

AI/MACHINE LEARNING LEARNING TASK

How Machines Learn

Learning area
Digital Technologies

Year level
Year 9 & 10

Duration
90 minutes

Task summary

This task enables students to have the opportunity to analyse problems and design, implement and evaluate data using Machine Learning.

Session overview

Students can create a basic Machine Learning program with at least two data sets (classes) using Teachable Machine.

Digital technologies

- VR
- AR
- Robotics
- Drones
- Other: Machine Learning

Required resources

Hardware:

- Laptops with integrated webcam and microphone
- Presentation screen

App:

- [Teachable Machine by Google](#) - A web-based Machine Learning training tool that enables students to create various projects without learning how to code. There are currently three models available: Image, Sound, and Pose. Students will go to [Teachable Machine](#) for the tutorial first (3 - 15 minutes)

Videos:

- [What is Machine Learning?\(2:19\)](#) - A brief informative introduction to what Machine Learning is and how it is used in real life scenarios.
- [Machine Learning: Solving Problems Big, Small, and Prickly \(5:20\)](#) - A video produced by Google that explains what Machine Learning can do in practical applications.

Teaching resources:

- [Teaching deck](#) – download a copy for your own use.
- [Student digital notebook](#) – download a copy and distribute it to students via email or learning management system.

Other resources to try (optional)

[Machine Learning Projects](#) - These are Machine Learning project ideas using Scratch coding.

Planning and preparation

Assumptions

- Students may or may not have a basic understanding of what Machine Learning is all about.
- Students know how to capture data on their computers using the web camera and/or microphone.
- If using stock images instead of web camera input, students will need to have access to a collection of images that they can use to teach the Machine Learning tool. Please note that for accuracy, students should provide a large number of images (at least 20 to 30 per class/data set).

Additional preparations for teachers

- Go through the [Teachable Machine](#) tutorial beforehand to have an idea of how the tool works.
- Watch the videos to make sure that they are appropriate for their respective classes and devices.
- Make sure all devices are fully charged and set-up appropriately before the lesson, with all apps installed and working.
- Download any stock images from sources and upload them to a folder or learning management system that students can access.
- Download and distribute copies of the [placeholder link for 10 - Student Digital Notebook](#) to students via email or a learning management system.

Task Sequence

1

Introductory activity / Provocation (5 – 10 mins)

Using the [placeholder link for 10 - Teaching Deck](#), show students the video on slide 2 [What is Machine Learning?](#) (2:19) and discuss (slide 3):

- What do they understand about Machine Learning?
- Can they think of other real-life examples of how Machine Learning is currently being used?
- What other possible ways can Machine Learning be used?

2

Prior knowledge check (5 mins)

Show slide 4 and ask students if they have had experience teaching a machine before or if they have used a tool like [Teachable Machine](#). Get students to share what they've designed if they have used a Machine Learning tool before. If students have no prior experience with this tool, proceed to the next activity.

3

Activities (60mins)

1. Tell the students that the class is going to learn how to 'teach' a machine to do something (output) based on a specific trigger (input). This task may be completed either individually or in small groups.
2. Ask students to go to the [Teachable Machine](#) website and ask them to work on the tutorial to gain a basic understanding of how this Machine Learning tool works. The website link is on slide 5 of the teaching deck and the tutorials are found on the page.
3. After going through the tutorial, teachers can either start a brief discussion on what the students have learnt using the activity or get students to respond to these question on page 2 of their [placeholder link for 10 - Student Digital Notebook](#):
 - a. How does the Machine Learning tool work?
 - b. What do they understand about the input and output process?
 - c. What do they understand about the 'Classes'?
 - d. Can they think of other ideas on how to use this Machine Learning tool?
4. Show the video [Machine Learning: Solving Problems Big, Small, and Prickly](#) (5:20) on slide 6 of the teaching deck as a prompt on how Machine Learning is used to solve real life problems.
5. Get students to create their own simple Machine Learning project using [Teachable Machine by Google](#). Instructions on page 5 of the student digital notebook and slide 8 of the teaching deck.

They can choose either an image, sound, or pose trigger. Remind the students to work on simple ideas with just two or three classes using one of the three models available (image, sound, pose). If there is a folder with pre-downloaded stock images for students to use to train the machine, teachers may direct them to that resource. Otherwise, students will need to create their own. Teachers can share some possible mini projects found on slide 7 on the teaching deck:

- *Feelings Identifier* - Get the machine to identify basic feelings based on images/webcam input (e.g., Sad, Happy, Angry)
- *Sound Level Identifier* - Get the machine to identify sound levels (e.g., Loud, Regular, Soft)
- *Posture Identifier* - Get the machine to identify the correct posture for a particular pose or stance.

6. Ask students to fill in the Machine Learning task table in their digital notebook. Get students to identify class, label, and number of samples. Then, run trials and record the results of the trials. Add any relevant notes.
7. If there's time, get students to test each other's mini projects.

4

Check for understanding
(10 – 15 mins)

Instruct students to write a reflection on their Machine Learning project on page 6 of their digital notebook. Teachers may also opt to ask students to do a presentation of their Machine Learning projects.

If using this task as a formal assessment, teachers can refer to the suggested rubric found on the teaching deck and digital notebook. If students are not required to work in small groups or to do a presentation, teachers can omit the 'Project Presentation' and 'Collaboration and Communication Skills' sections of the rubric.

| Differentiation for students with additional needs | Extension ideas | Video tips |
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| <p>Some students may be required to work with a partner or in a small group.</p> <p>Making some pre-downloaded images for students to use to train their model might be helpful.</p> <p>Assign a simple project that students can work on instead of leaving the task open ended.</p> | <p>For additional or extended challenges, teachers might ask students to expand the number of samples for their design or to create a new design.</p> <p>Try some Scratch projects using ideas from Machine Learning Projects.</p> | <p>The video for this learning task gives a quick demo of how the Machine Learning tool works.</p> |

Curriculum Connections

Australian Curriculum Version 9.0

Year 9 and 10 - Digital Technologies

Develop techniques to acquire, store and validate data from a range of sources using software, including spreadsheets and databases (AC9TDI10P01)

Cross-curriculum priorities

- Aboriginal and Torres Strait Islander Histories and Cultures
- Asia and Australia's Engagement with Asia
- Sustainability

General capabilities

- Literacy
- Numeracy
- Digital literacy
- Critical and creative thinking
- Personal and social capability
- Ethical understanding
- Intercultural understanding