AI for Workforce

Module 3: What is inside AI?

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Recap

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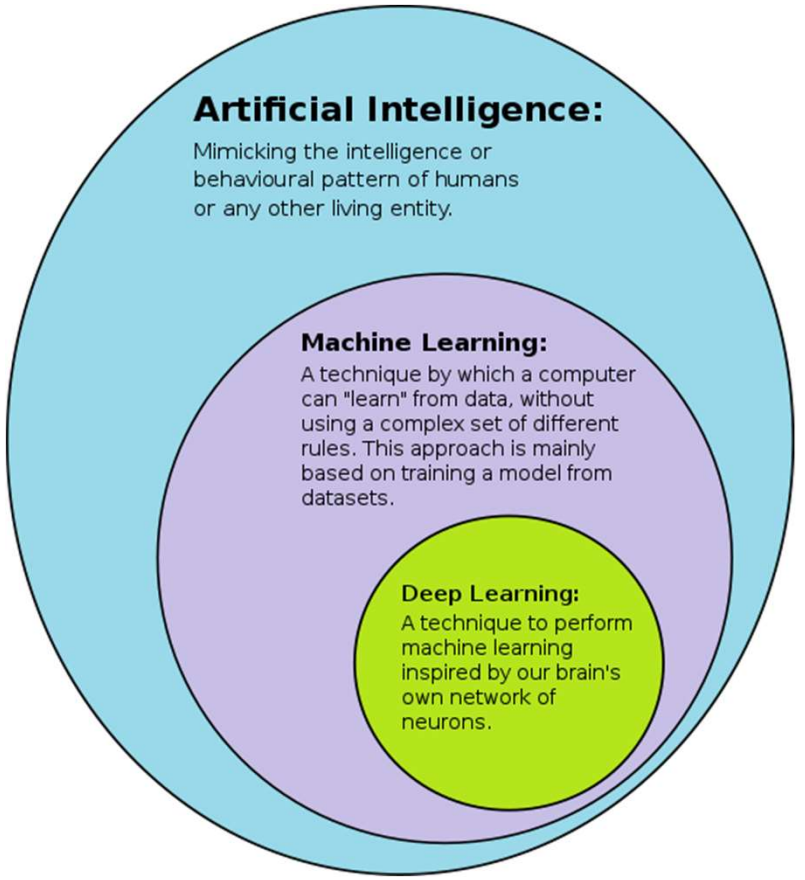
Let’s start by understanding how AI, Machine Learning and Deep Learning fit together

Artificial Intelligence: Mimicking the intelligence or behavior pattern of humans (umbrella term)

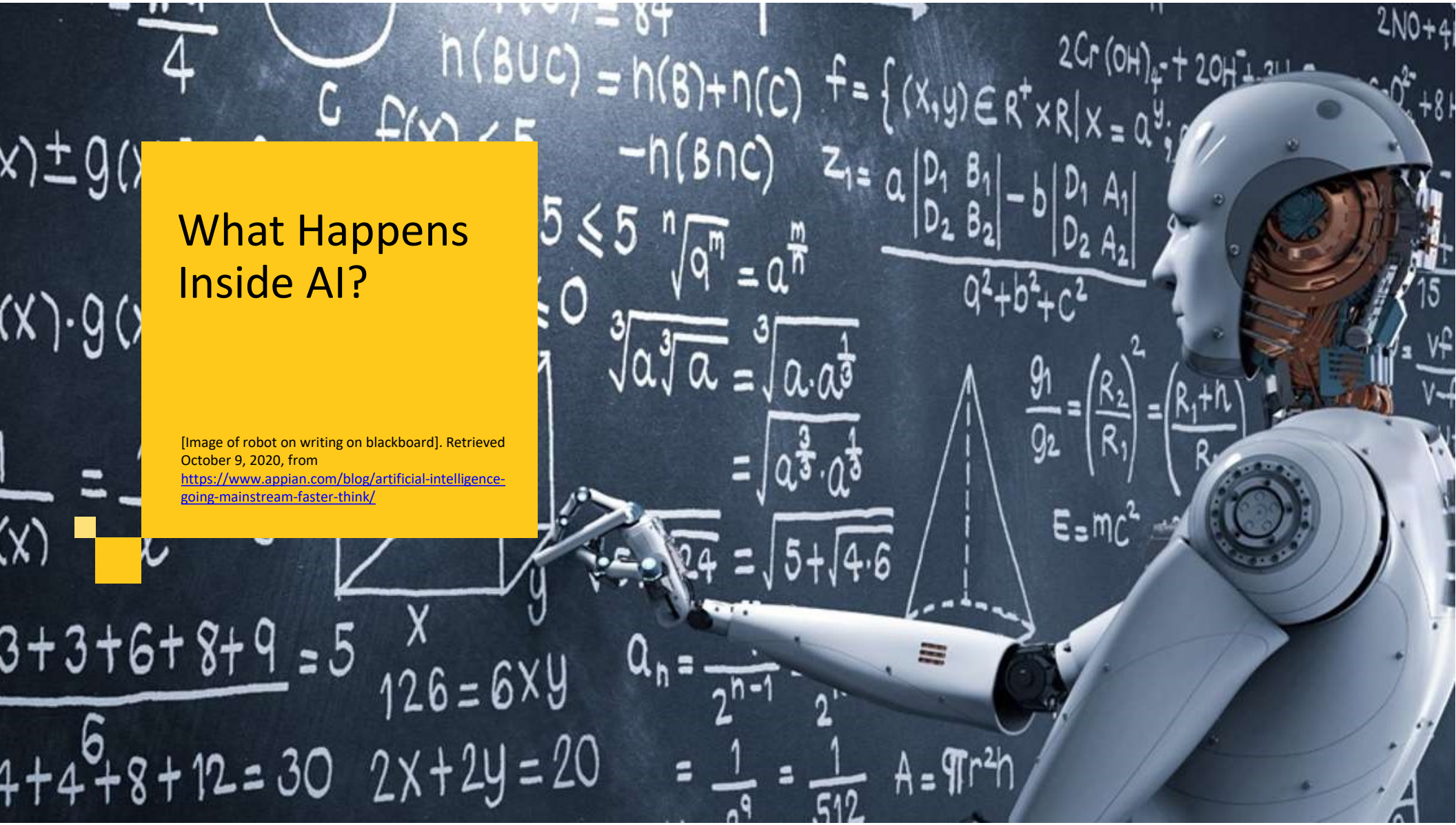
Machine Learning: A technique by which a computer can “learn” from data without explicit rules.

Deep Learning: A technique to perform machine learning inspired by our brain’s own network of neurons



[Image of AI-ML-DL] Retrieved on Oct 3, 2021 from https://commons.wikimedia.org/wiki/File:AI-ML-DL.svg

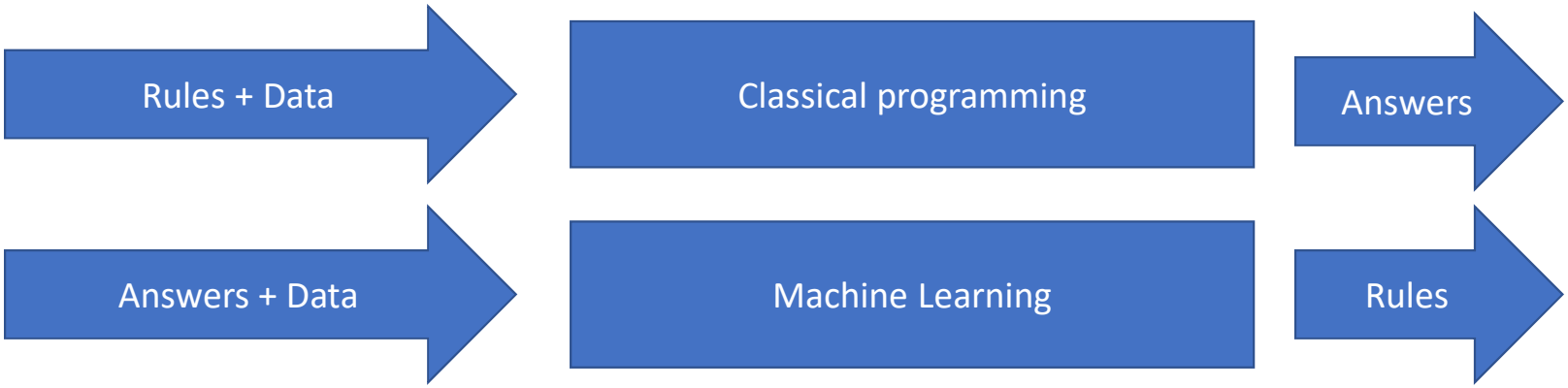
What Happens Inside AI?



[Image of robot on writing on blackboard]. Retrieved October 9, 2020, from https://www.appian.com/blog/artificial-intelligence-going-mainstream-faster-think/

How AI Works

- Computer algorithms make predictions based on existing data. By using statistics, it aims to find a pattern in the massive amount of data, and thus creating a rule to make decisions. The rule is created from the pattern and not from programming it explicitly.



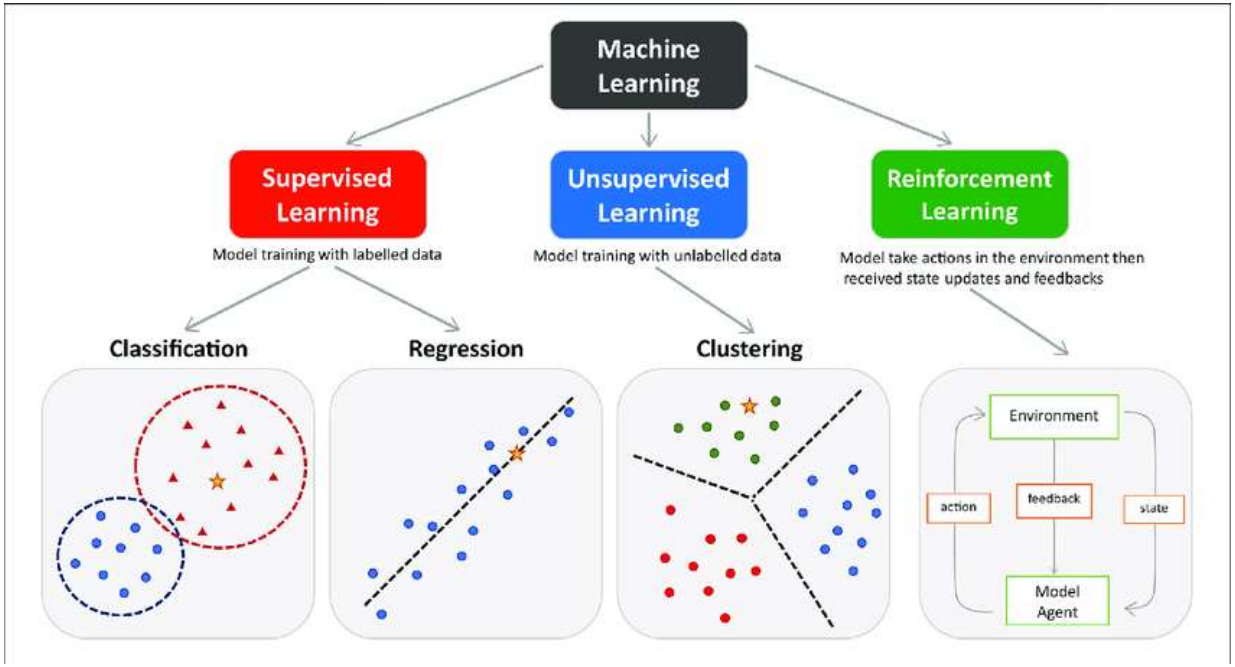
Machine learning (ML) is an important subsection of AI and will be studied in detail in the further weeks.

However, for now let us look at some broad distinctions in ML to understand the working of AI.

