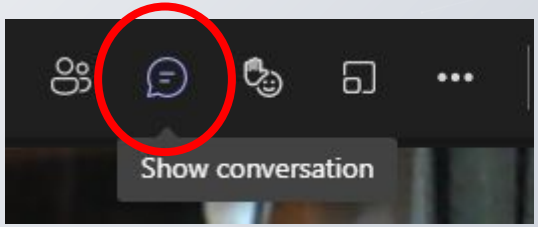
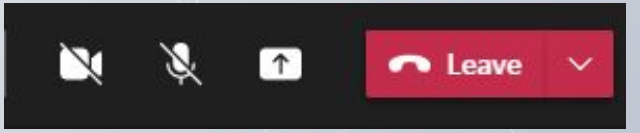
While we wait to get started ...

Open the chat



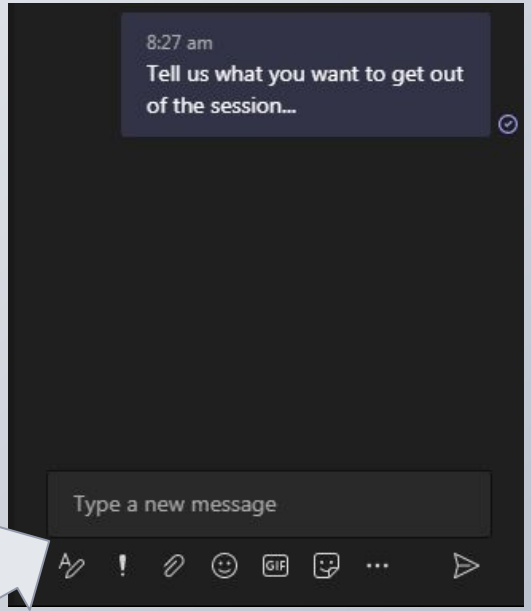


Your mic is on mute
... and camera disbaled

Tell us what you want to get out of the session.

NOTE:
your name will appear with your comment.

The chat won't be part of the recorded version.



What context could you use in your classroom to induce creating an AI model?

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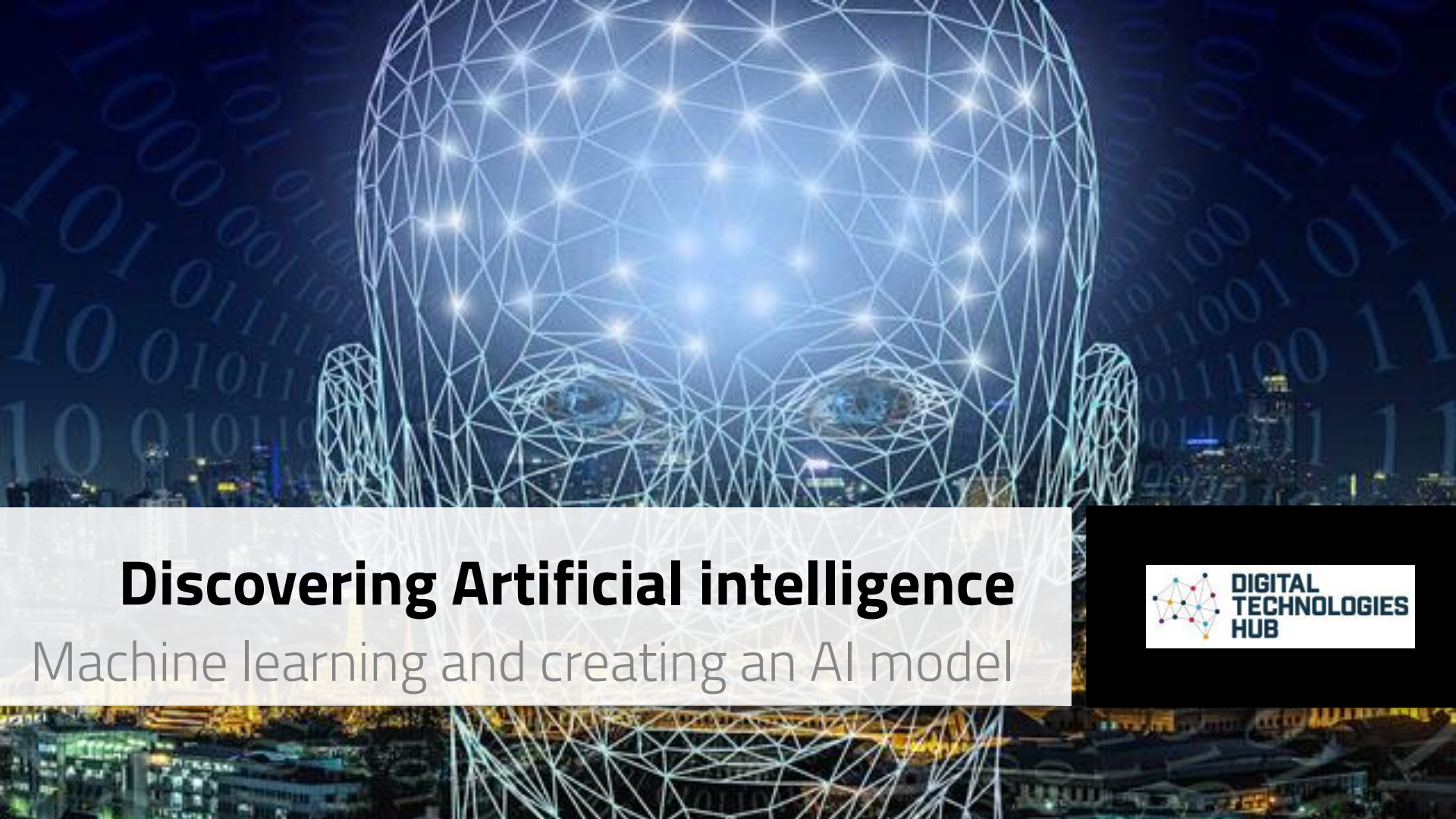

Discovering Artificial intelligence

Machine learning and creating an AI model

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Acknowledgement of Country

ESA acknowledges the Eastern Kulin Nation, Traditional Custodians of the land on which our head office stands, and pays our respects to Elders past and present.

We recognise the Traditional Custodians of Country across Australia and their continuing connection and contribution to lands, waters, communities and learning

By the end of this session...

