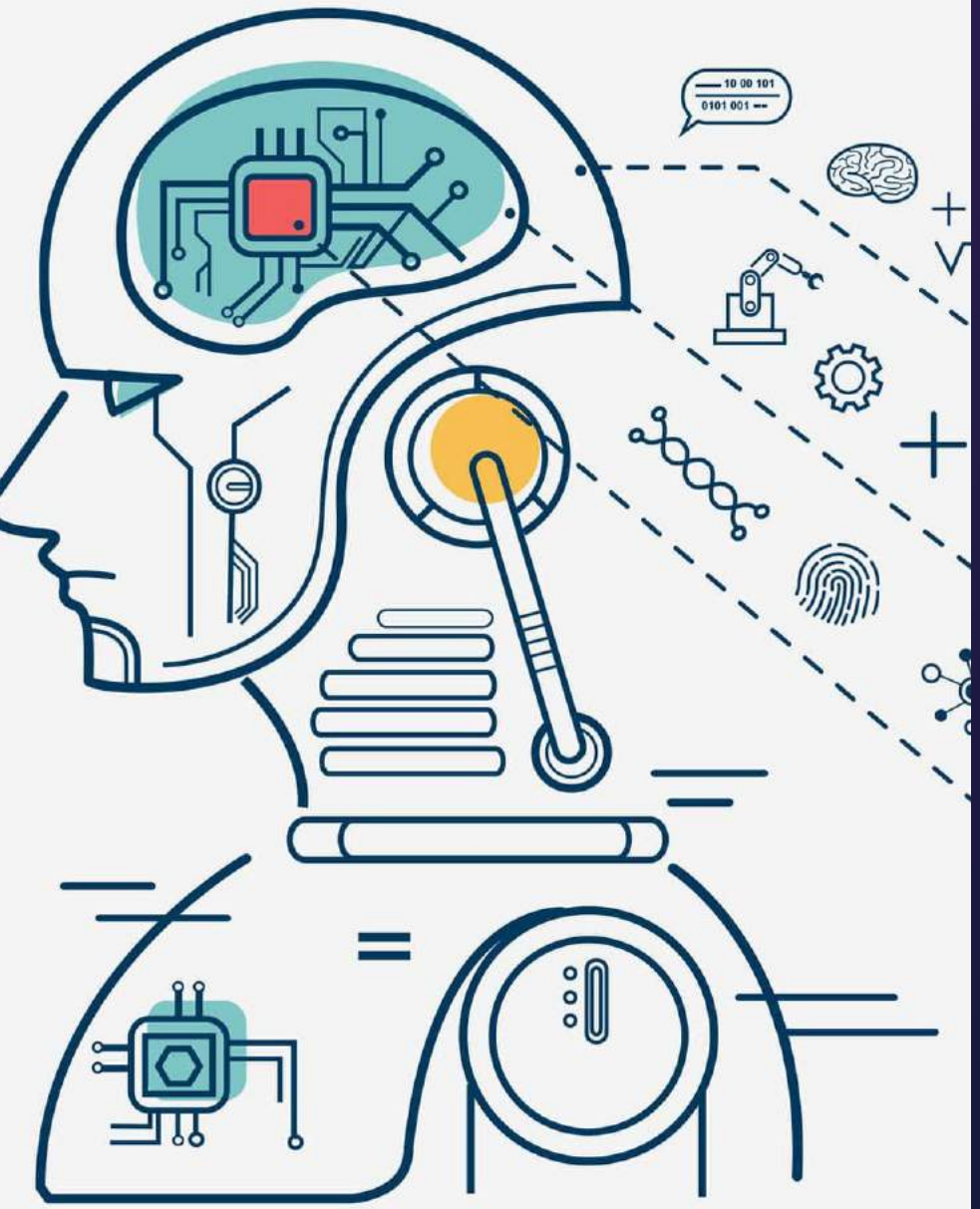
Use Cases:

- Group flocks by performance, then look at shared characteristics (or vice versa)
- Find farms between two clusters, and see what you can change to drag it to a certain one