Types of Machine Learning Models

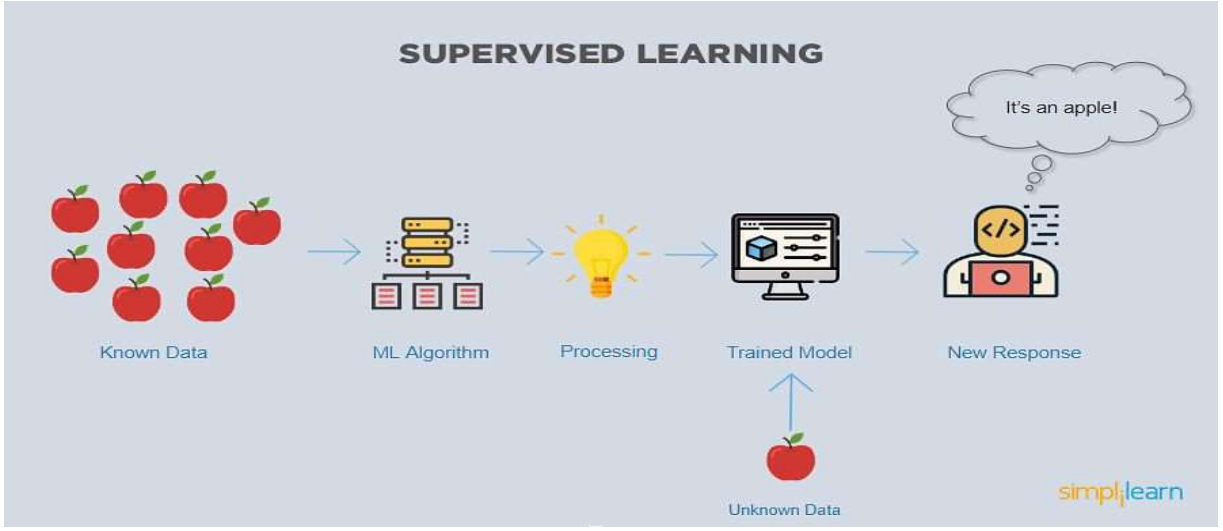
AI Models are broadly classified intro three types:

- Supervised Learning
- Unsupervised Learning
- Reinforcement learning



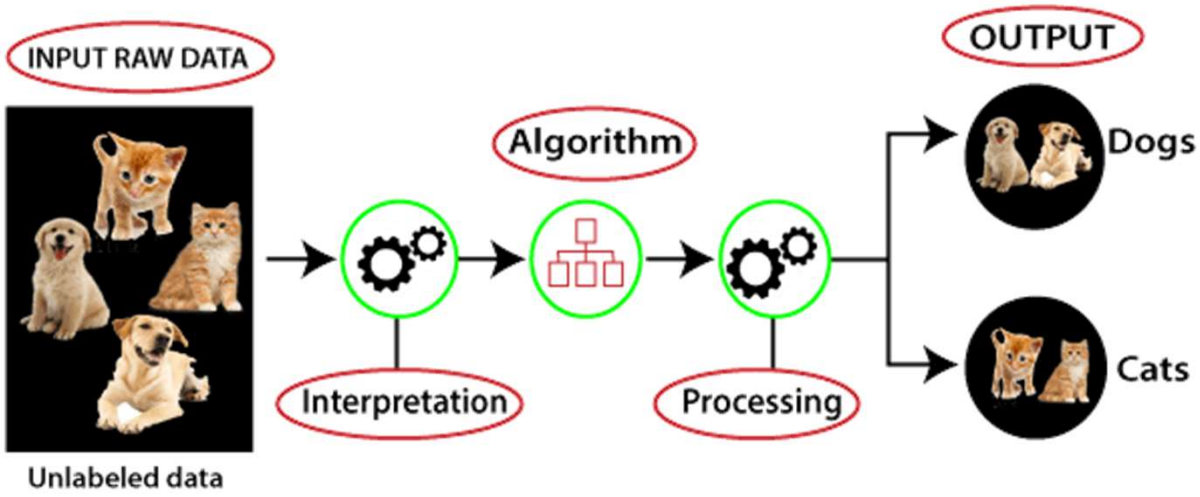
Types of AI Models- Supervised Learning

- This model is trained using labeled data.
- This method involves providing the model with correct inputs and outputs so that it learns the expected behavior through a mapping function.
- Supervised learning has real world applications such as risk assessment, image categorization, fraud detection, spam filtering, etc.



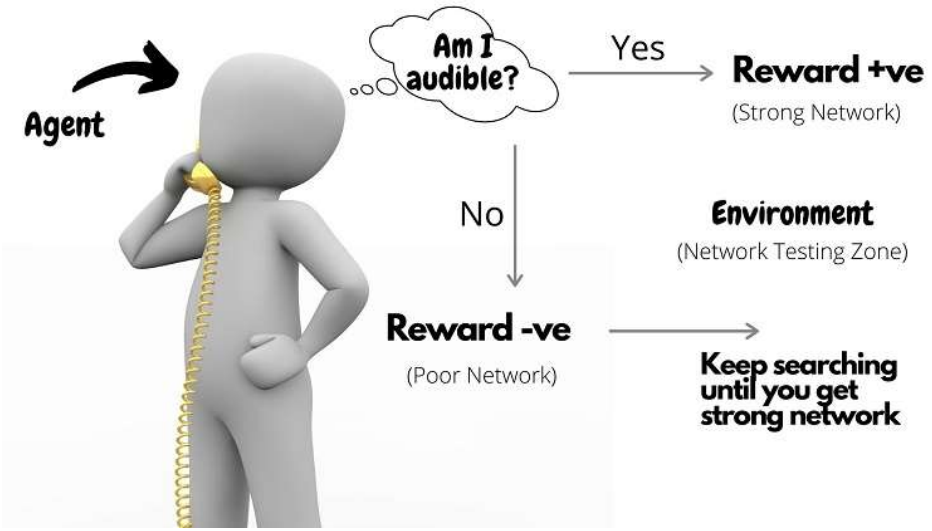
Types of AI Models- Unsupervised Learning

- In this models the training set is not labelled.
- The model tries to find similarities and patterns in objects and groups them together.
- Useful in real world scenarios where the ideal solution to the problem is not known.



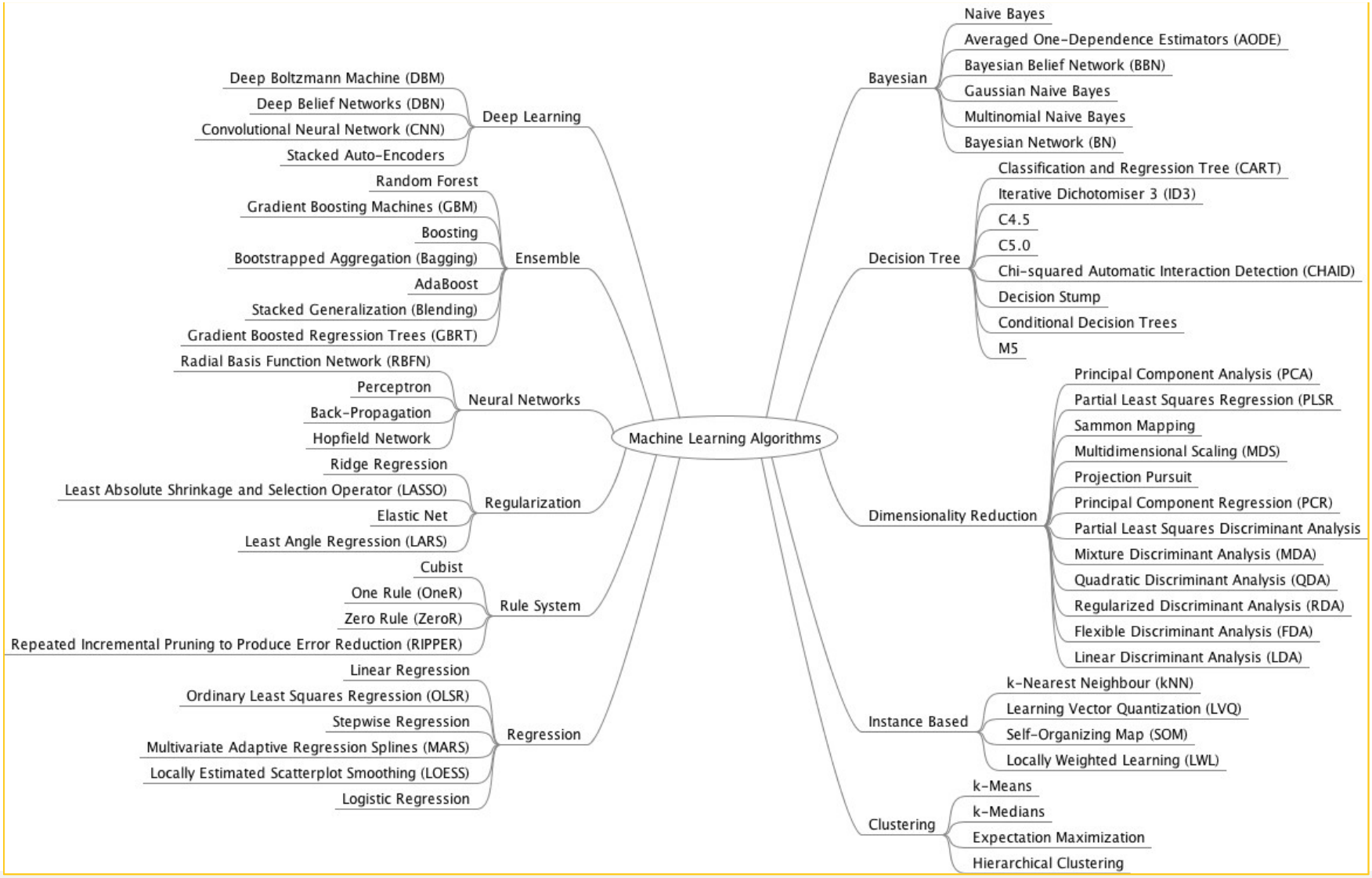
Types of AI Models- Reinforcement Learning

- Reinforcement learning uses feedback-based algorithms, where it observes each output from the algorithm to improve itself.
- One major example includes robot house cleaners. These robots initially bump lightly into walls and slowly build a map of the house with all these learnings.



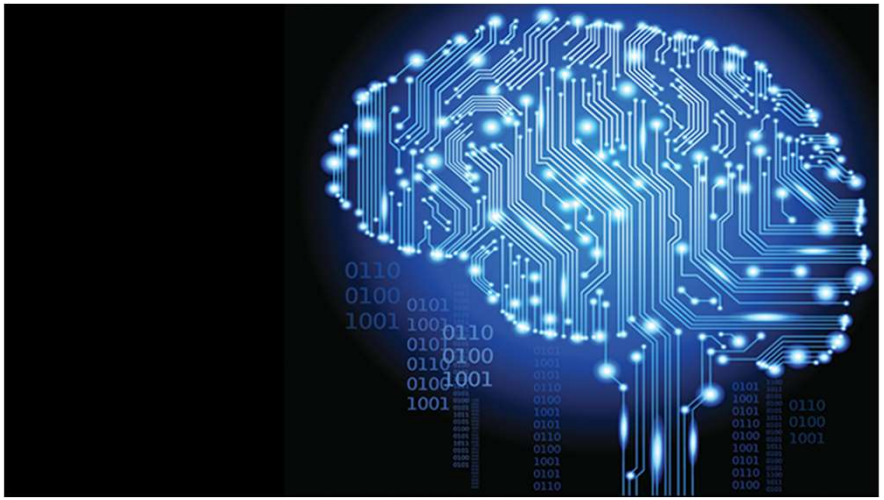
For a detailed look into types of ML algorithms refer to the next diagram

[Image of a network of Machine Learning Algorithm]. Retrieved October 9, 2020, from https://towardsdatascience.com/which-machine-learning-model-to-use-db5fdf37f3dd


Machine Learning Algorithms
Deep Learning
Deep Boltzmann Machine (DBM)
Deep Belief Networks (DBN)
Convolutional Neural Network (CNN)
Stacked Auto-Encoders
Ensemble
Random Forest
Gradient Boosting Machines (GBM)
Boosting
Bootstrapped Aggregation (Bagging)
AdaBoost
Stacked Generalization (Blending)
Gradient Boosted Regression Trees (GBRT)
Neural Networks
Radial Basis Function Network (RBFN)
Perceptron
Back-Propagation
Hopfield Network
Regularization
Ridge Regression
Least Absolute Shrinkage and Selection Operator (LASSO)
Elastic Net
Least Angle Regression (LARS)
Rule System
Cubist
One Rule (OneR)
Zero Rule (ZeroR)
Repeated Incremental Pruning to Produce Error Reduction (RIPPER)
Regression
Linear Regression
Ordinary Least Squares Regression (OLSR)
Stepwise Regression
Multivariate Adaptive Regression Splines (MARS)
Locally Estimated Scatterplot Smoothing (LOESS)
Logistic Regression
Bayesian
Naive Bayes
Averaged One-Dependence Estimators (AODE)
Bayesian Belief Network (BBN)
Gaussian Naive Bayes
Multinomial Naive Bayes
Bayesian Network (BN)
Decision Tree
Classification and Regression Tree (CART)
Iterative Dichotomiser 3 (ID3)
C4.5
C5.0
Chi-squared Automatic Interaction Detection (CHAID)
Decision Stump
Conditional Decision Trees
M5
Dimensionality Reduction
Principal Component Analysis (PCA)
Partial Least Squares Regression (PLSR
Sammon Mapping
Multidimensional Scaling (MDS)
Projection Pursuit
Principal Component Regression (PCR)
Partial Least Squares Discriminant Analysis
Mixture Discriminant Analysis (MDA)
Quadratic Discriminant Analysis (QDA)
Regularized Discriminant Analysis (RDA)
Flexible Discriminant Analysis (FDA)
Linear Discriminant Analysis (LDA)
Instance Based
k-Nearest Neighbour (kNN)
Learning Vector Quantization (LVQ)
Self-Organizing Map (SOM)
Locally Weighted Learning (LWL)
Clustering
k-Means
k-Medians
Expectation Maximization
Hierarchical Clustering

Understanding The Mind of AI

- Artificial Intelligence basically helps a machine take its own decisions, but How?
- Let us understand how AI analyzes a situation and makes a decision.
- Following is the process followed by AI to decide whether a boy can go to a park or not.