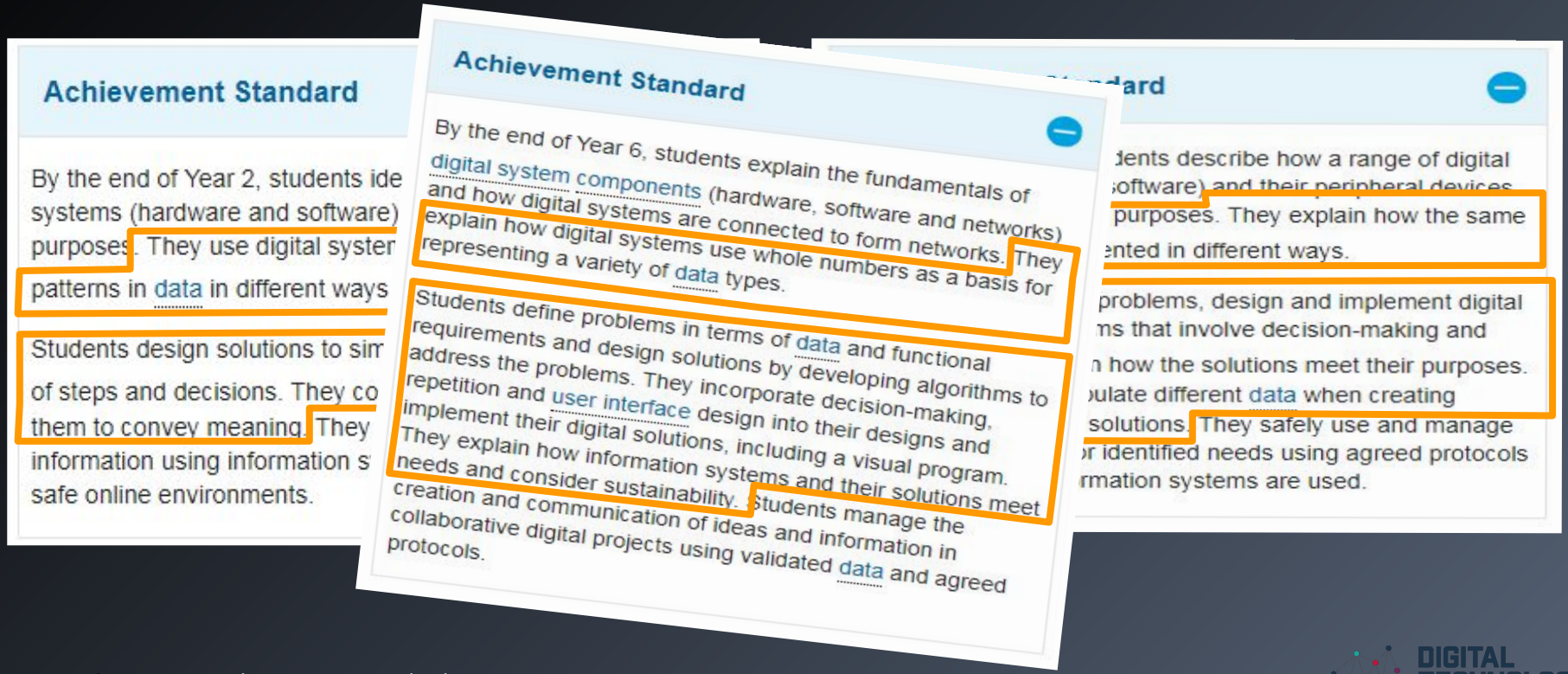
You should be able to:

Describe how to train an AI and choose a context for students to create their own model.

Develop an understanding of bias and how to limit it in their AI model.

Use an AI model in a Scratch 3.0 project.