How to get Evan to stop his presentation

Step 1 Ask a question



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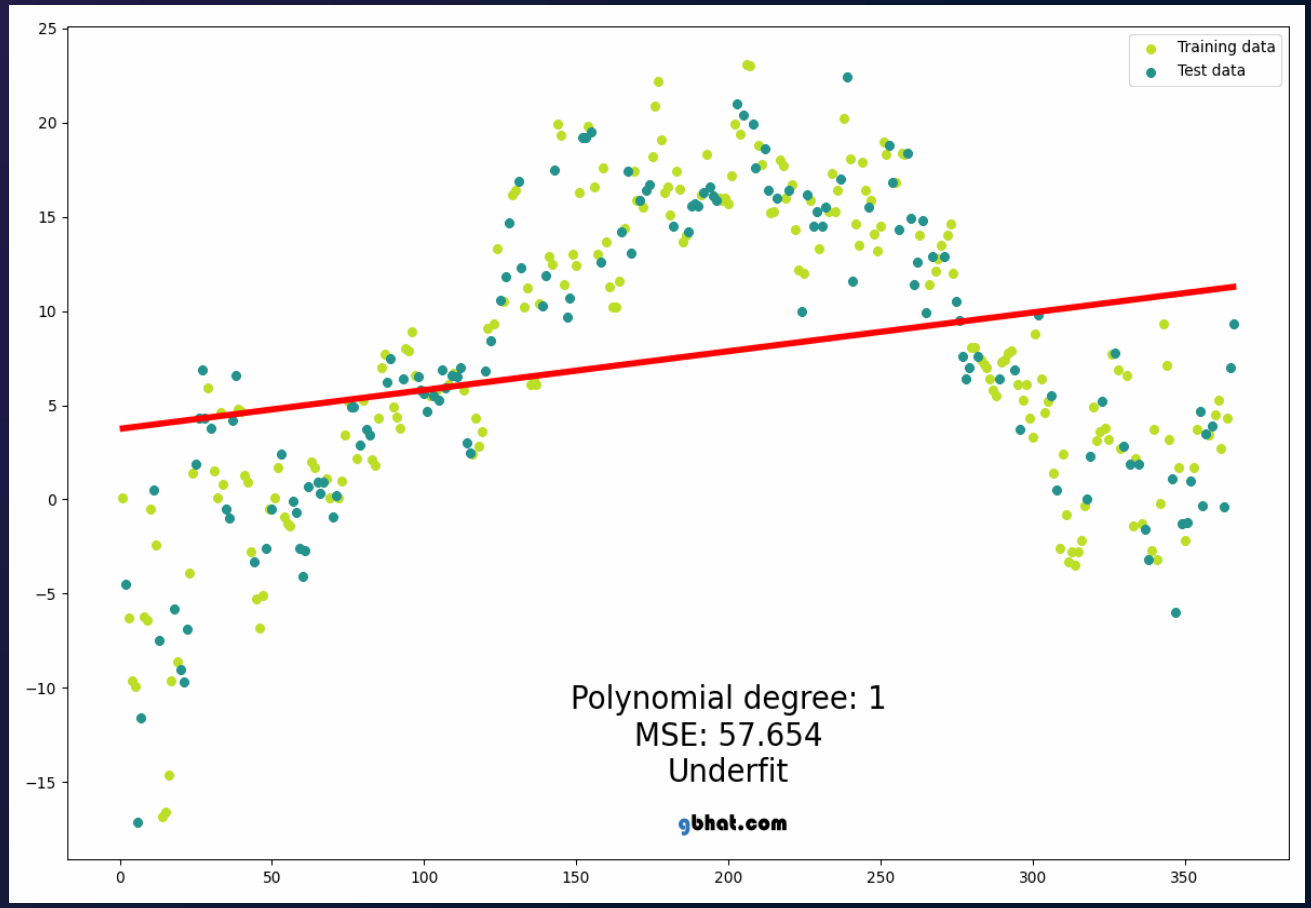
Regression

- **Overview**
  - Includes certain types of non-straight lines
  - You have a formula, and you run an algorithm to draw a line as close to all points as possible, only changing the coefficients
  - More coefficients = more accuracy! (Kind of)

- **Algorithm**
  - Step 1 Take a guess what coefficients should be
  - Step 2 Plug in known inputs/outputs and write down how off we were
  - Step 3 Figure out which coefficients are giving us problems and change them
  - Step 4 Repeat steps 2-3 until changing doesn't make us more accurate