How does AI make a decision?

If you want to go to the park, how do you make your decision?

Do I have a jacket?

Do I have an umbrella?

Is it raining now?

What is the weather forecast for later?

brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/people
brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/green
brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/background

How does AI make a decision?

If you want to go to the park, how do you make your decision?

3rd

Do I have a jacket?

4th

Do I have an umbrella?

1st

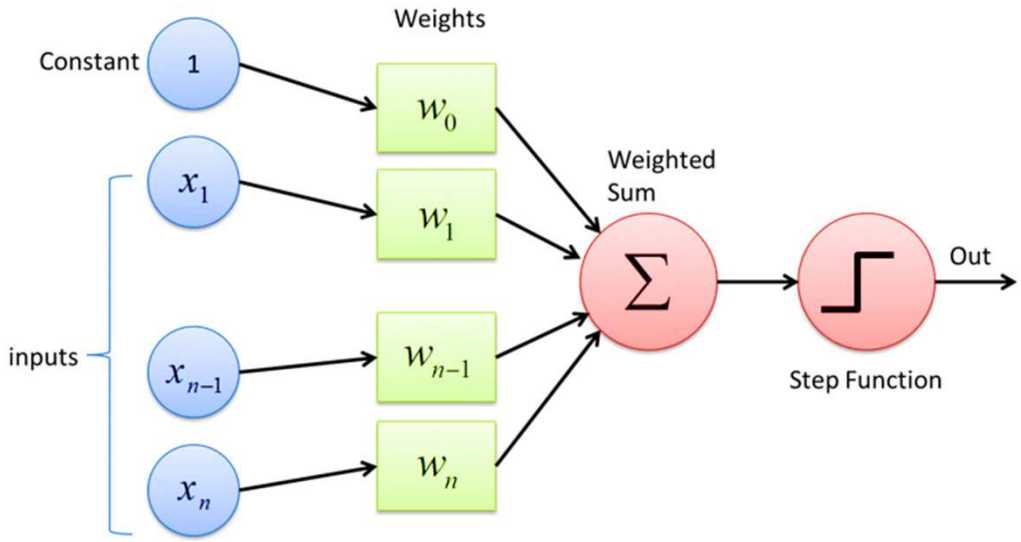
Is it raining now?

2nd

What is the weather forecast for later?

brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/people
brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/green
brgfx[Image].Retrieved October 9, 2020, from https://www.freepik.com/vectors/background

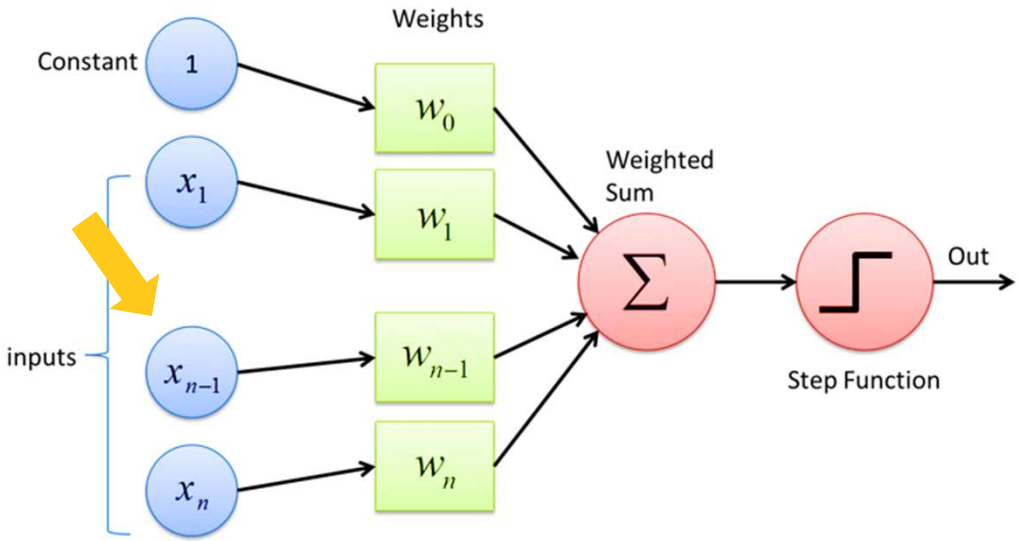
What is a Perceptron?



[Image of perceptron]. Retrieved October 9, 2020, from https://deepai.org/machine-learning-glossary-and-terms/perceptron

What is a Perceptron?

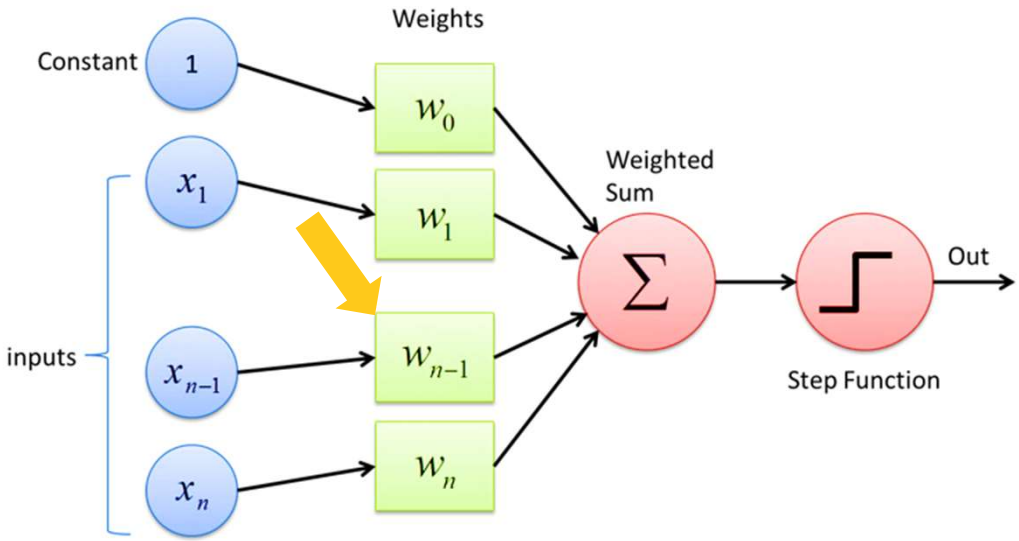
Add all the inputs (factors/conditions/ features) in



[Image of perceptron]. Retrieved October 9, 2020, from https://deepai.org/machine-learning-glossary-and-terms/perceptron

What is a Perceptron?

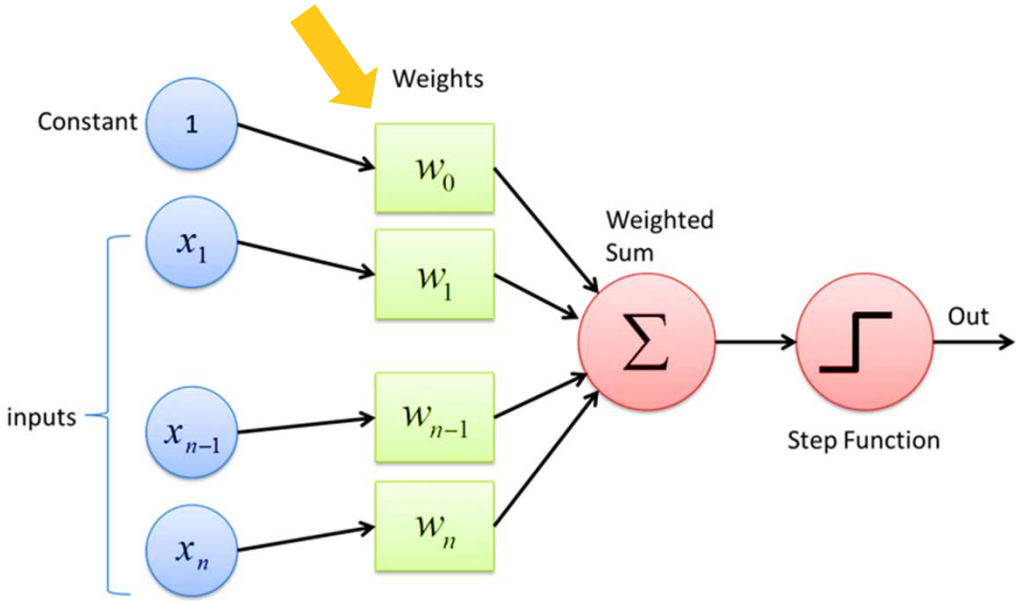
Introduce weights for the importance of the respective inputs



[Image of perceptron]. Retrieved October 9, 2020, from https://deepai.org/machine-learning-glossary-and-terms/perceptron

What is a Perceptron?

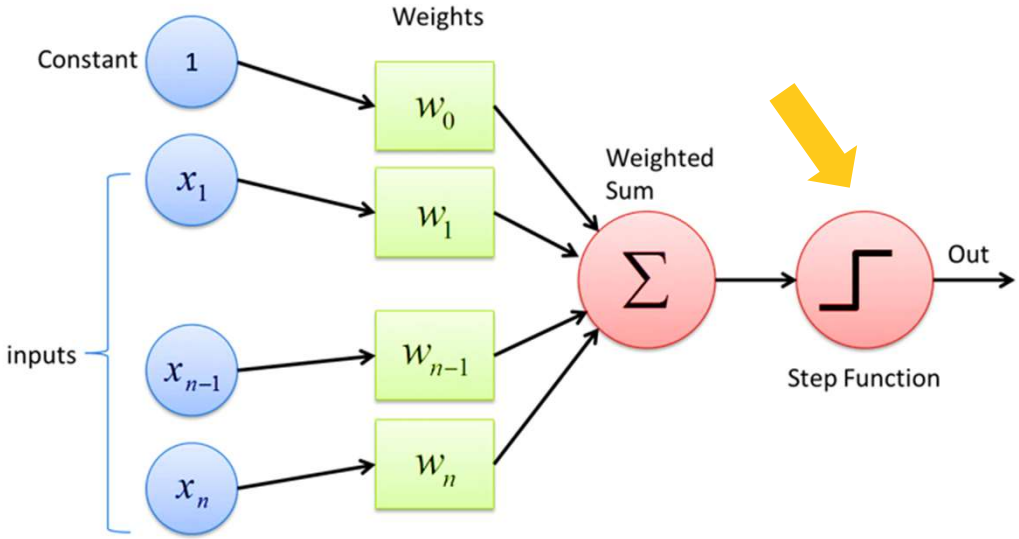
Introduce a ‘bias’ to get a ‘Yes’ or ‘No’ decision



[Image of perceptron]. Retrieved October 9, 2020, from https://deepai.org/machine-learning-glossary-and-terms/perceptron

What is a Perceptron?