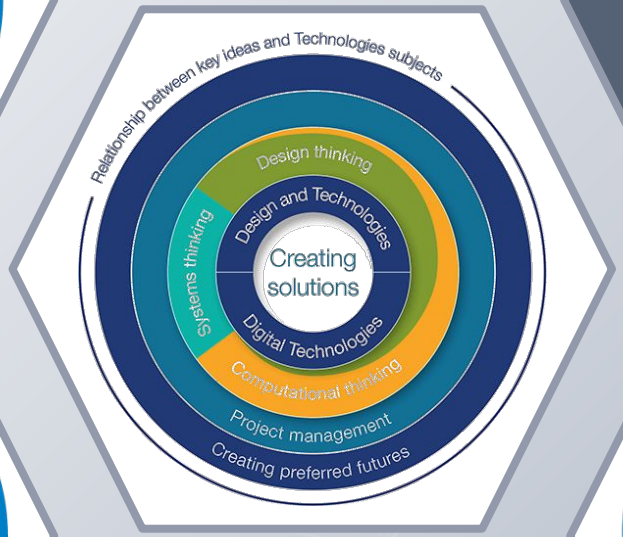
Achievement standards: starting point

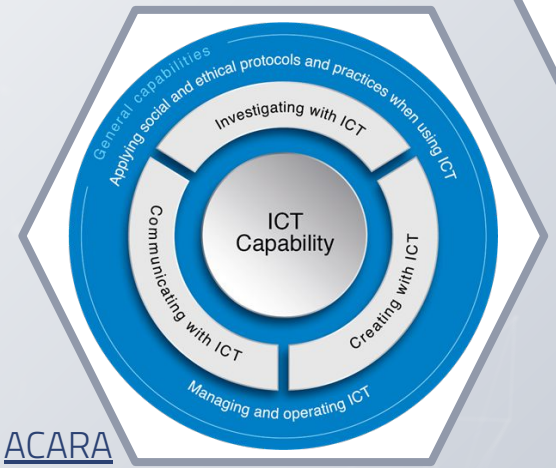


Credits: ACARA Achievement Standards

Australian CURRICULUM

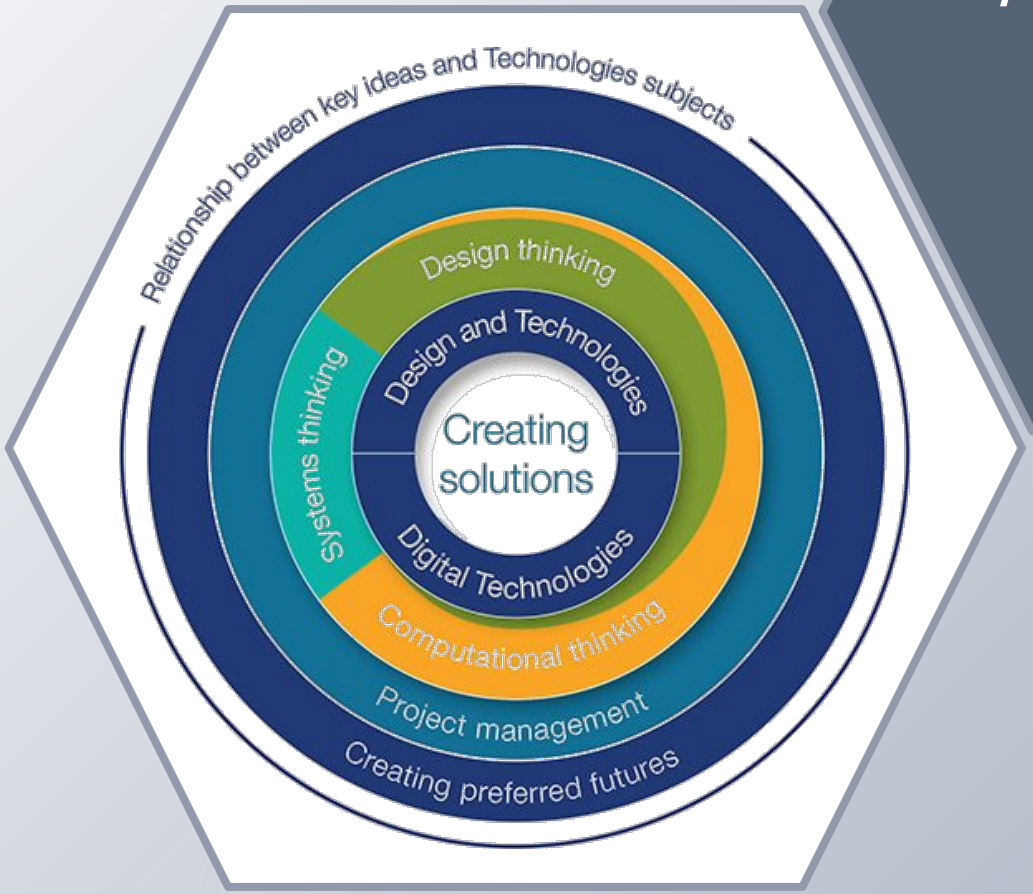
AI topics



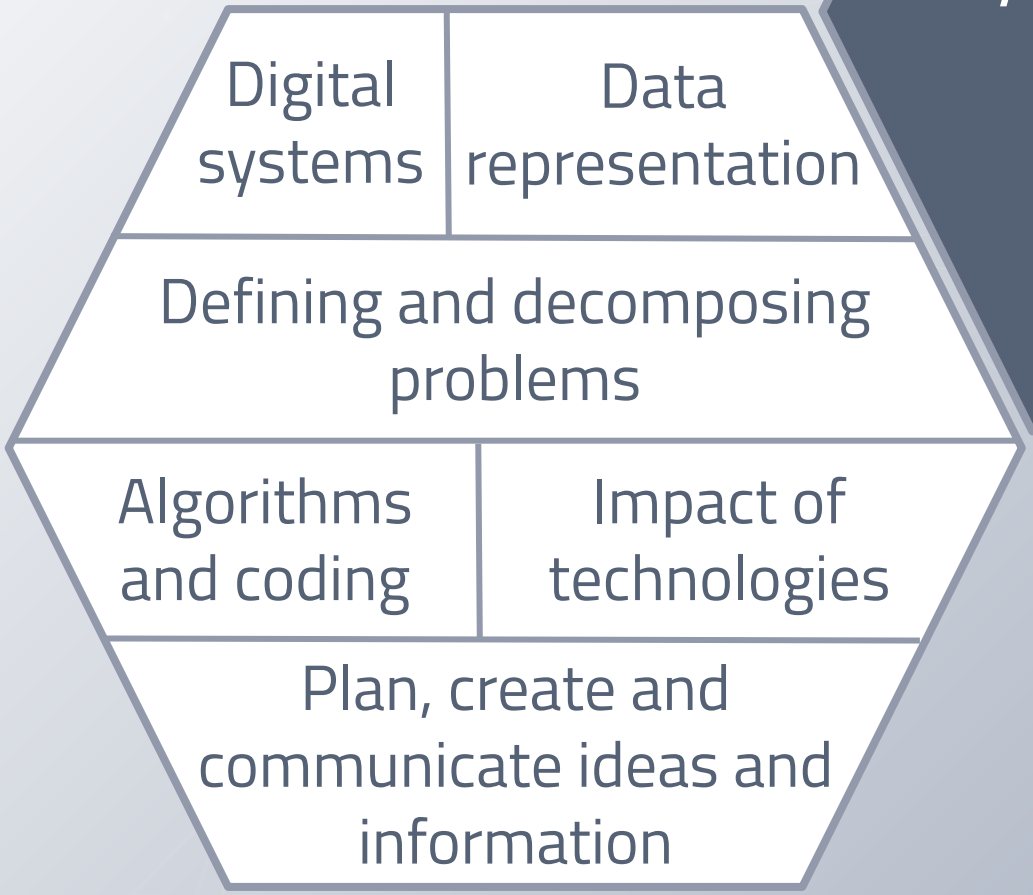


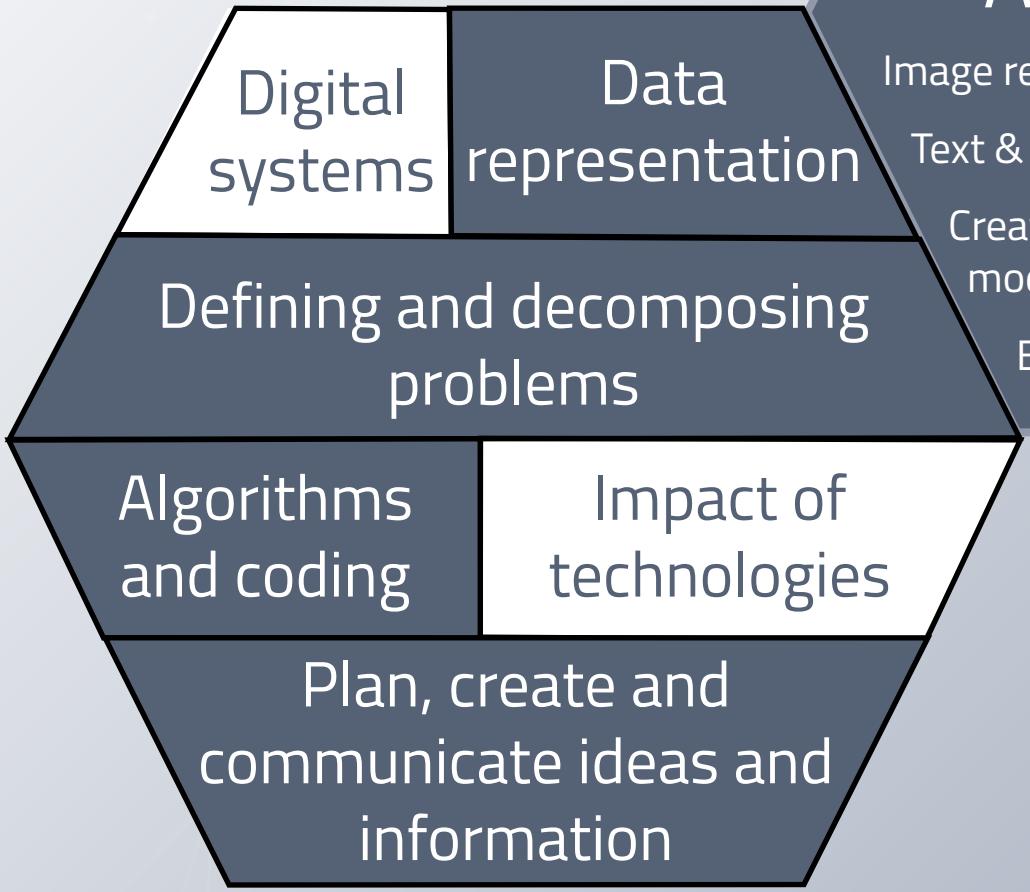
Source: ACARA

AI topics


Relationship between key ideas and Technologies subjects
Design thinking
Design and Technologies
Creating solutions
Digital Technologies
Systems thinking
Computational thinking
Project management
Creating preferred futures

