



THIS WORKBOOK BELONGS TO:

Student workbook

MACHINE LEARNING UNPLUGGED COURSE



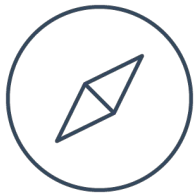
Welcome

In this project, you and your team will work together to design and build a machine learning model that solves a problem you care about.

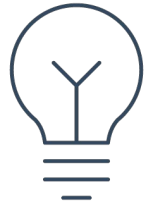


The process

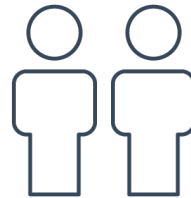
You will work your way through a range of activities, split across 5 modules.



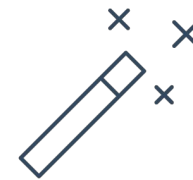
1. Crash course



2. Idea generation



3. Scoping



4. Product development



5. Pitch



MACHINE LEARNING IN A DAY

COURSE ACTIVITIES

Activity 1.1 - [What is machine learning?](#)

Activity 1.3 - [Cat or dog?](#)

Activity 1.4 - [Neural networks](#)

Activity 2.2 - [How facial recognition works](#)

Activity 2.3 - [Issues with facial recognition](#)

Activity 2.4 - [Other uses of facial recognition](#)

Activity 3.2 - [Anti-bullying model](#)

Activity 3.3 - [Chatbots](#)

Activity 4.1 - [Recommendation systems](#)

Activity 4.2 - [Filter bubbles](#)

Activity 4.3 - [Dangers of recommendation systems](#)

Activity 5.1 - [Driverless cars](#)

Activity 5.2 - [Bias in machine learning](#)

Activity 5.3 - [When algorithms go wrong](#)

Activity 6.2 - [Review of machine learning](#)

Activity 7.1 - [Spot possible problems](#)

Activity 7.2 - [Explore your idea](#)

Activity 7.3 - [Develop your idea](#)

ACTIVITY 1.1

WHAT IS MACHINE LEARNING?

COURSE

MACHINE LEARNING UNPLUGGED

Questions to answer before you watch the video

Have you heard of the term machine learning? YES / NO
If yes what do you think it means?

After you have watched the video

What is machine learning?

Why is the use of machine learning increasing rapidly?

Can you think of any any issues or problems caused by the increase in the use of machine learning?

Understanding what ML is and how it functions should help you recognise where you are interacting with computers in your everyday life and what this means for you (as a human?).

NAME

ACTIVITY SHEET 1.3
CAT OR DOG

COURSE
MACHINE LEARNING UNPLUGGED

What are your rules for identifying the difference between the two images?

Image 1

Image 2

Image 3

Image 4

Revised rules for identifying images of cats and dogs

Can you tell the difference between cats and dogs?

NAME

ACTIVITY SHEET 1.4
NEURAL NETWORKS

COURSE
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What is an algorithm?

What are some of the uses of machine learning mentioned in the video?

How do the bots get trained?

How do neural networks work?

NAME

ACTIVITY SHEET 2.2

HOW FACIAL RECOGNITION WORKS

COURSE

MACHINE LEARNING UNPLUGGED

How does facial recognition work?

What can cause bad readings and how can they be overcome?

What are some of the applications of facial recognition?

What are some of the issues with facial recognition?

How does it work and how is it used?

NAME

ACTIVITY SHEET 2.3

ISSUES WITH FACIAL RECOGNITION

COURSE

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Why is Ed Bridges concerned?

What was the police response?

Why might facial recognition be an issue in the future?

Do you think the police should be using facial recognition technology? Explain your answer.

What are the issues surrounding facial recognition technology?

NAME

ACTIVITY SHEET 2.4

OTHER USES OF FACIAL RECOGNITION

COURSE

MACHINE LEARNING UNPLUGGED

What are the advantages and disadvantages of using facial recognition technology?

Should schools in this country use facial recognition technology in the classroom? Explain your answer.

What rules would you have for the use of facial recognition technology?

What are the issues surrounding facial recognition technology?

NAME

ACTIVITY SHEET 3.2
ANTI-BULLYING MODEL

COURSE
MACHINE LEARNING UNPLUGGED

What would be the problem with using IF statements to test the phrases?

Kind things

Mean things

Phrases to test the model

How does it work and how is it used?

NAME



ACTIVITY 3.3
CHATBOTS

COURSE
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What other uses of chatbots have you come across?

What are the advantages of chatbots?

What are the drawbacks of using chatbots? Have you any ideas for how these could be overcome?

What could be done to make the chatbot seem more human?

NAME

ACTIVITY 4.1

RECOMMENDATION SYSTEMS

COURSE

MACHINE LEARNING UNPLUGGED

How do Netflix and Spotify produce recommendations?