Decision Trees

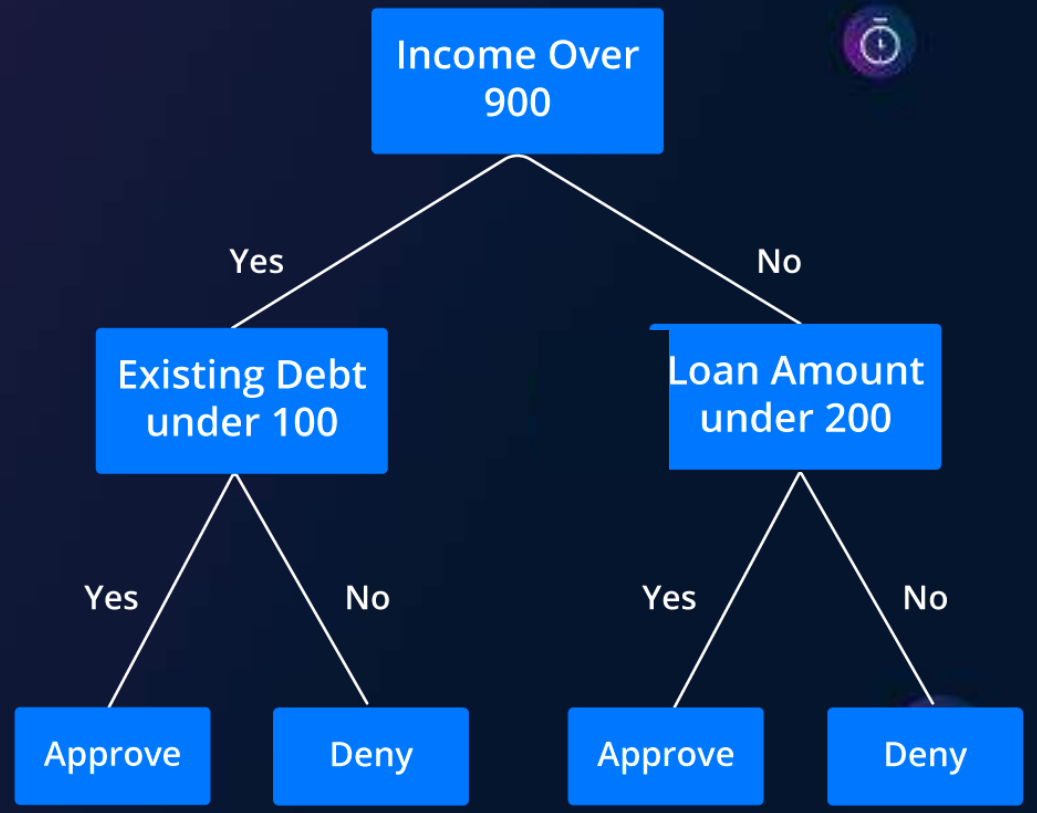
Loan Amount	Existing Debt	Income	Paid Back
100	0	400	??
100	0	950	Yes
210	30	950	Yes
300	100	400	Yes
200	900	950	??
100	900	400	No

- **Overview**
  - Includes many types of non-straight lines
  - You have many rows and interesting columns, and the computer builds you the model.