AI topics

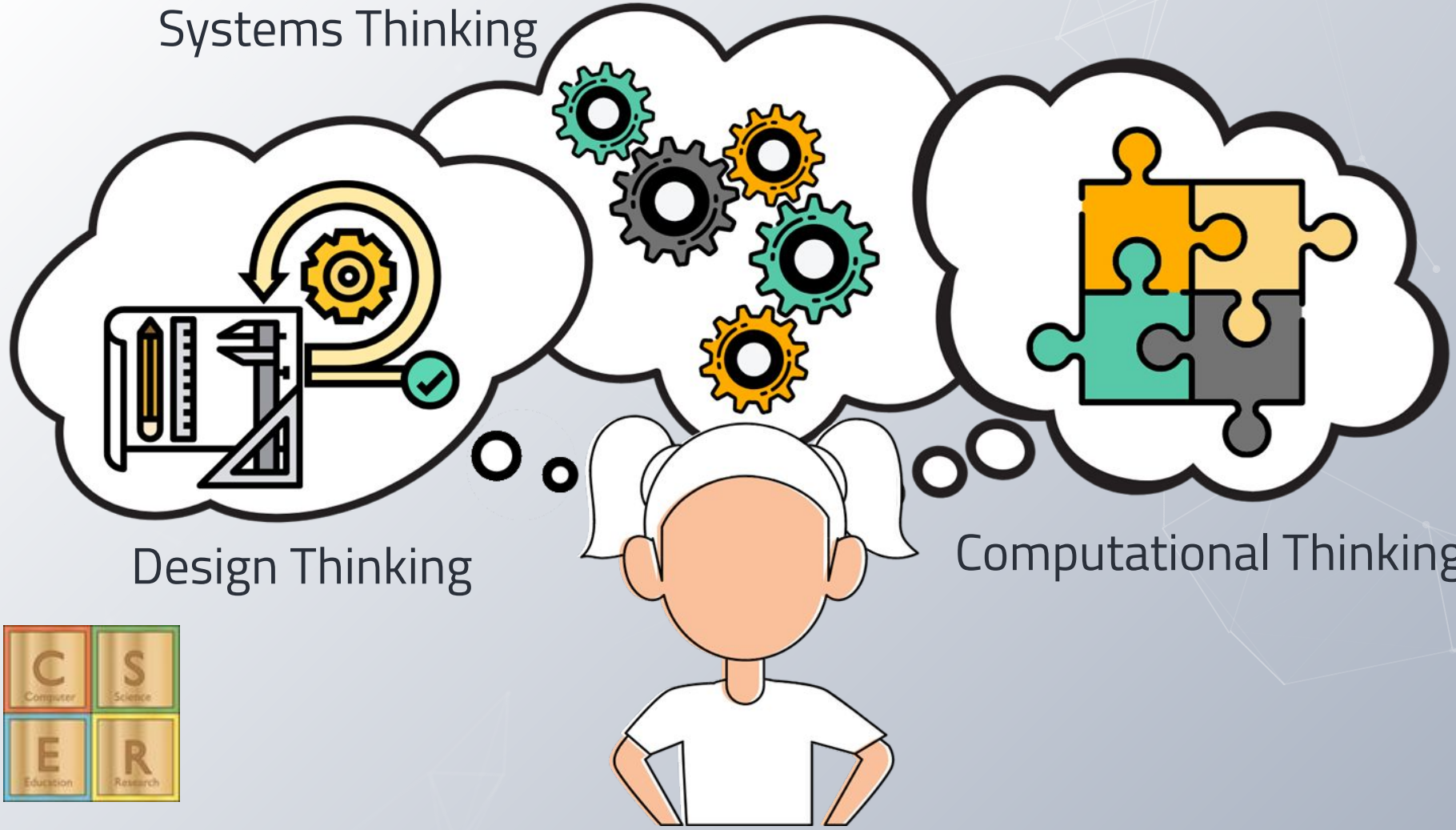

Digital systems
Data representation
Defining and decomposing problems
Algorithms and coding
Impact of technologies
Plan, create and communicate ideas and information



AI topics

- Image recognition
- Text & speech recognition
- Creating & using AI models (machine learning)
- Bias and ethical issues

Systems Thinking



Design Thinking

Computational Thinking

What is an AI model?

An AI (artificial intelligence) model is a program that has been trained on a set of data (called the training set) to recognize certain types of patterns.

Learning

So the AI is a program that can learn.

- It needs **learning data** to carry out the learning process.
- And (usually) our **feedback** to get it right
- We use **test data** to check if the learning was successful

Let’s make an AI model

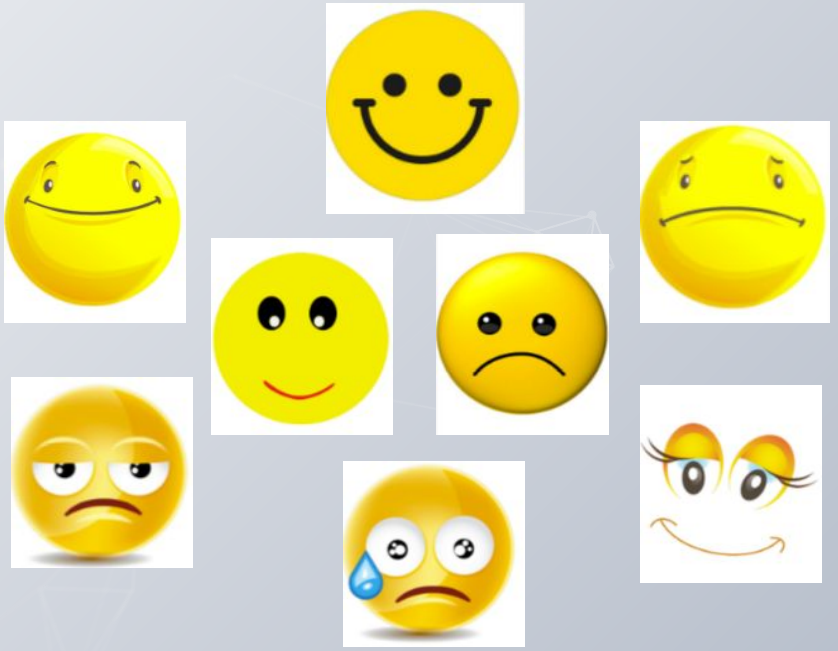
LESSON: **Can AI guess your emotion?**
(Years F-4)

Objective

Build an AI model that can distinguish happy and sad emojis.

1) Collect Learning Data

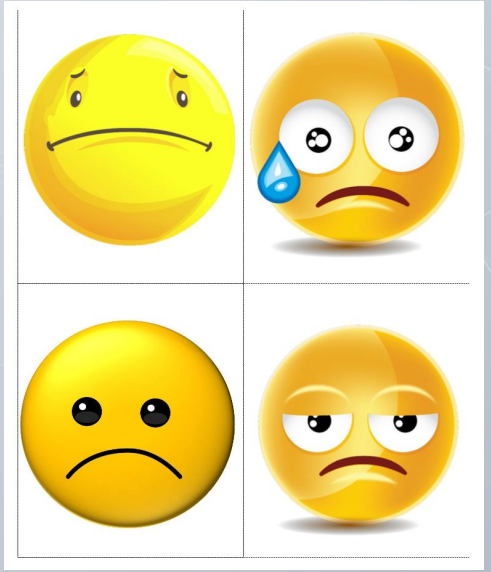
We collect images of happy and sad emojis



2) Group the learning Data

We then group and label the learning data, for example by placing the images in labeled buckets

happy



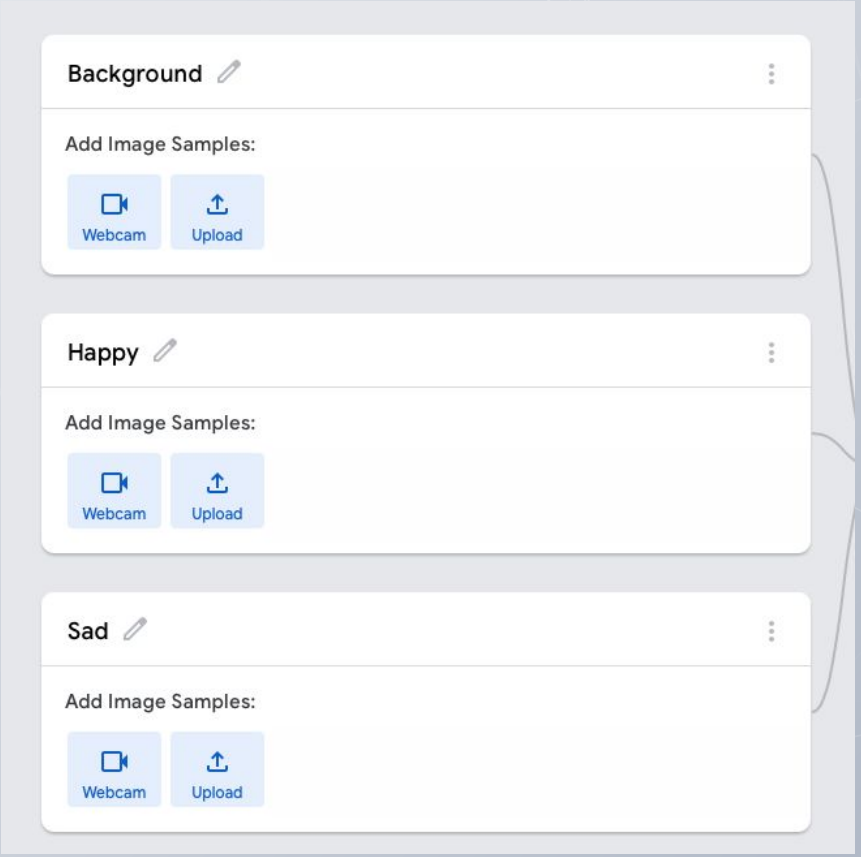
sad

3. Configuring the AI

Set up the groups in the AI.