Can you think of any other Machine Learning recommendation systems?

What is good about recommendation systems?

Can you think of any drawbacks of recommendation systems?

How well do you think Netflix or other recommendation systems know you?
Why is this?

NAME



ACTIVITY 4.2

FILTER BUBBLES

COURSE

MACHINE LEARNING UNPLUGGED

'A squirrel dying in front of your house may be more relevant to your interests right now than people dying in Africa' - What point is Mark Zuckerberg trying to make? Do you agree with him? Explain your answer.

What is a 'filter bubble'?

How do filter bubbles get created?

What are the dangers of a filter bubble?

Do you think you can trust recommendation systems? Why? Why not?

NAME

ACTIVITY SHEET 4.3

DANGERS OF RECOMMENDATION SYSTEMS

COURSE

MACHINE LEARNING UNPLUGGED

What is the problem with not knowing how machine learning algorithms work?

How does the algorithm influence what you watch on Youtube? Why does it do this?

How can algorithms be used to affect behaviour in elections?

What are the dangers with recommendation systems?

NAME

ACTIVITY 5.1a

DRIVERLESS CARS - DECISION MAKING

COURSE

MACHINE LEARNING UNPLUGGED

<h3>Saving more lives</h3> <p>Is it important to minimise the number of people or animals killed?</p>	<h3>Protecting passengers</h3> <p>Is it more important to protect passengers than pedestrians?</p>	<h3>Upholding the law</h3> <p>Should preference be given to those obeying the law e.g. those crossing when the green light is showing?</p>
<h3>Avoiding intervention</h3> <p>Should you avoid changing the direction of the car?</p>	<h3>Gender preference</h3> <p>Is it more important to save males or females?</p>	<h3>Species preference</h3> <p>Is it more important to save human lives than animals?</p>
<h3>Age preference</h3> <p>Is it more important to save young people or old people?</p>	<h3>Fitness preference</h3> <p>Is it more important to save people who are physically fit?</p>	<h3>Social value preference</h3> <p>Is it more important to save a doctor than a criminal?</p>

Which of these factors are most important to your team? Discuss with other students and rank these factors in order of importance. Are there any other factors that should be built into the decision making process?

NAME

ACTIVITY SHEET 5.1b
SELF DRIVING CARS

COURSE
MACHINE LEARNING UNPLUGGED

What do you think are the most important factors for the self driving cars decision making algorithms? Do others agree?

What would happen if these decisions were not pre-programmed?

Is it morally or ethically right to pre-program these decisions? Explain your answer

What are the issues surrounding self driving cars?

NAME



ACTIVITY 5.2

BIAS IN MACHINE LEARNING

COURSE

MACHINE LEARNING UNPLUGGED

What causes bias in machine learning?

What issues can this bias cause?

Do you think bias can be overcome in Machine Learning? Explain your answer

Overall do you think Machine Learning will lead to more or less bias in decision making? Explain your answer

What is the impact of bias in Machine Learning?

NAME

ACTIVITY SHEET 5.3

WHEN ALGORITHMS GO WRONG

COURSE

MACHINE LEARNING UNPLUGGED

Why were many students unhappy about the initial A Level results?

Why did the algorithm produce such different results from the Centre Assessed Grades (CAGs)?

Do you think the algorithm was biased? Explain your answer.

What went wrong?

NAME

ACTIVITY 6.2

REVIEW OF MACHINE LEARNING

COURSE

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Things to include in your introduction

Examples of machine learning you are going to include

Positive impacts

Issues

Things to include in your conclusion (including your own opinion)

Use this worksheet to make notes for your report

NAME

ACTIVITY SHEET 7.1

SPOT POSSIBLE PROBLEMS

COURSE

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Think about issues that have been caused by the current coronavirus pandemic	Think through your average day – what frustrations or issues do you encounter?
Things that I would like to be different in my local community or my life	Things that I wish more people knew about or understood better

Use this sheet to jot down your ideas about possible problems.

NAME



ACTIVITY 7.2

EXPLORE YOUR IDEA

COURSE

MACHINE LEARNING UNPLUGGED

Was there a time when this problem didn't exist? If so, what has changed? If not, how have people coped with the problem so far?

Who is impacted most by this problem?

What will happen if this problem is not solved?

What will happen if it is solved?

Think through the problem you have identified and answer these questions.

NAME

ACTIVITY SHEET 7.3
DEVELOP YOUR IDEA

COURSE
MACHINE LEARNING UNPLUGGED

The problem I have identified	Who the problem affects
My proposed solution	Data I'm going to need

Use this sheet to jot down your ideas about possible problems.

NAME



Ace, course complete!

Making great machine learning models requires hard work and constant improvement. Machine learning development is a journey. Where will your journey end?



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