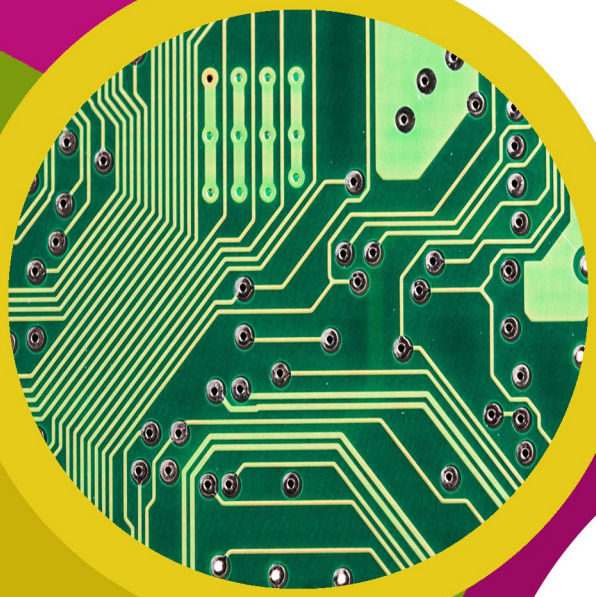
# technocamps

# Machine Learning Session Plan

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# Workshop Schedule

Introduction to ML - 30 minutes

Pattern Recognition - 20 minutes

ML Simulation Activity - 10 minutes

ML in Scratch 1 - 1 hour and 30 minutes

ML Quiz - 15 minutes

ML in Scratch 2 - 1 hour and 30 minutes

Conclusion - 15 minutes

Post-Day Questionnaires - 10 minutes

Note: These are estimated times, these will vary between classes, schools etc. so times will need to be adjusted accordingly.

Total: 4 hours 40 minutes

## Attendee Prerequisites

1. Basic experience of Scratch programming.

## Learning Outcomes

1. Improved knowledge of Machine Learning.
2. To gain confidence in implementing ML Scratch programs.

## Preparation

1. Ensure all computers have access to https://machinelearningforkids.co.uk.
2. Print out animal images for simulation activity. Print out ML workbooks, one for each student attending workshop.
3. Each student will need a pen for some activities.

## Session Plan Key

In this session plan we use the following colours to differentiate the types of activities:

- **Yellow - Explain.** Teachers should explain the slide/example to the class.
- **Green - Discuss.** Teachers should start an open discussion with the class to get them to feedback some answers/ideas.
- **Purple - Activity.** Students are expected to complete an activity whether it be in their workbooks or on the computer, followed by a discussion of their solutions.
- **Green - Introduction/Conclusion.** The introduction/conclusion is also colour coded green. Teachers should hand out materials in the introduction and conclude the day and collect materials at the end.

## Introduction

Begin with introductions, and a brief explanation of the Technocamps programme, before handing out pre-day questionnaires to be filled out by the students and teacher.

## Activity: What is ML?

Students to write their definition of ML in their workbooks.

## Explain: Machine Learning

Machine Learning is a system with the ability to automatically learn and improve from experience without being explicitly programmed.

Machine Learning focuses on the development of computer programs that are provided with data and use it to learn by themselves.

## Activity: Do you know any ML systems?

Students should write in their workbook any ML systems they know of.

## Discuss: Current ML systems

Talk about the various ML systems that the students have mentioned. If it has not been mentioned talk about the various examples provided on the slides: Siri, Google Maps, Security Cameras, Games (Dota2, ML Chess or the Draw It Mobile App).

Play the embedded mobile Draw It game. Talk about how the game works.

Talk about the company KUKU, briefly mention how they are the world leading suppliers of robotics and play the table tennis bot vs champion video.

## Activity: How does ML work?

Students should write down their own opinion on how ML work in their workbooks.

## Discuss: How does ML work?

Discuss answers given by students, at the end summarise to say that can they see that in ML Pattern Recognition is a major part of it.

## Explain: Pattern Recognition

Explain that Pattern recognition is the ability to recognise patterns in data sets.

## Activity: Pattern Recognition

Students are to try and work out all eight Pattern Recognition tasks.
Answers:

1) B
2) A
3) C - March 1889
4) 18
5) C - 16
6) C
7) 87
8) Five spades and four diamonds.

## Activity: ML Simulation

Using the animal images printed out of various images of turtles and tortoises (images provided in our pack), show a random image to the class and ask them what they thing it is. Is it a turtle or a tortoise. After an answer is given simply say correct or incorrect depending on their answer. Do not provide any more information than this. Do this a few times.

Next, show the class two separate sets of images that helps them with their guesses. One set contains three images of turtles, the other three images of tortoises. Note, do not tell the students which of the two set are all turtles or tortoises. Show them another random image of a turtle or a tortoise and ask them is it a turtle or tortoise. After the guess, ask the students why they made that guess. Hopefully, they are able to work out that turtles are sea living creatures where as tortoises are land living therefore majority of the time, the images with a body of water is a turtle (we have provided images where there is a clear distinction between the environment the creatures are in).

To finish discuss the difference between having examples to view before guessing and guessing without. Also talk about how they were able to differentiate between turtle and tortoise they used Pattern Recognition. What was the pattern between the objects in each of the set.

## Activity: Make Me Happy

Demonstrate the full game working. Explain the game that they are to produce at the end.

Using the website: https://machinelearningforkids.co.uk students are to log in as guests and create a new project that recognise text.

Using the slides for the workshop guide the students through this activity step by step. Ensure that you are confident with completing the task yourself before delivering the workshop.

Further guide and step by step explanation can be found at https://machinelearningforkids.co.uk/#!/worksheets

## Explain: What have they done?

Explain that the have trained the computer to recognise text as being kind or mean.

This is called "supervised learning" because they are supervising the computer's training by providing necessary data for it to use. The computer will learn from patterns in the examples students have given it.

## Activity: ML Quiz

Students are to work in groups and go through the quiz (quiz is provided in Kahoot).

Quiz answers:
1) B
2) C
3) A
4) A
5) A
6) C
7) B
8) B

## Activity: ML Simulation 2

Similar to the first ML Simulation, using the animal images printed out of various images of crocodiles and alligators (images provided in our pack), show a random image to the class and ask them what they thing it is. Is it a crocodile or an alligator.

Next, show the class two separate sets of images that helps them with their guesses. One set contains three images of crocodiles, the other three images of alligators. Note, do not tell the students which of the two set are all turtles or tortoises. Show them another random image of a crocodile or a an alligator and ask them what they think it is.

This time, talk about the process in regards to how a machine can learn in this way similar to what they did when creating the Make Me Happy game.

## Activity: Pac-Man

Demonstrate the full game working. Explain the game that they are to produce at the end.

Using the website: https://machinelearningforkids.co.uk students are to log in as guests and create a new project that recognise text.

Using the slides for the workshop guide the students through this activity step by step. Ensure that you are confident with completing the task yourself before delivering the workshop.

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## Extensions: Other ML Games

Now that they have finished, the can go on to: https://machinelearningforkids.co.uk/#!/worksheets and try out the "Smart Classroom" project, that creates a smart assistant in Scratch that lets them control virtual devices. Click "Download" -> Quick simplified version of the project, ideal for use as a first introduction to the tool - "Download project worksheet".

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