These are **Happy** and **Sad**.

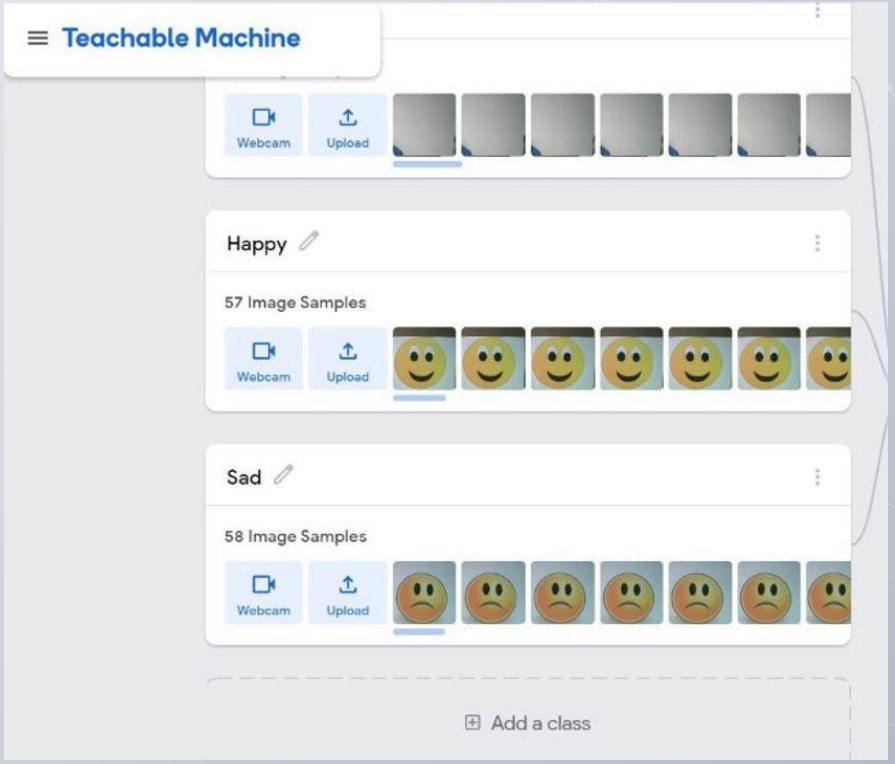
Also, add a **Background** Group



4. Add the images to the AI

Record the images under their respective groups, **Happy** or **Sad**.

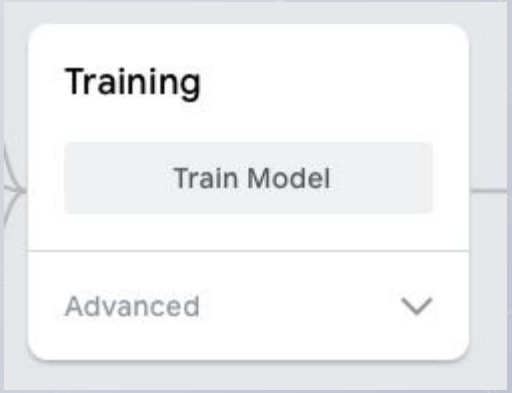
In the **Background** group, record images of the background. This is our control group.



5. Start the learning process

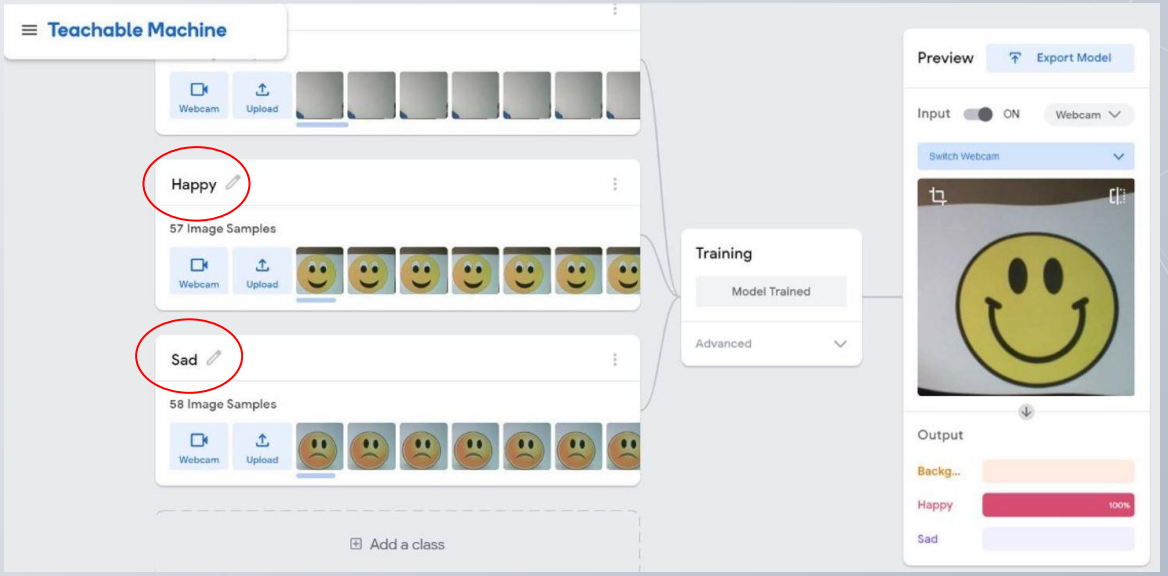
Tell the AI to begin learning.

Internally, the AI will begin a process of adjusting its internal values. Teachable Machine doesn't show this, but you can view this in the My Computer Brain AI.



6) Learning process complete

We have given all these different images to the AI and told it to learn. Because we have labeled the images, the AI knows what they mean. (supervised learning)

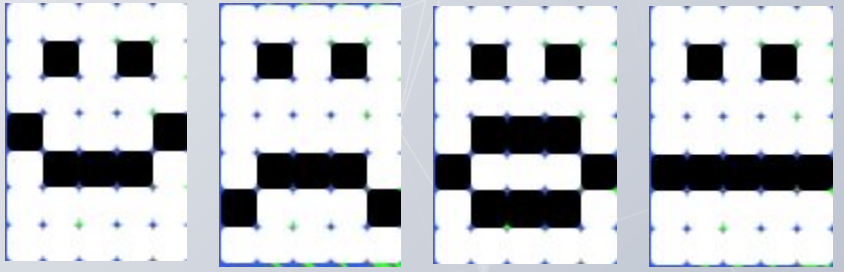


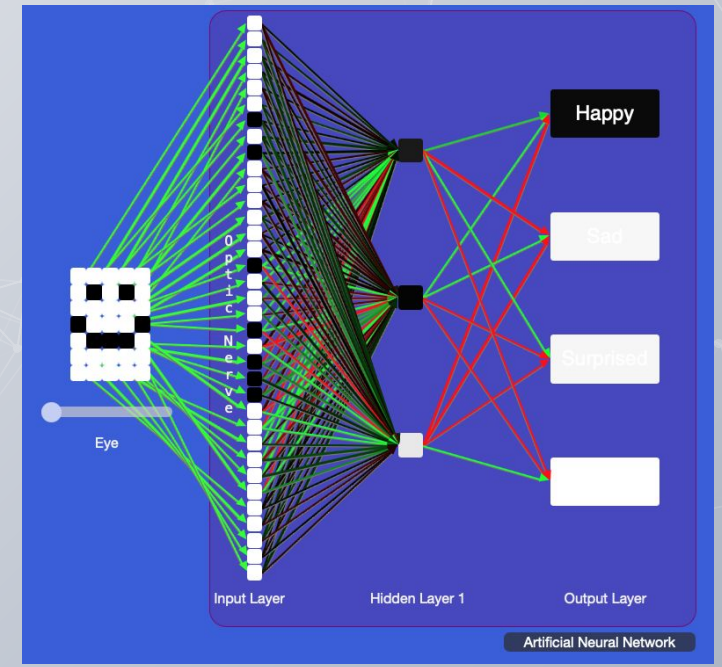
Science Alert

What actually happens in an AI when it learns?