What is the outcome?
Positive value = Yes
Negative value = No



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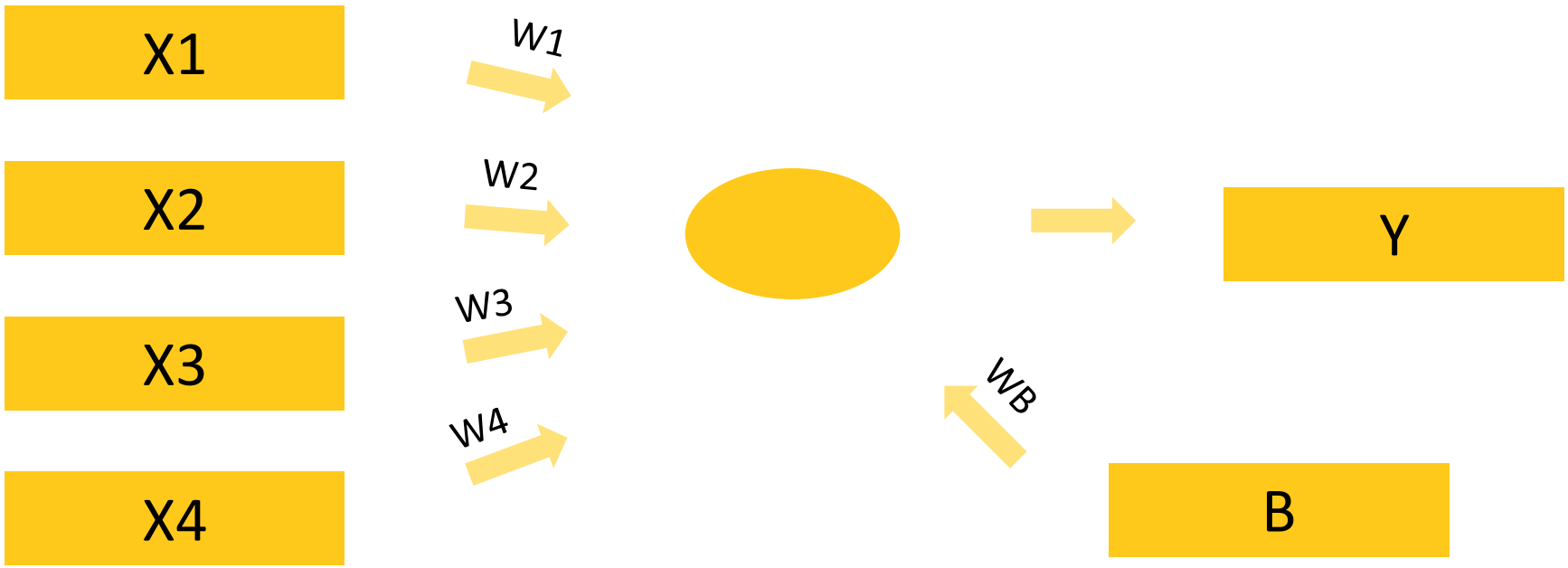
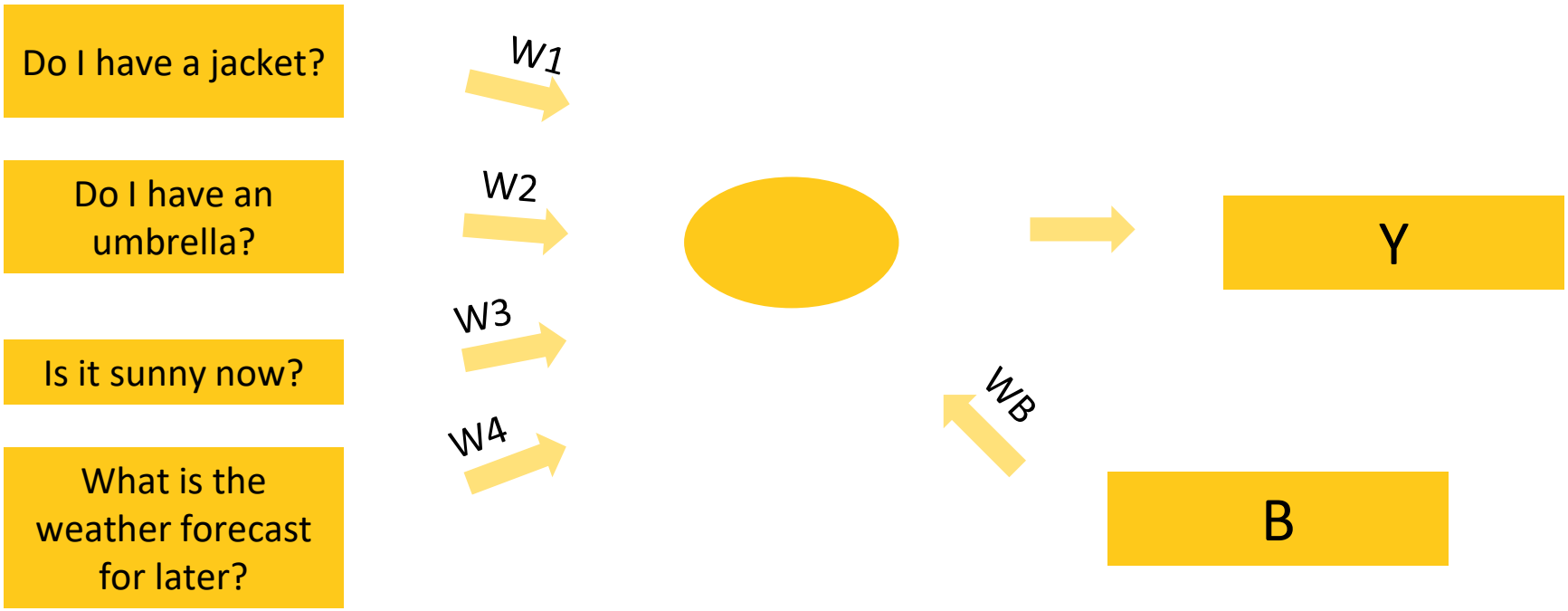
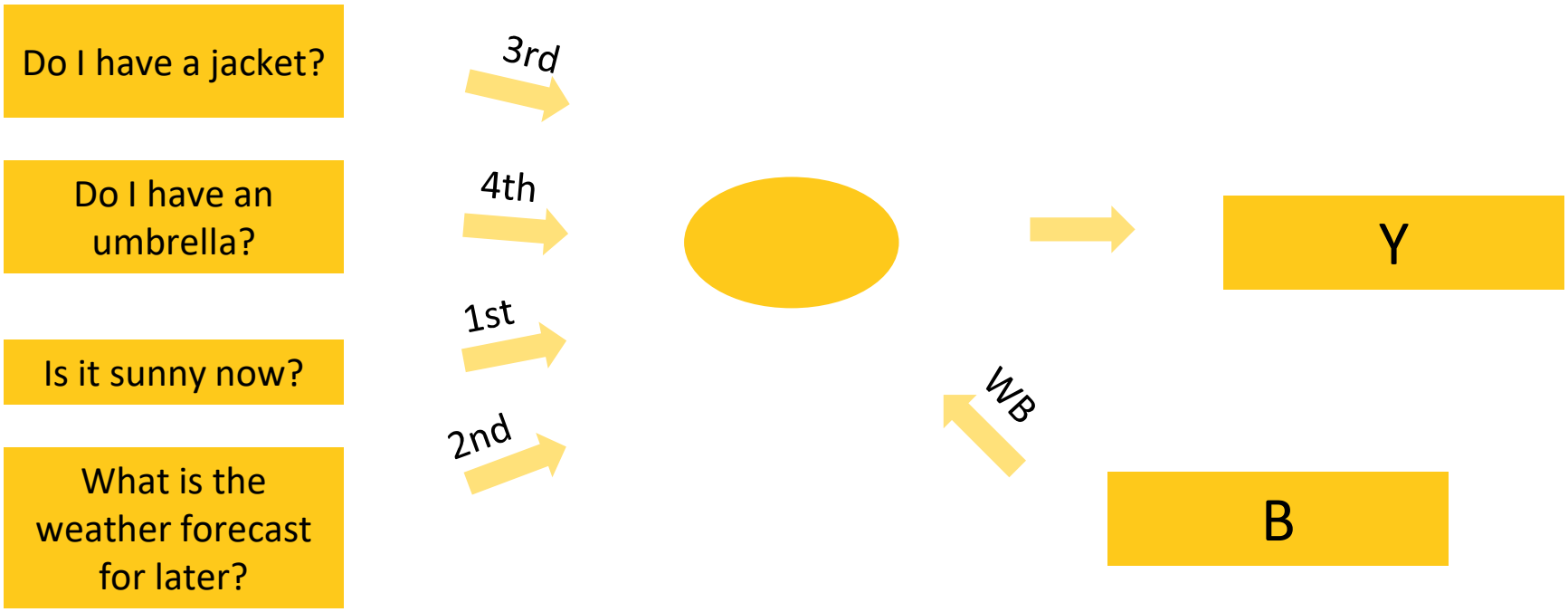
Perceptron Example (go to the park)



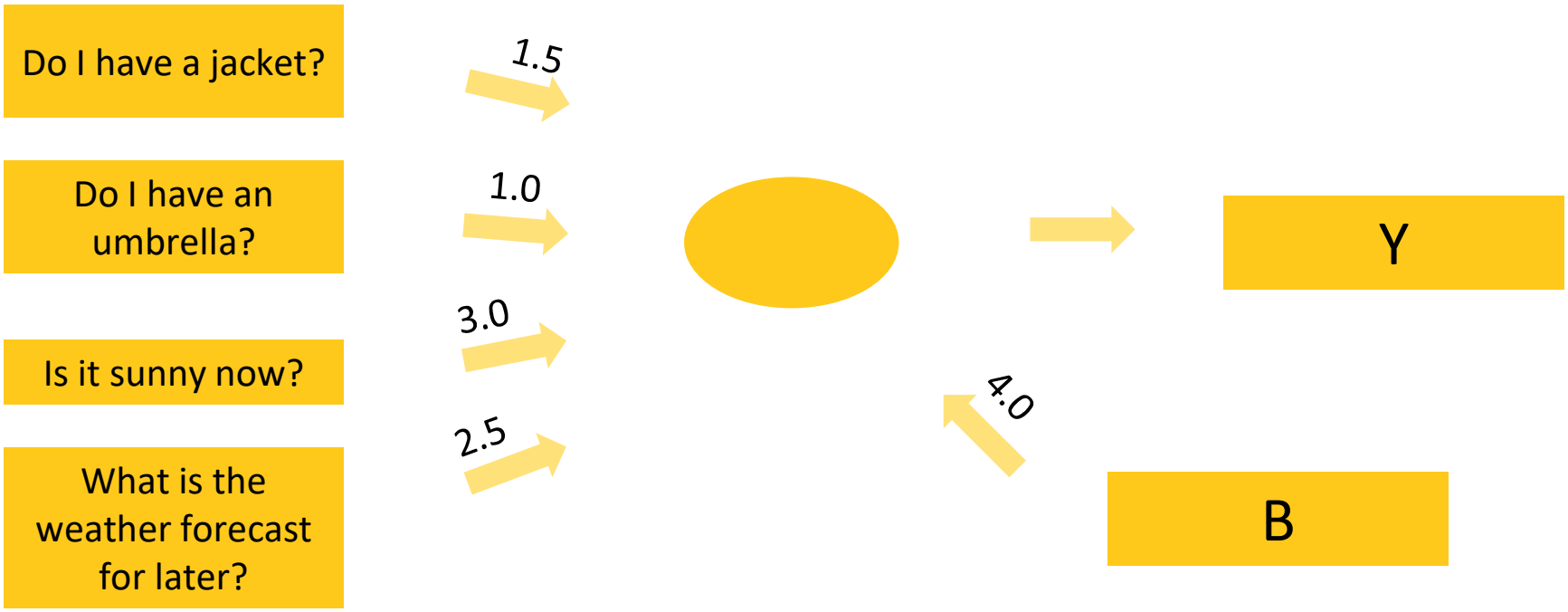
Perceptron Example (go to the park)