  - No math formula is given!
  - More data = more accurate (kind of)

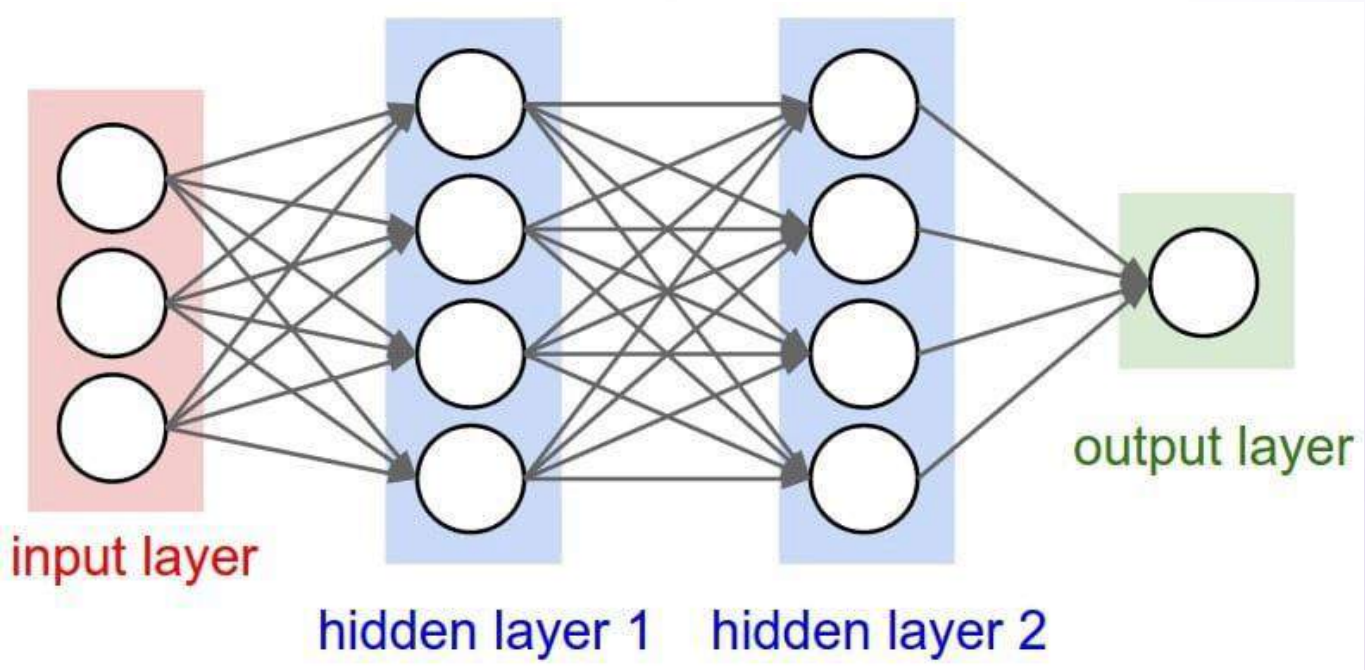
- **Algorithm**
  - Step 1 Pick an important column
  - Step 2 Sort the entire table by that column
  - Step 3 Split the table in half by the average of that column
  - Step 4 Repeat steps 1-3 until splitting leaves N rows