What is learning anyway?

Demo

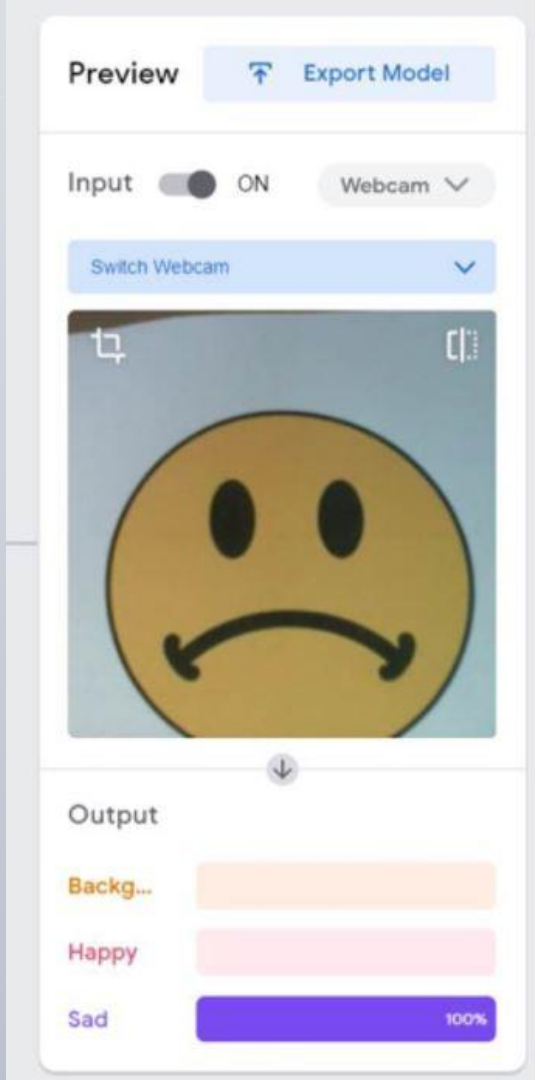




Testing the model

We then test our model

For the test, we use different data

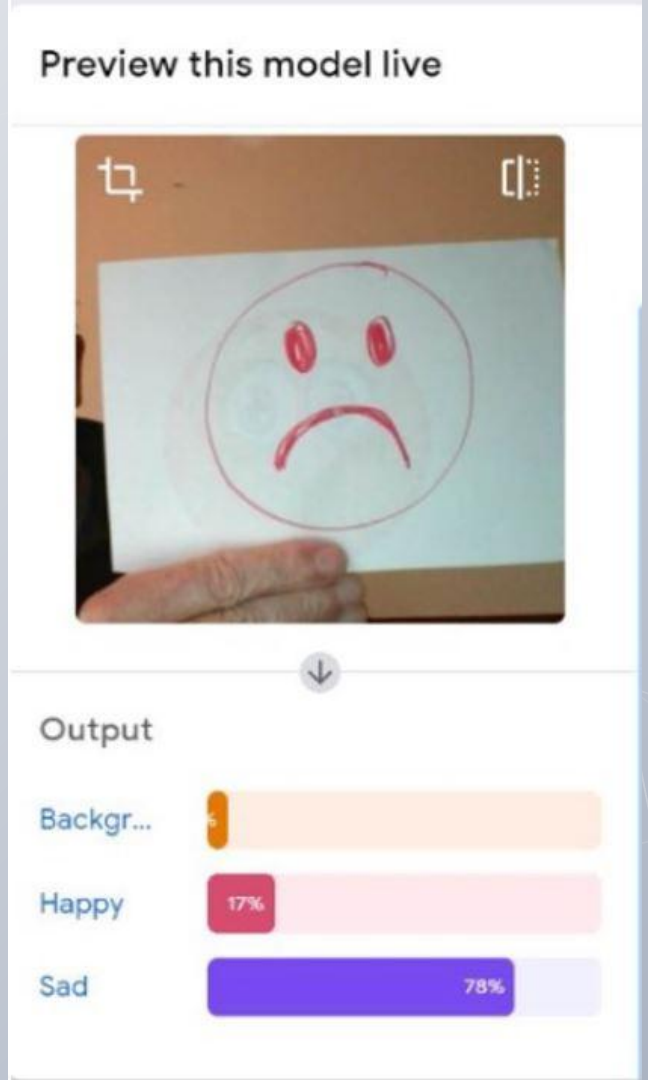


LESSON: Can AI guess your emotion?
(Years F-4)

Confidence

The AI tells us how likely it is that the input belongs to a certain class.

Here, the AI is 17% certain that this is a happy face, but 78% that it is a sad face.

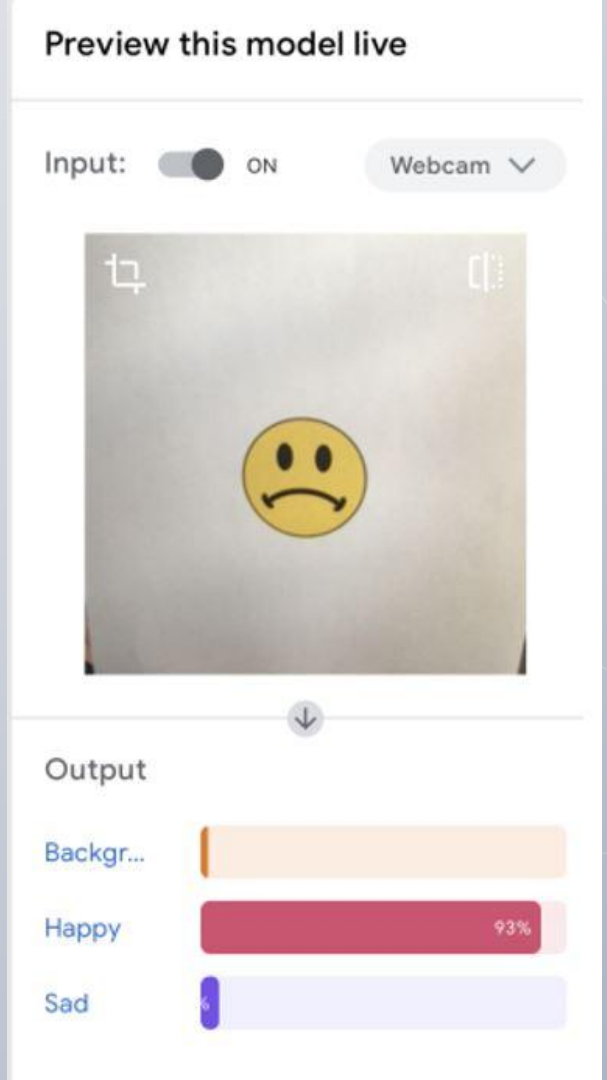


Confidence issues

The AI can be confident, but still be wrong.

Here, the AI is 93% confident that it sees a happy face, yet it is wrong.

Our AI model has a problem.



Creating & training an AI model

Use this pre-made model to test the AI to see how well it recognises happy and sad. (You will need a device with a webcam).