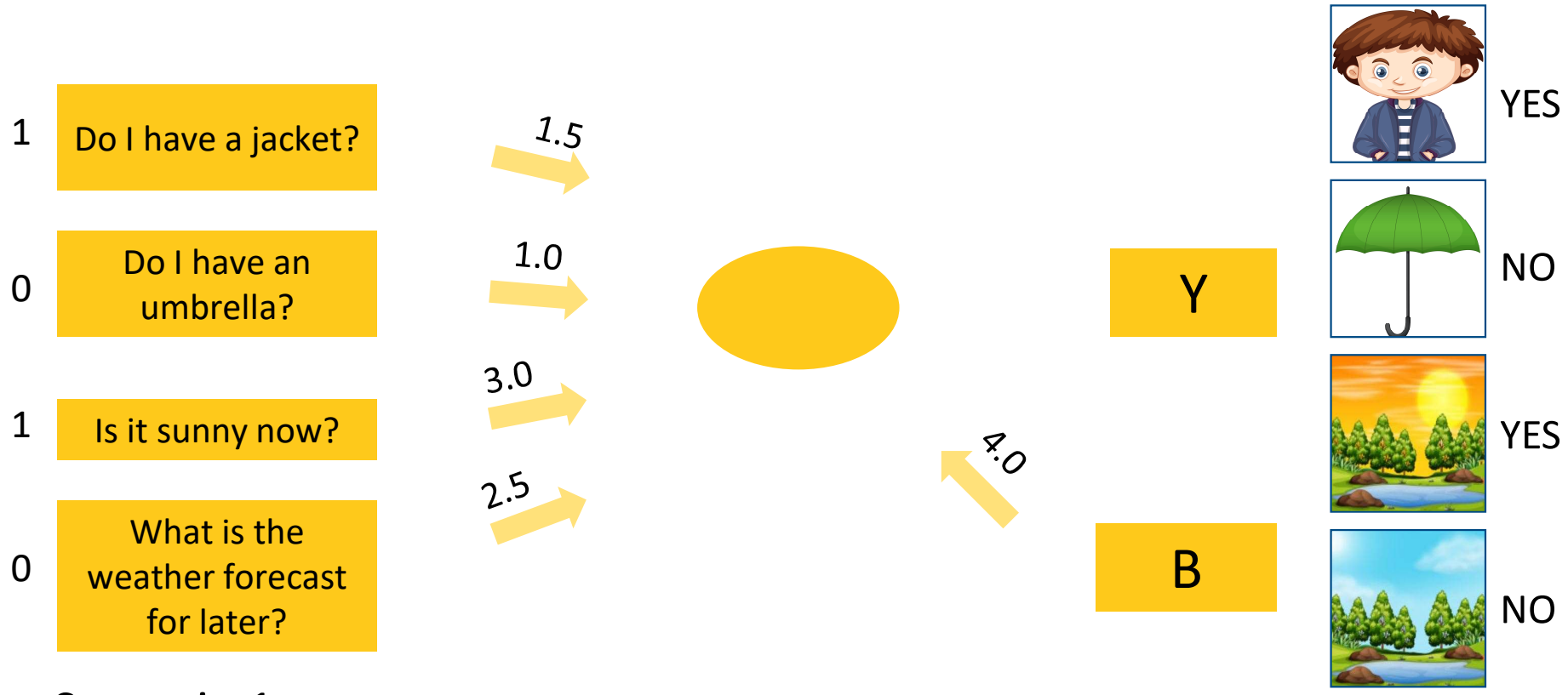
Perceptron Example (go to the park)



Perceptron Example (go to the park)

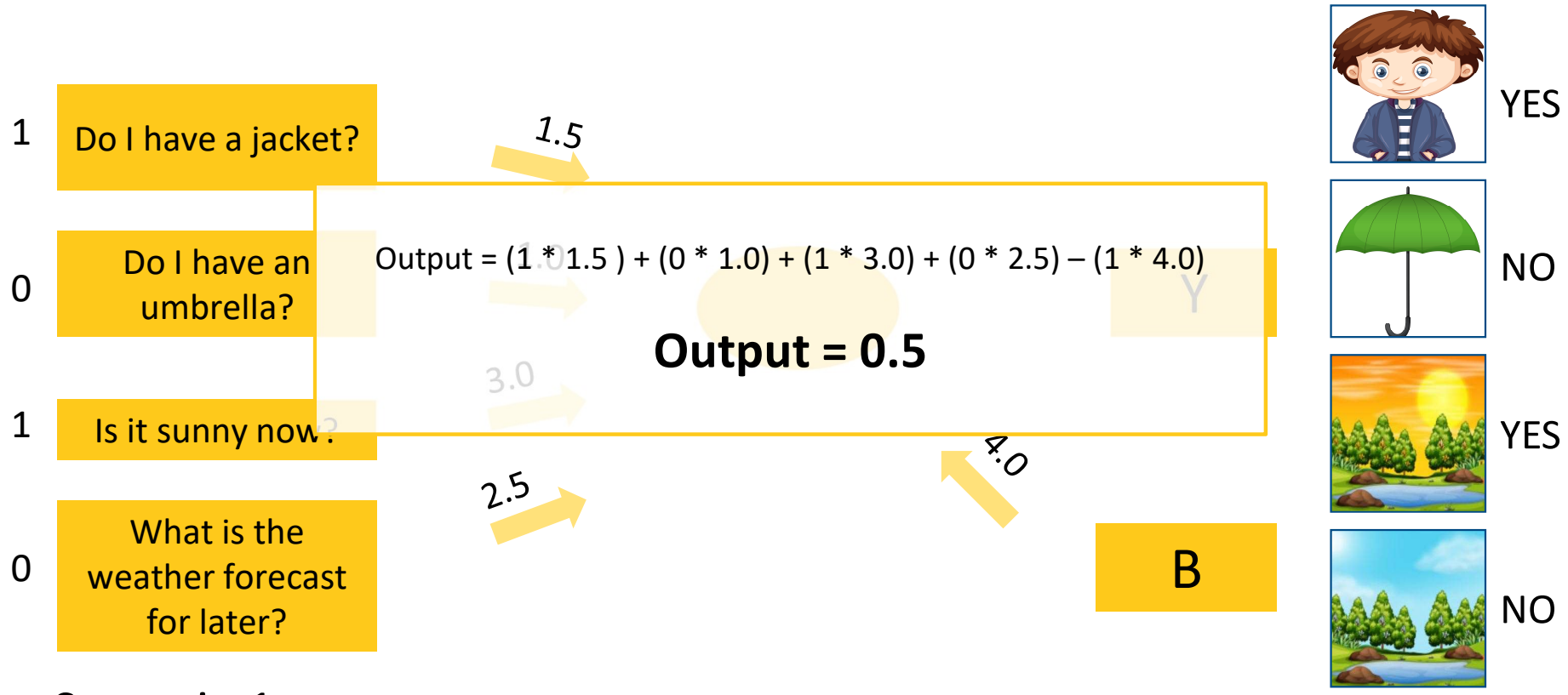


Perceptron Example (go to the park)



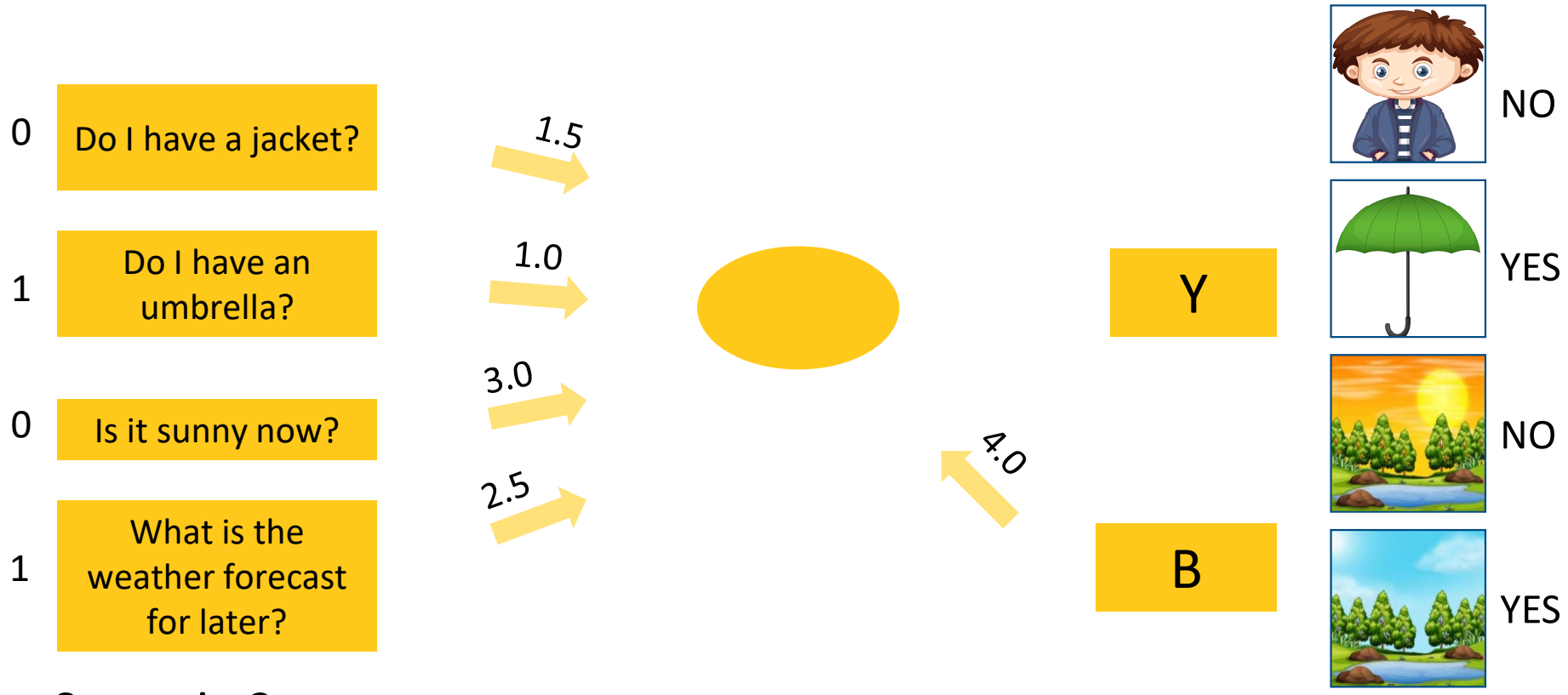
Scenario 1

Perceptron Example (go to the park)



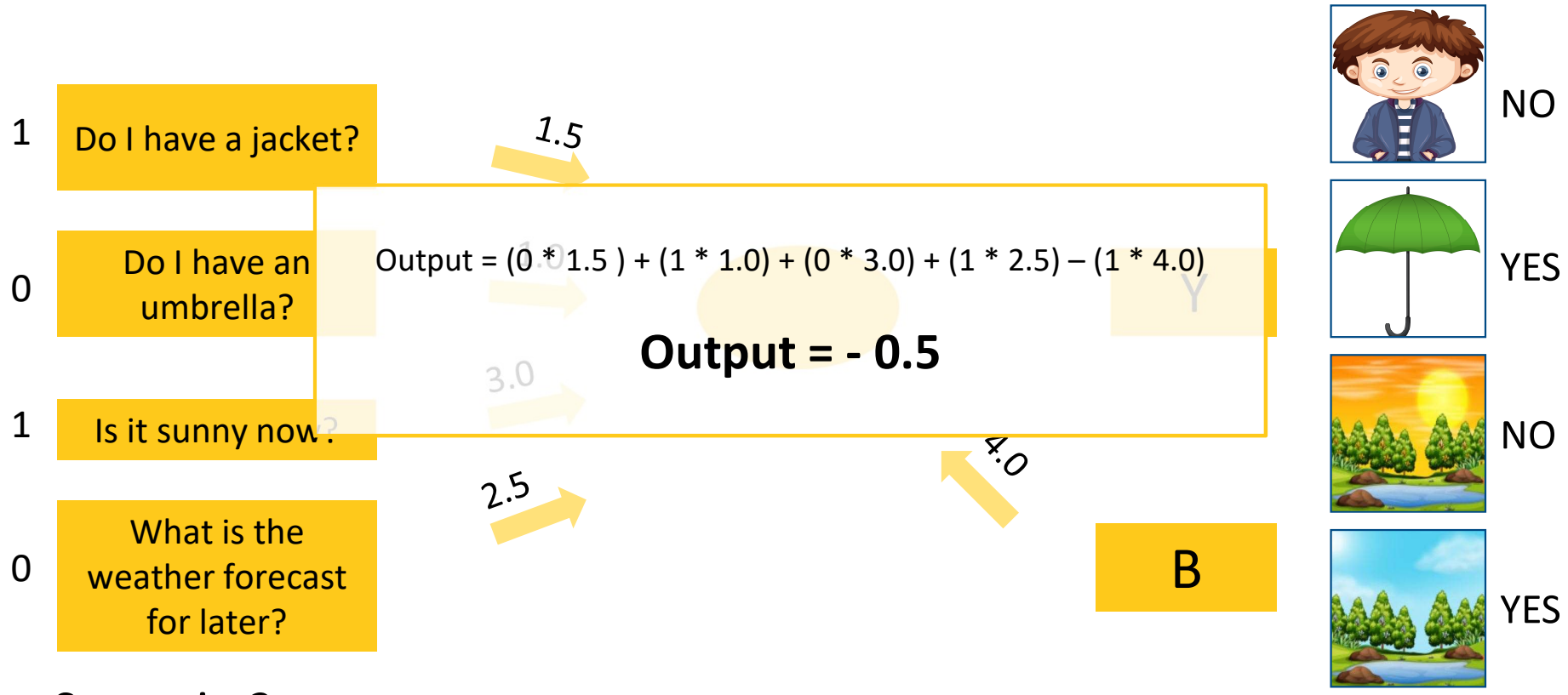
Scenario 1

Perceptron Example (go to the park)



Scenario 2

Perceptron Example (go to the park)



Scenario 2

Group Activity

- Should I play basketball today?
- Should I study for my Math test?
- Should I watch Netflix?