Decision Trees

Loan Amount	Existing Debt	Income	Paid Back
100	0	400	Yes
100	0	950	Yes
210	30	950	Yes
300	100	400	Yes
200	900	950	No
100	900	400	No*



Neural Networks



- **Overview**
  - Can learn the most complicated trends
  - Usually very hard to interpret
  - Long training times
  - Needs lots of data
  - More layers/nodes = more accuracy! (Kind of)

- **Algorithm**
  - Step 1 Take a guess what coefficients should be
  - Step 2 Plug in known inputs/outputs and write down how off we were
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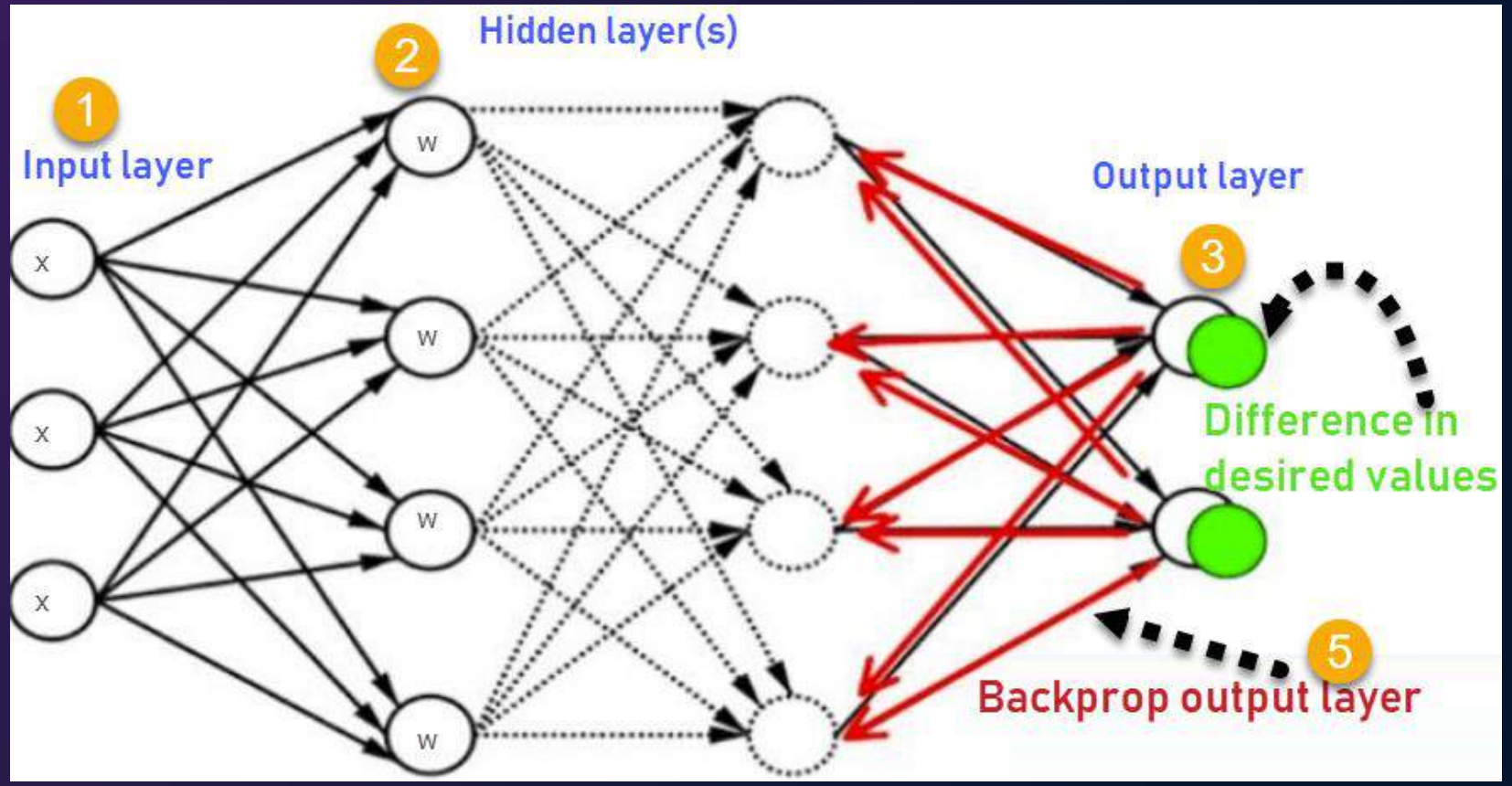
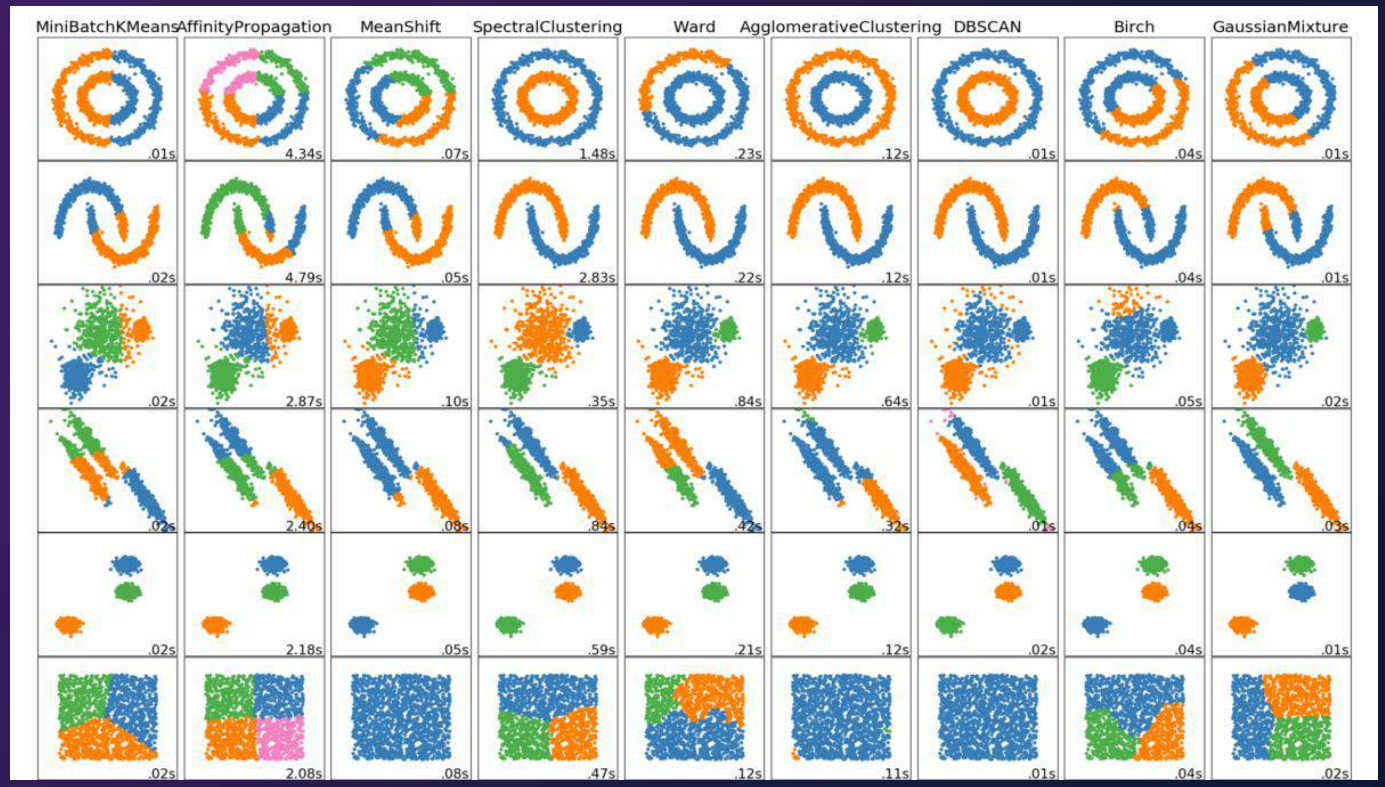
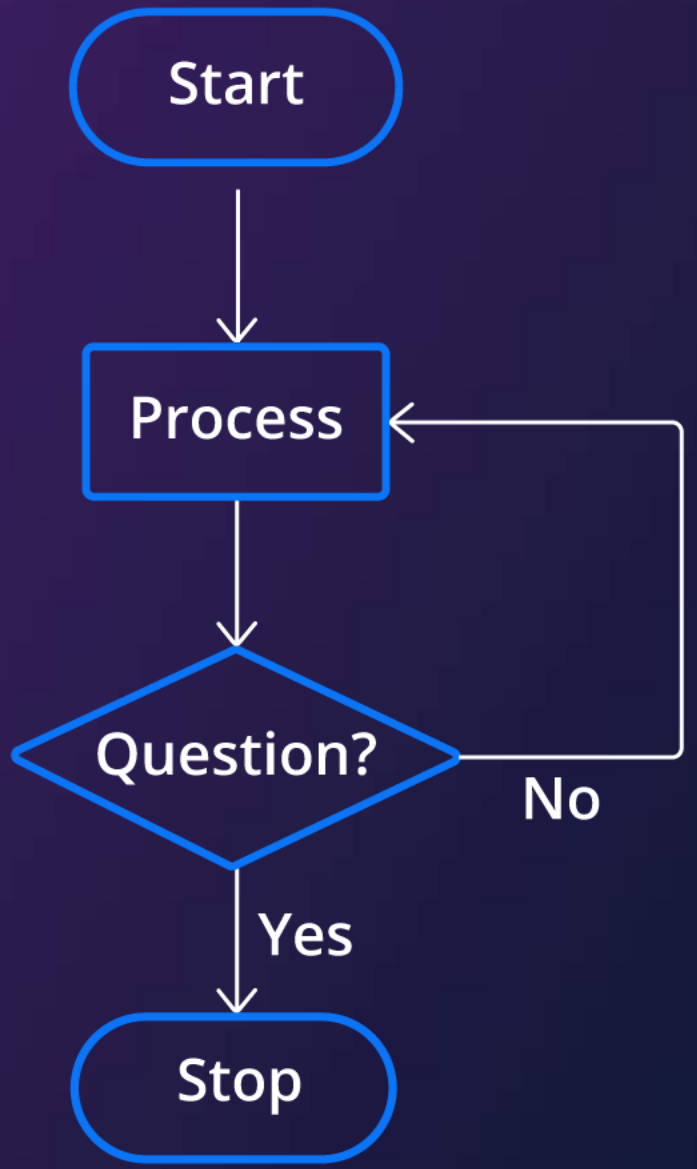
Neural Networks