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Bias

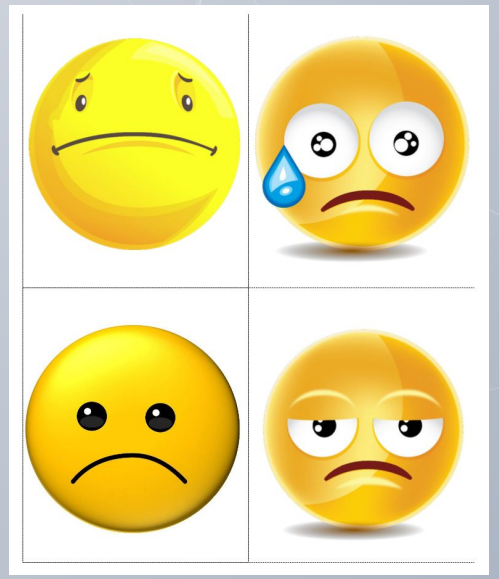
For an AI system to be unbiased requires the training data to be balanced.

Bias can be intentional, but often creeps in unintended.

Bias

Our model has a a number of biases:

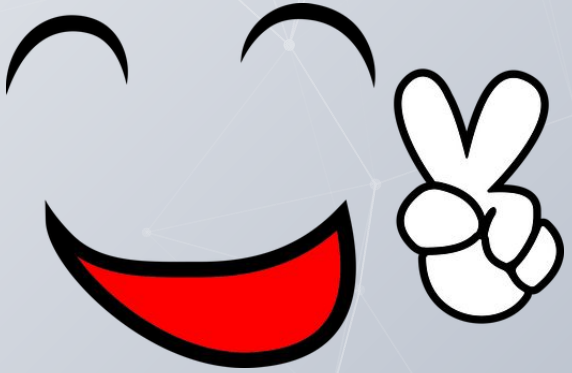
- Shape
- Colour
- Size
- Backgrounds
- Rotation
- ~~Eye, mouth shape ...~~



Activity

How could we address data bias in our model?



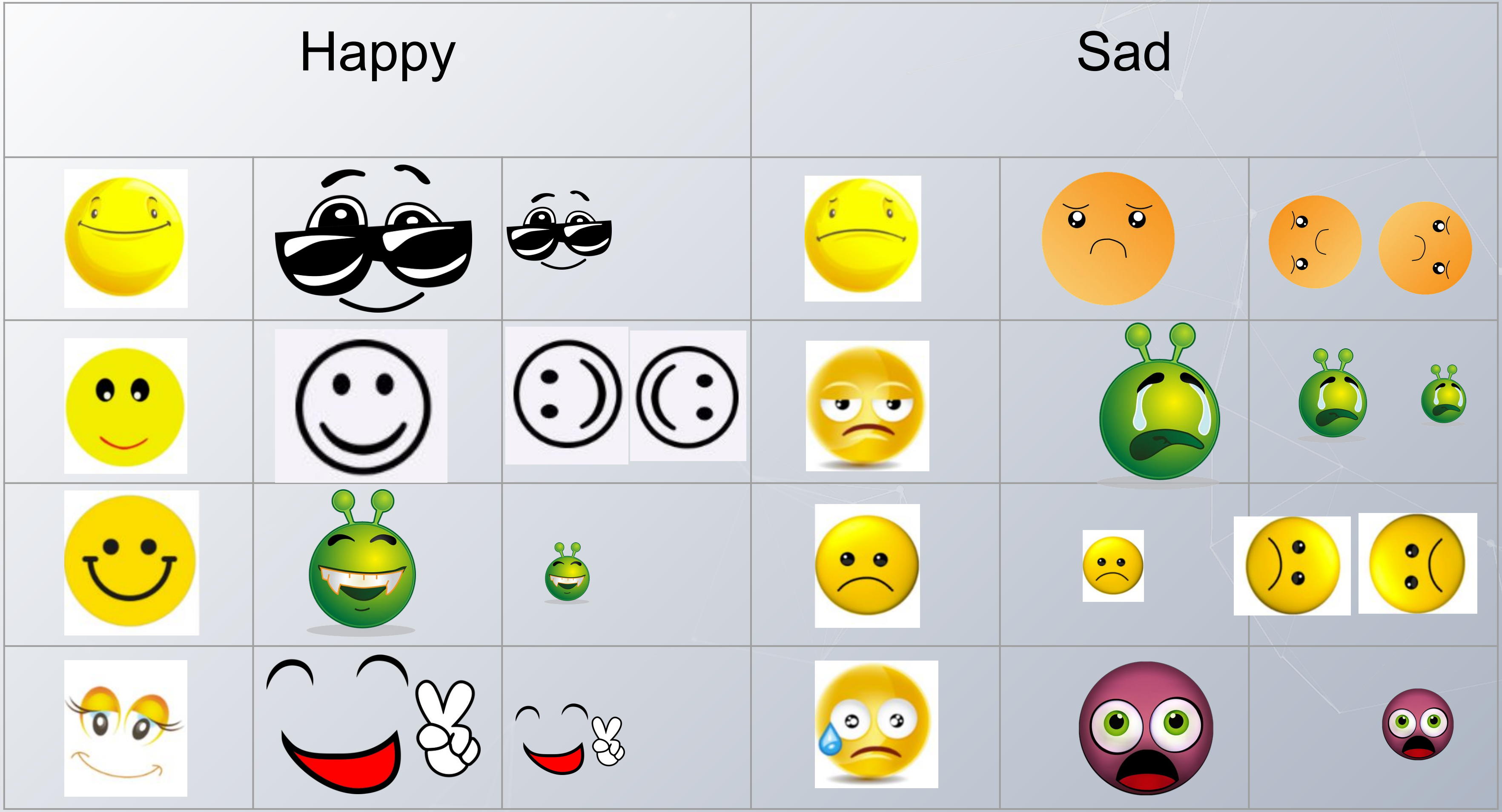





Images: Pixabay

Retraining our model

By following the previous steps, we can re-train our model with the additional data



Images: Pixabay

Bias.

It is quite normal for initial AI models to have a bias. It takes some experience to anticipate it.

It even happens to the professionals.

Note that we need to combine bias dimensions in our learning data for a better balanced model:

E.g.

- round-yellow-large-white background - **upright** 
- round-yellow-large-white background - **rotated 90 degrees** 

Bias - Summary

Is hard to avoid

Often creeps in unintended

Is a great hook to discuss limitations of AI, fairness and ethics with students.

We'll come back to this topic in Deep dive 5, AI and Ethics.

Creating an AI model

What contexts would engage your students when creating an AI model?

Put your idea in the chat!

Creating an AI model: engaging contexts

Possible contexts

- Paper, scissors, rock game
- AI fruit and veg identifier
- Cat sensor cat door (no dogs allowed!)
- Landmark identifier
- Flag recogniser
- Litter sorter (waste, recyclable, organic)

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Creating an AI model: engaging contexts

How can we avoid bias when creating these models?