Apply the learnings on perceptron for these examples

Group Presentation

- Should I play basketball today?
- Should I study for my Math test?
- Should I watch Netflix?

Apply the learnings on perceptron for these examples

To illustrate the power of no-code tools for implementing AI, let's explore Teachable Machine.

Teachable Machine

- What is Teachable Machine?
- Use case using Teachable Machine

Teachable Machine

What is Teachable Machine?

- Teachable Machine is a web-based tool that makes creating machine learning models fast, easy, and accessible to everyone.
- Teachable Machine models are real TensorFlow.js models that work anywhere JavaScript runs, so they play nice with tools like Glitch, P5.js, Node.js & more.
- Teachable Machine models can be exported to different formats to use elsewhere, like Coral, Arduino & more.

Let’s watch a video to understand more about Teachable Machine.

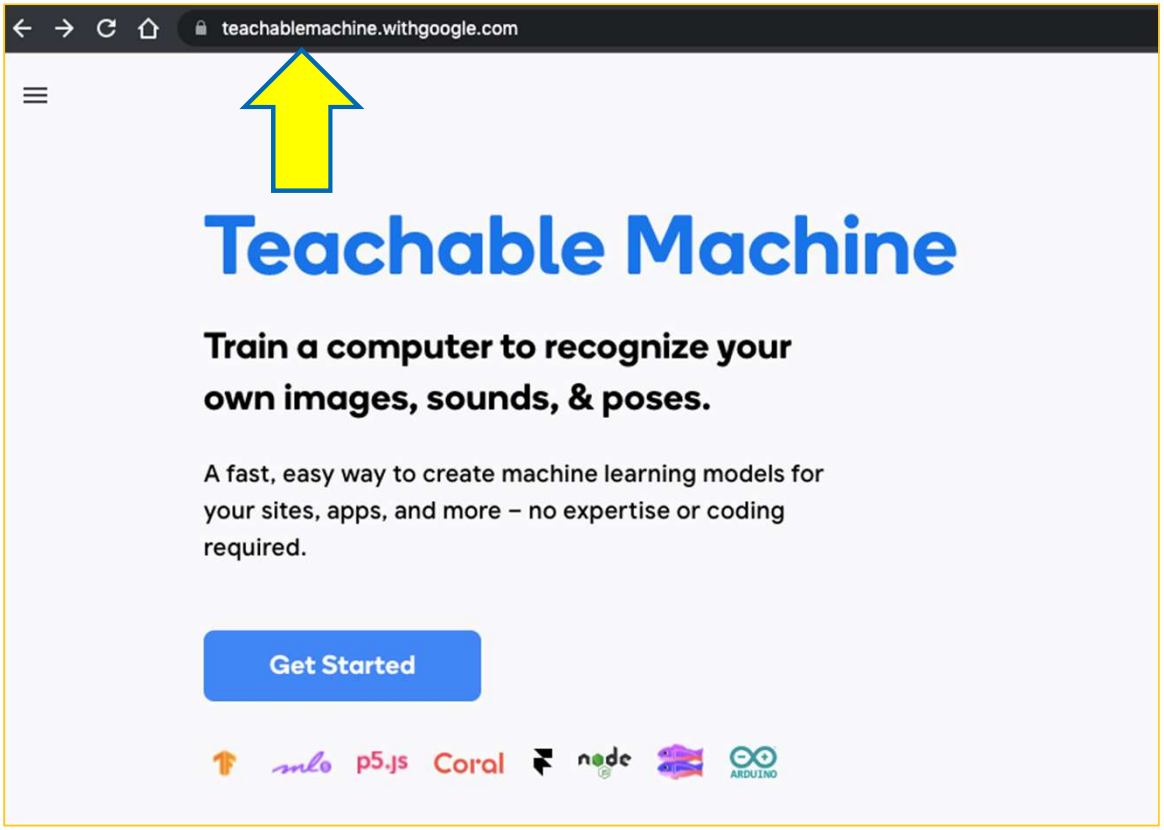
Teachable Machine

What is Teachable Machine?

Let’s explore Teachable Machine.

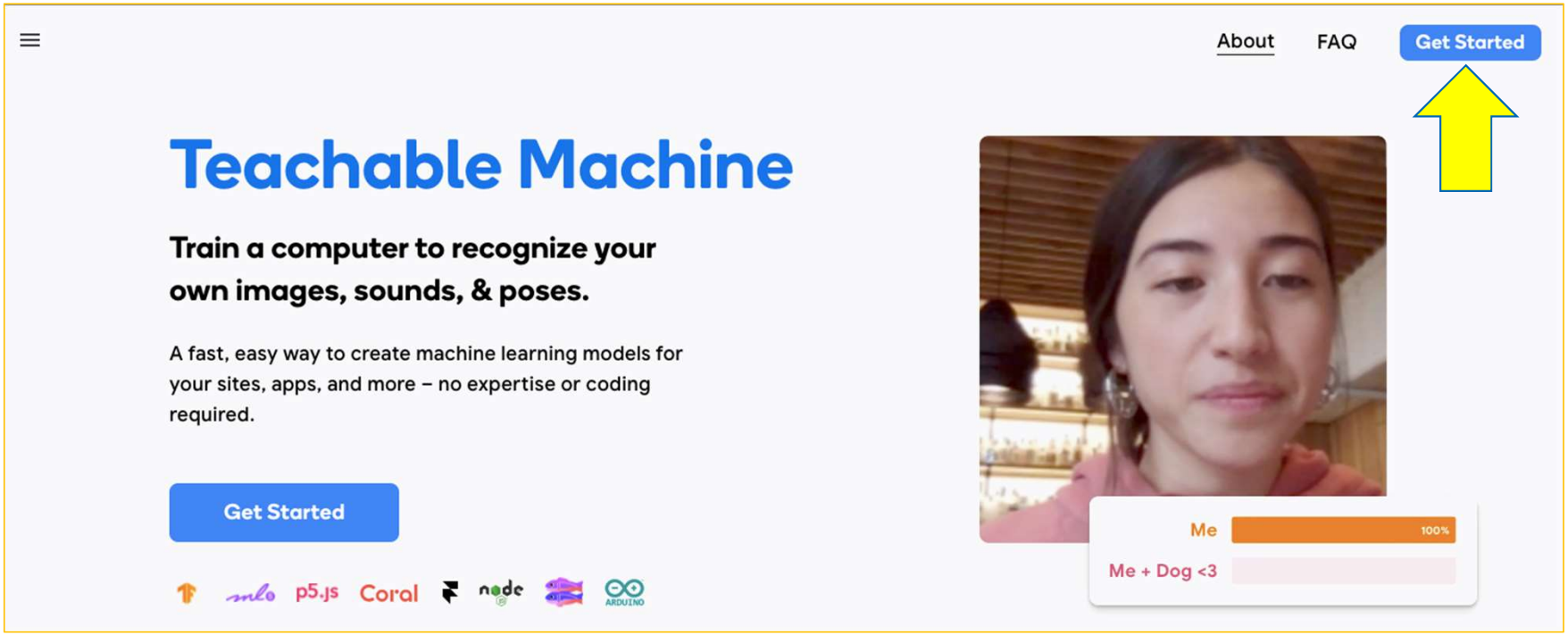
Teachable Machine

Step 1: Visit https://teachablemachine.withgoogle.com/



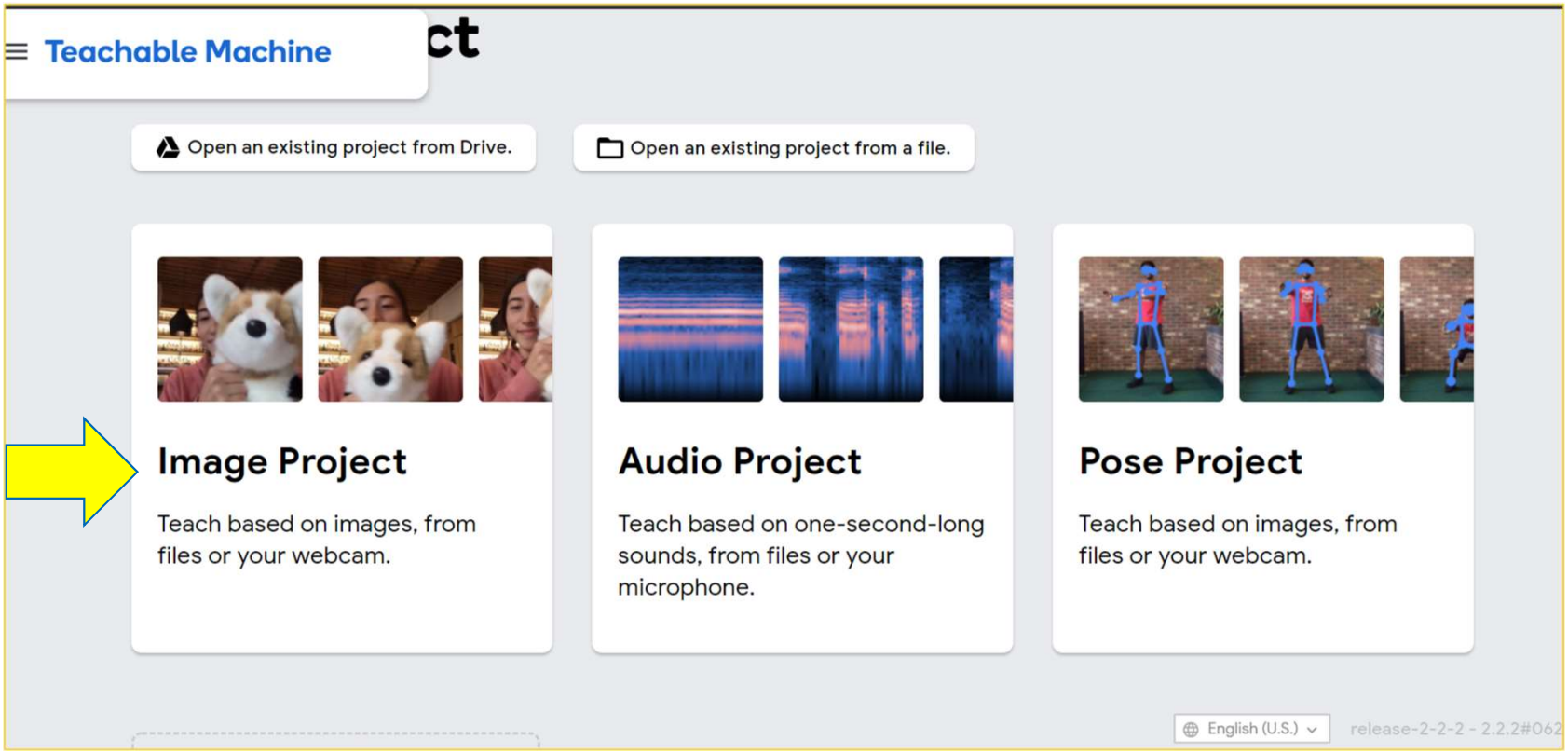
Teachable Machine

Step 2: Click “Get Started”