Clustering

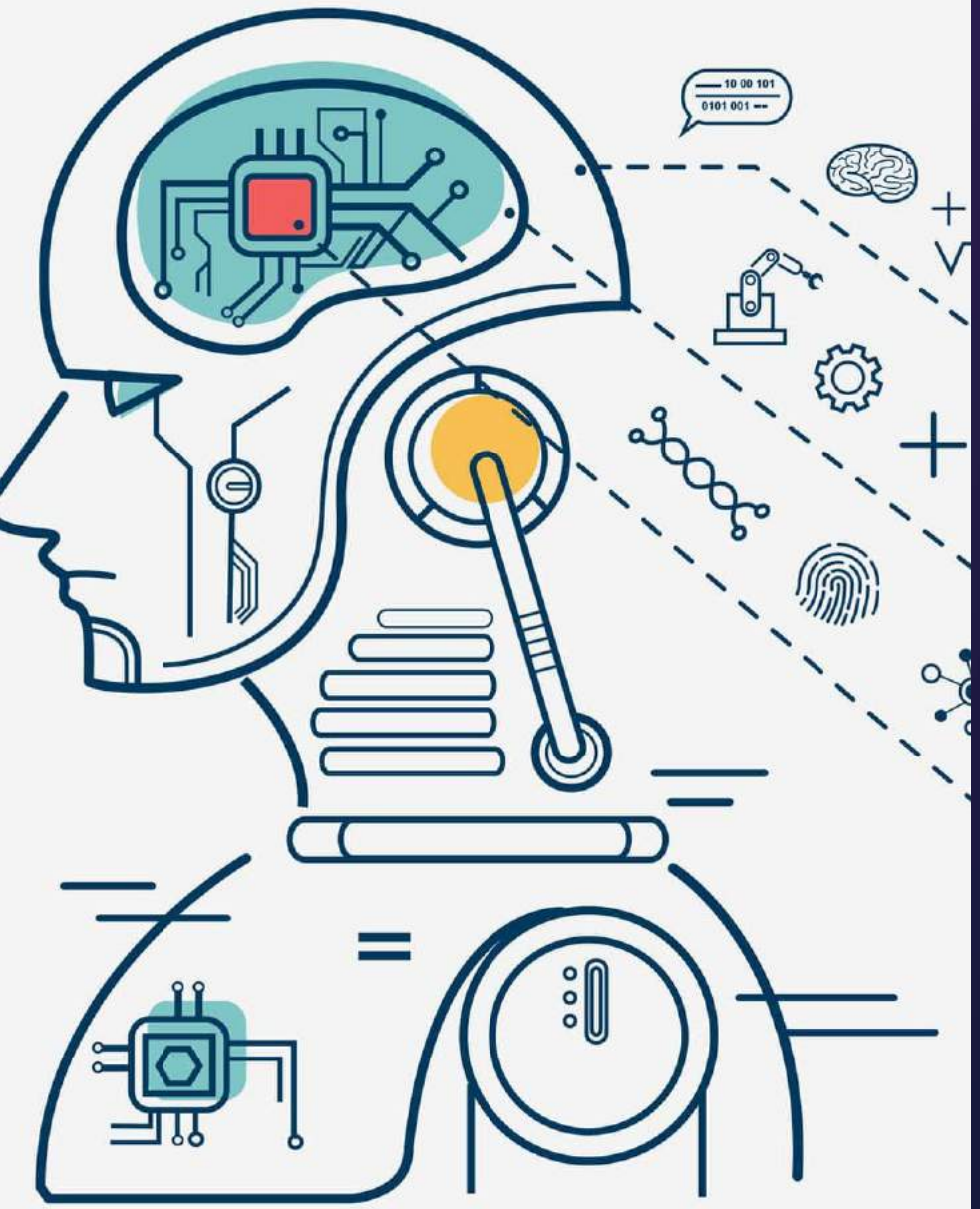


- **Overview**
  - Data dependent which algorithm you choose
  - More experimental and data discovery driven
- **Algorithm**
  - Step 1 Pick N random starting points
  - Step 2 Find next points that will minimize the total distance between found points
  - Step 3 Add “closest” points to their respective group
  - Step 4 Repeat steps 2-3 until for all points