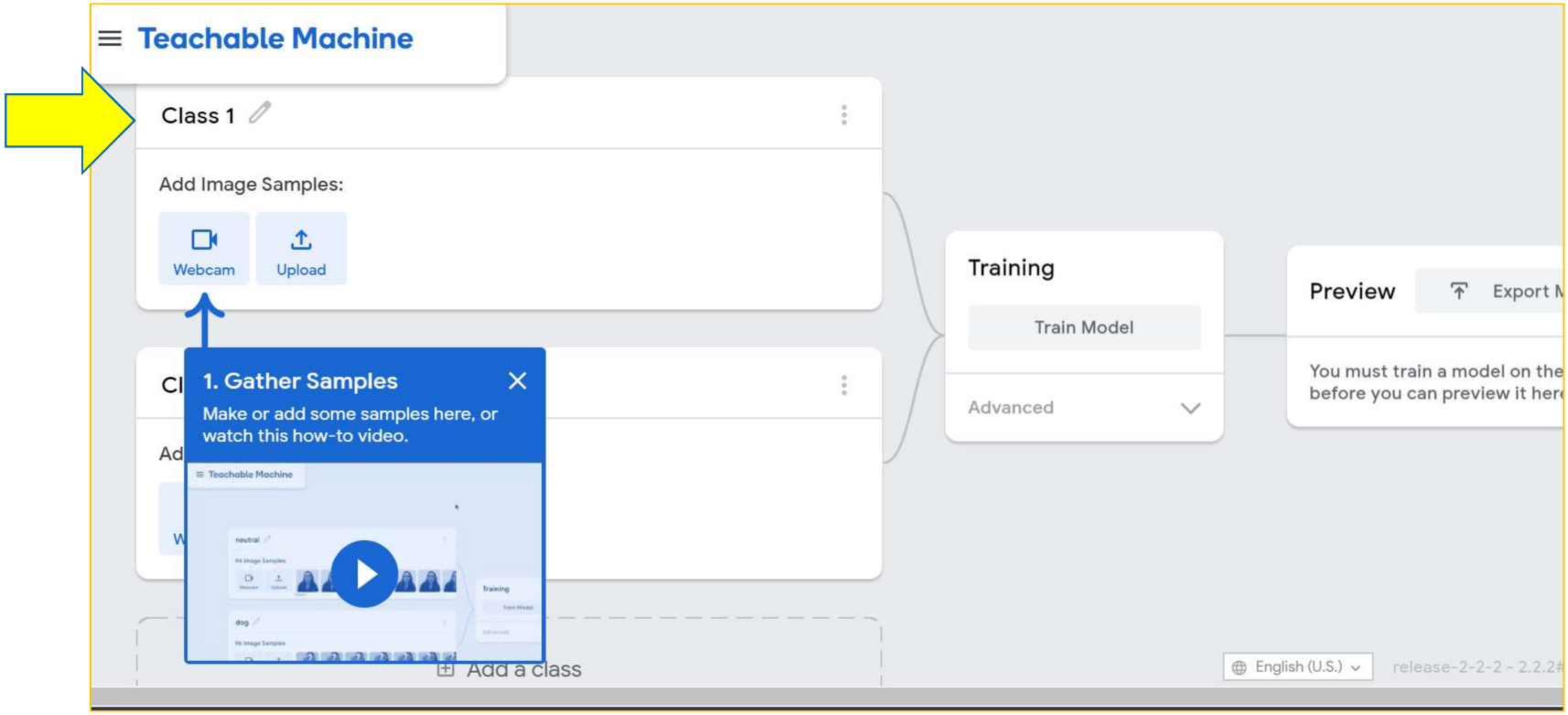
Teachable Machine

Step 3: Select “Image Project”



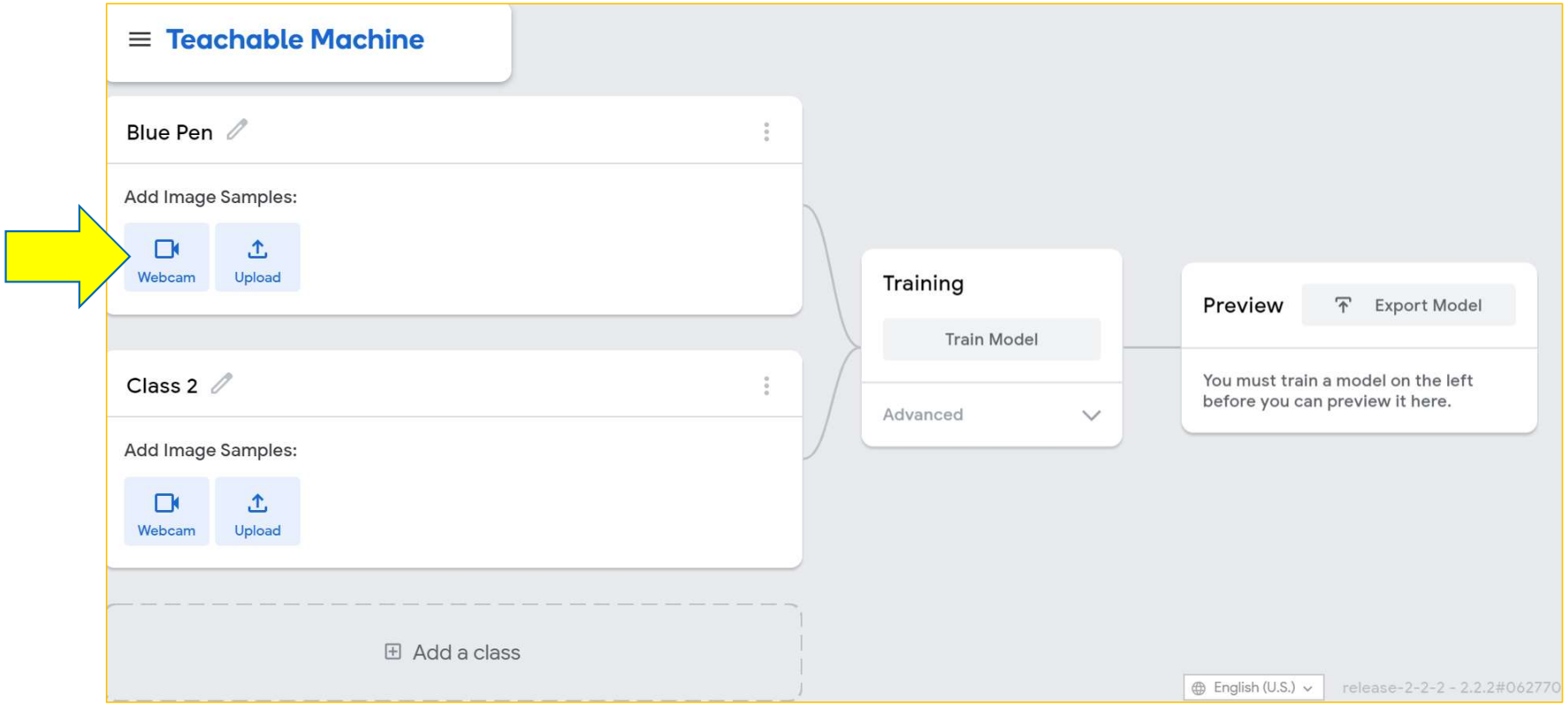
Teachable Machine

Step 4: Rename “Class 1”



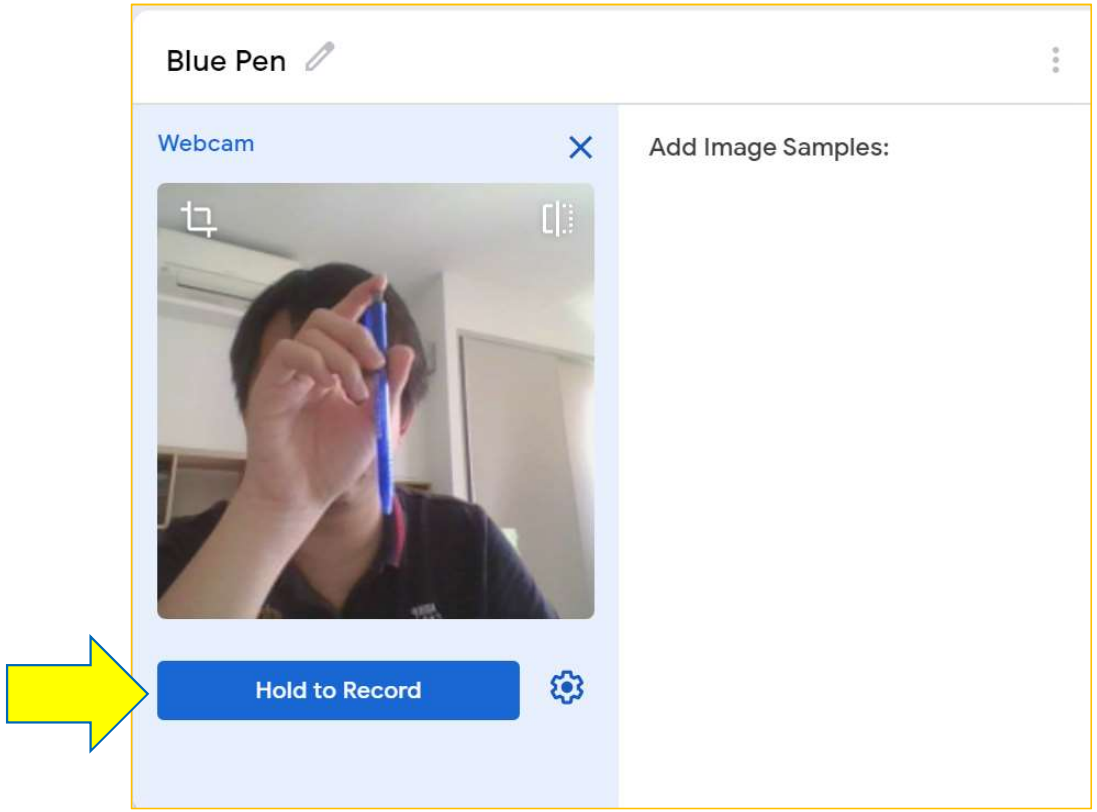
Teachable Machine

Step 5: Select “Webcam”



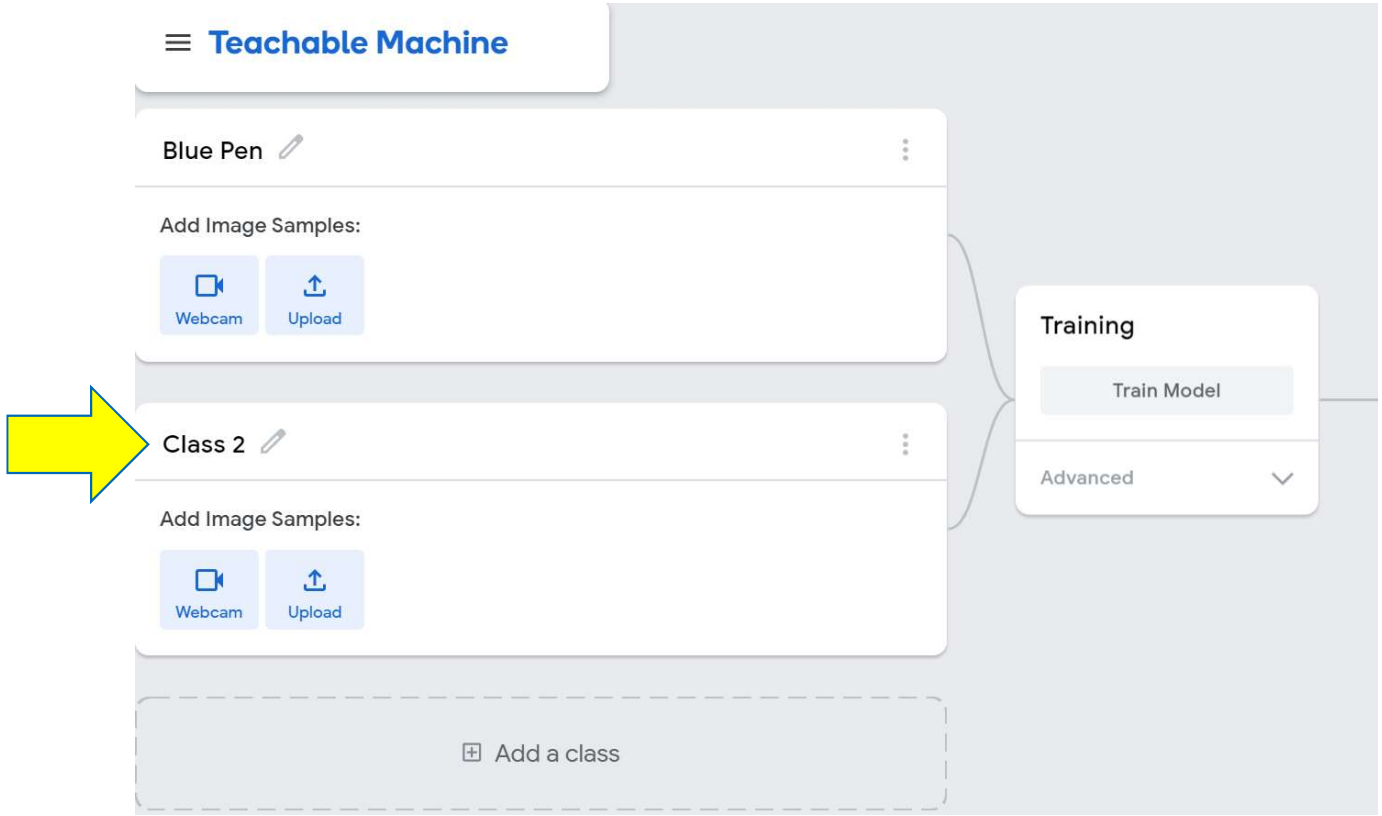
Teachable Machine

Step 6: Click “Hold to record”



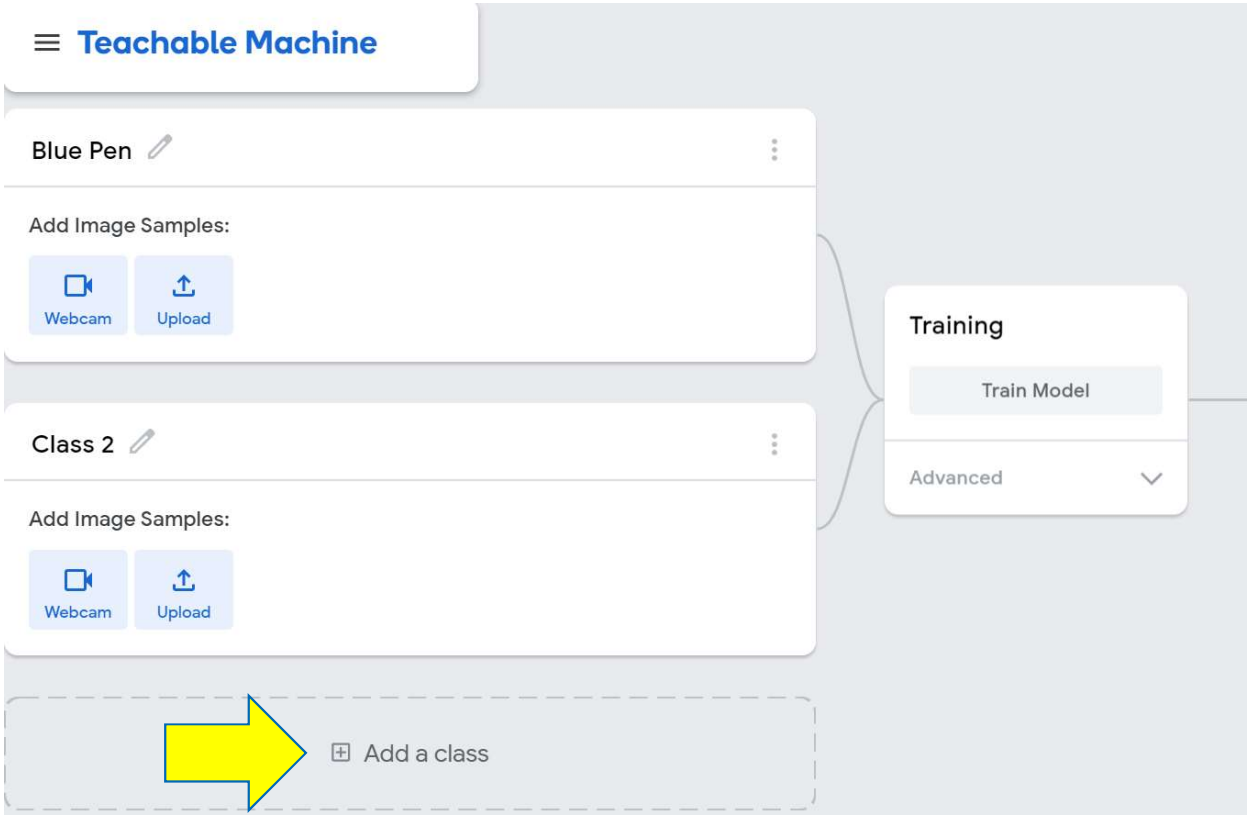
Teachable Machine

Step 7: Repeat steps 2 – 4 for “Class 2”



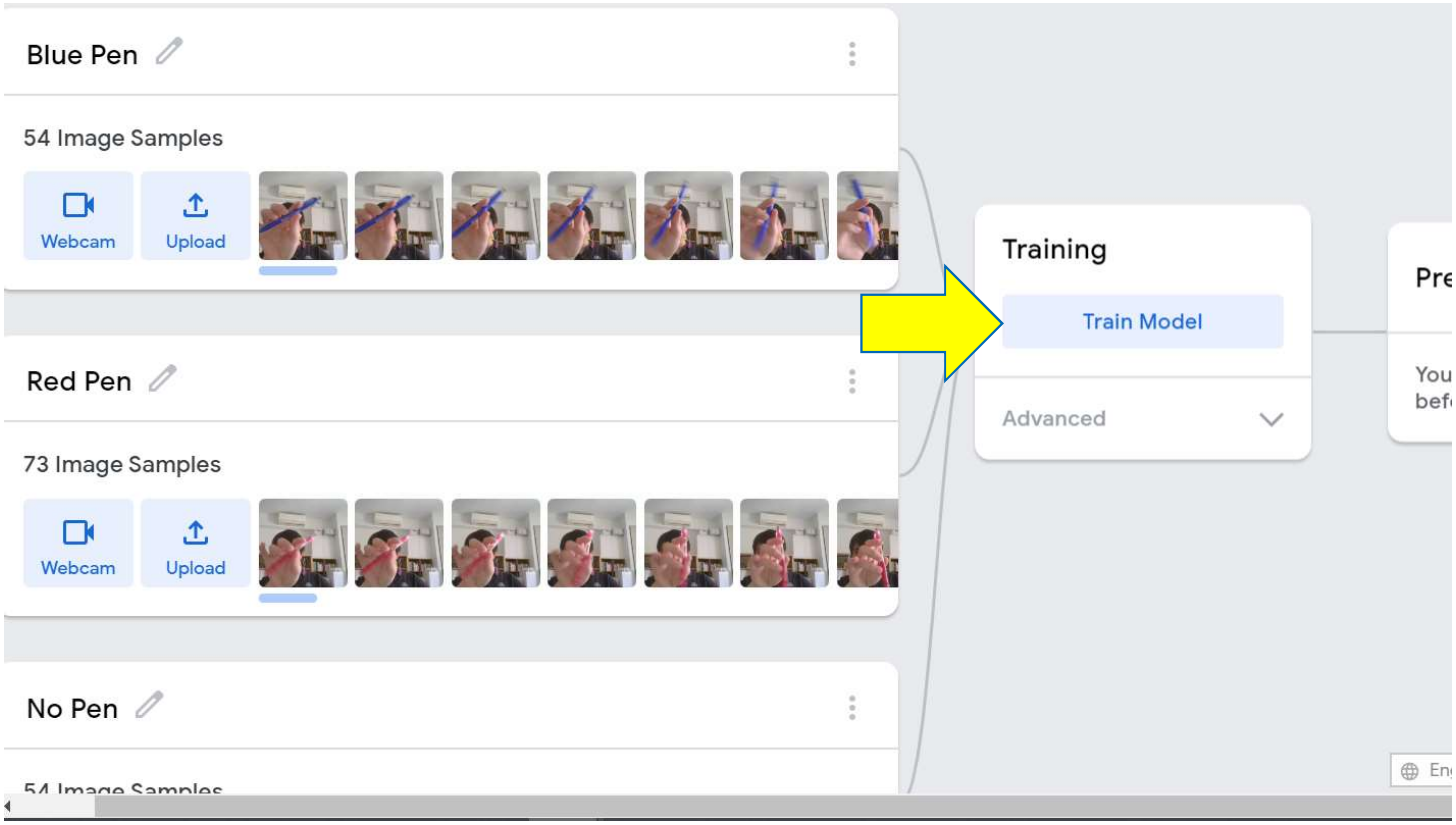
Teachable Machine

Step 8: Repeat steps 2 – 4 for “Add a class”



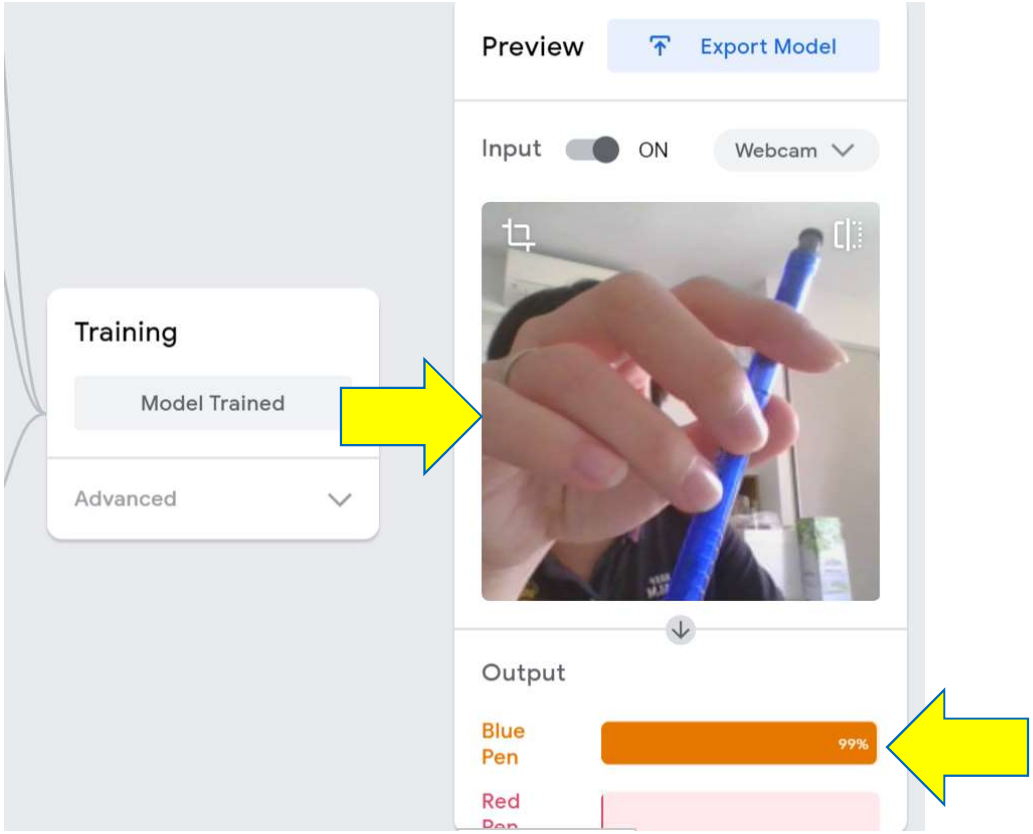
Teachable Machine

Step 9: Click “Train Model”



Teachable Machine

Step 10: Test Model using Red and Blue pen



Activity

Time: 15 minutes

Create a Machine Learning Model using Teachable Machine to perform any one of the task:

- Anime or not anime?
- Face Recognition
- Phone Models
- Stationery

Teachable Machine

- Anime or not anime?
- Face recognition
- Phone models
- Stationery

Explore other groups' Teachable Machine models

Reflection

- How does AI work?
- How does perceptron work?
- What is Teachable Machine?
- How to create a training model using Teachable Machine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