How to get Evan to stop his presentation

Step 1 Ask a question



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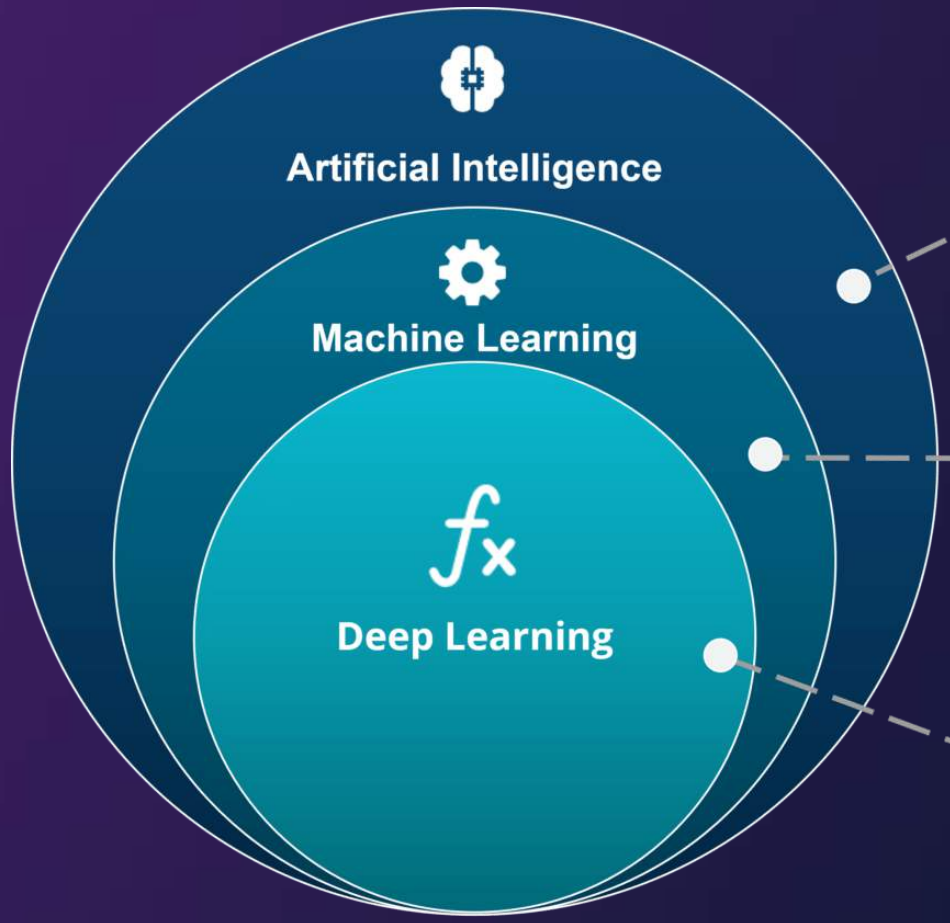
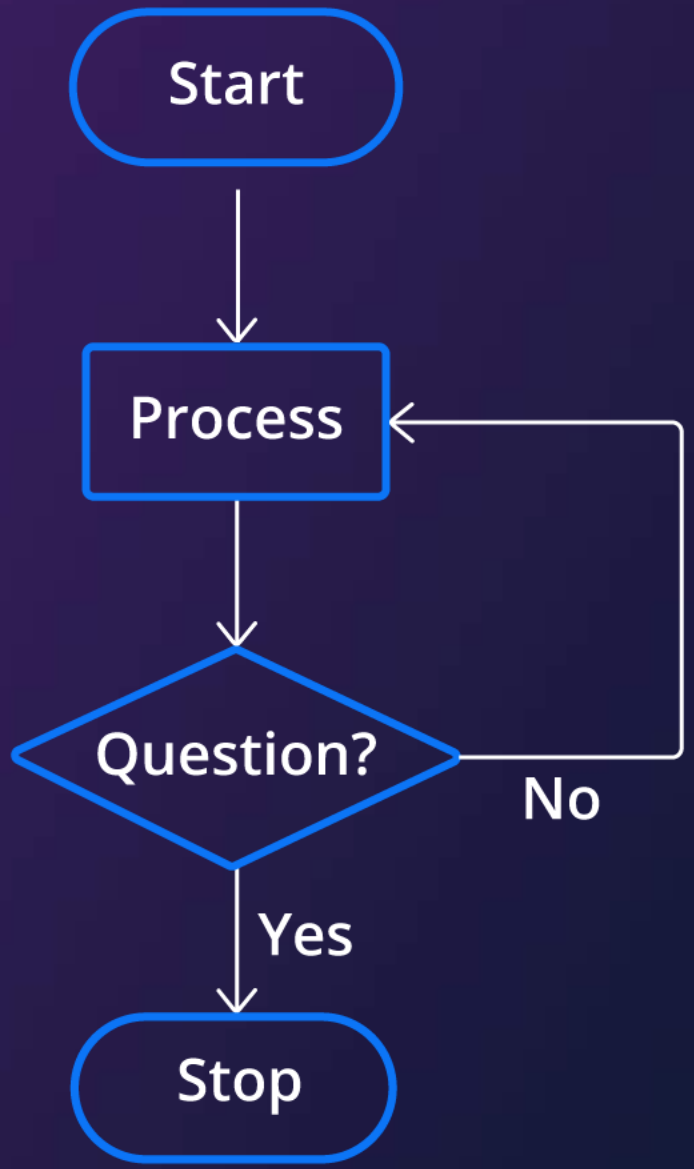


ARTIFICIAL INTELLIGENCE
A technique which enables machines to mimic human behaviour

MACHINE LEARNING
Subset of AI technique which use statistical methods to enable machines to improve with experience

DEEP LEARNING
Subset of ML which make the computation of multi-layer neural network feasible



How to get Evan to stop his presentation

Step 1 Ask a question

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Thanks Gracias 謝謝 ارك ش Danke Спасибо ありがとう Obrigado

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