- Paper, scissors, rock game
- AI fruit and veg identifier
- Cat sensor cat door (no dogs allowed!)
- Landmark identifier
- Flag recogniser
- Litter sorter (waste, recyclable, organic)

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Data: sourcing images

Recognise intellectual property

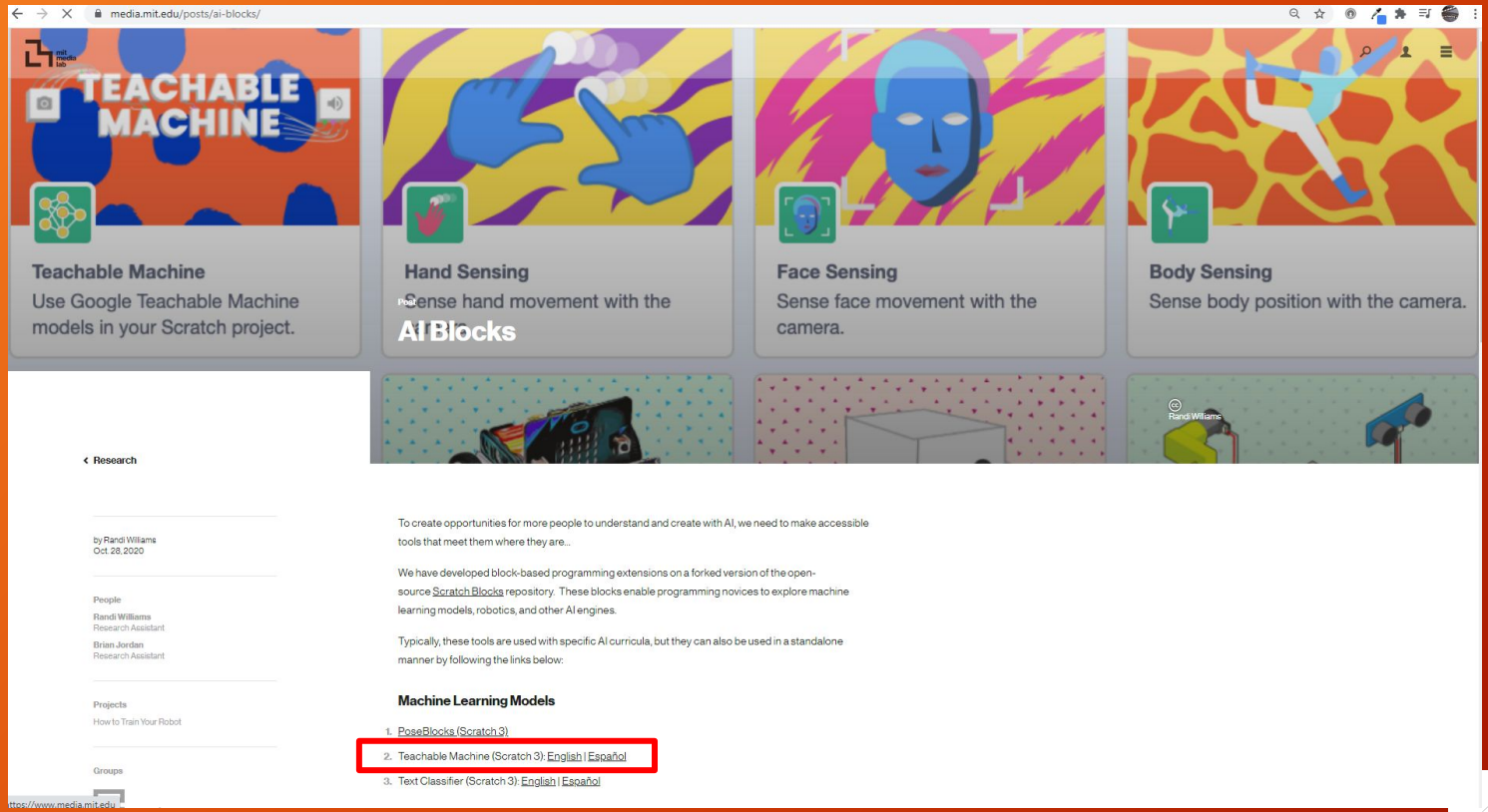
Part of **Applying social and ethical protocols and practices when using ICT**

Provide links to image free library or provide a folder of images (teacher curated)

Image recognition

The ability of machines to recognise objects in images or videos (part of **computer vision**).

A new version of Scratch that is AI compatible!



Created by
MIT Media Lab

https://www.media.mit.edu/posts/ai-blocks/

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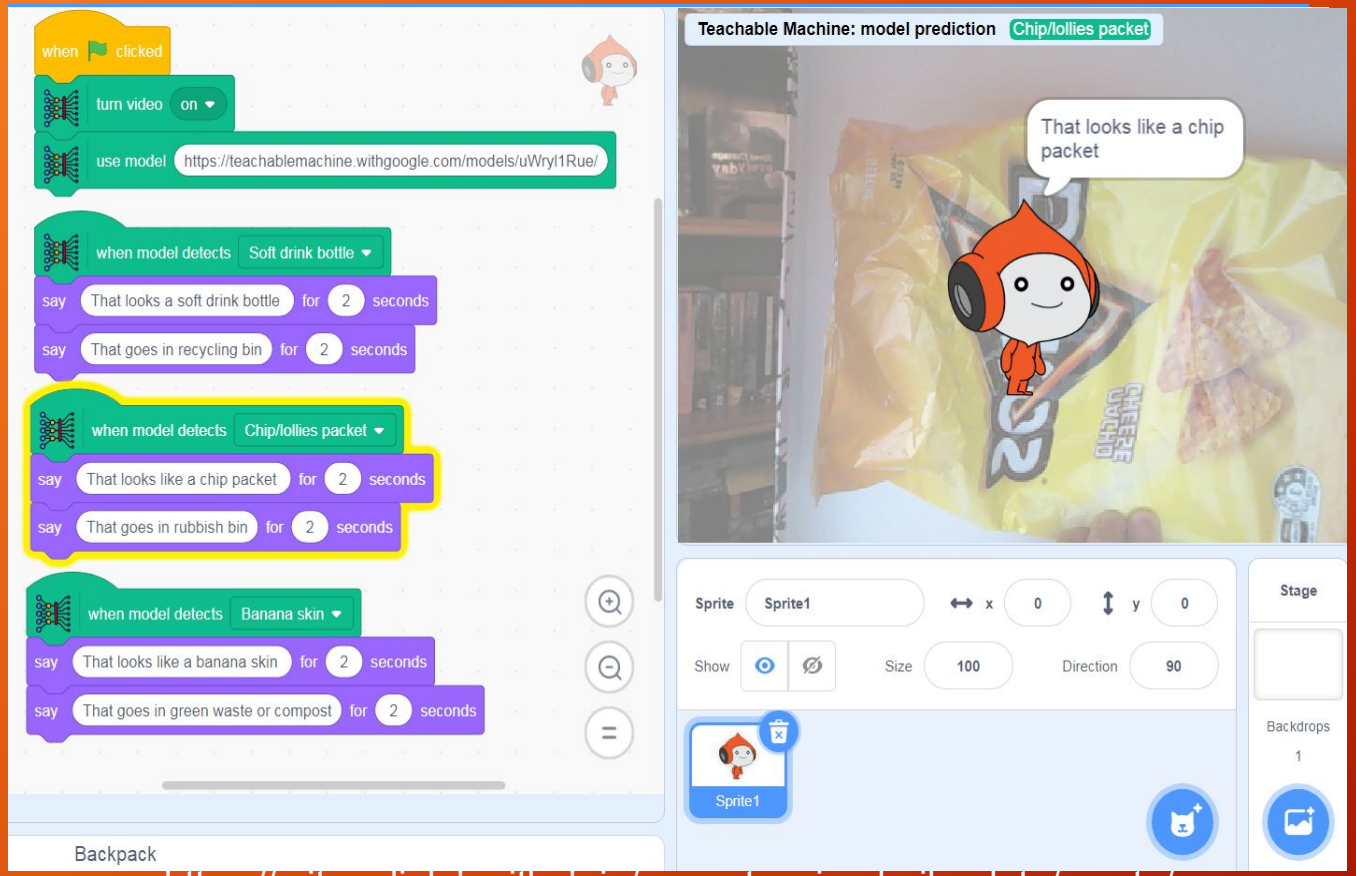
A new version of Scratch that is AI compatible!



Paste the model's unique URL.

Add some code blocks and you are away.

It is that simple!

https://mitmedialab.github.io/prg-extension-boilerplate/create/

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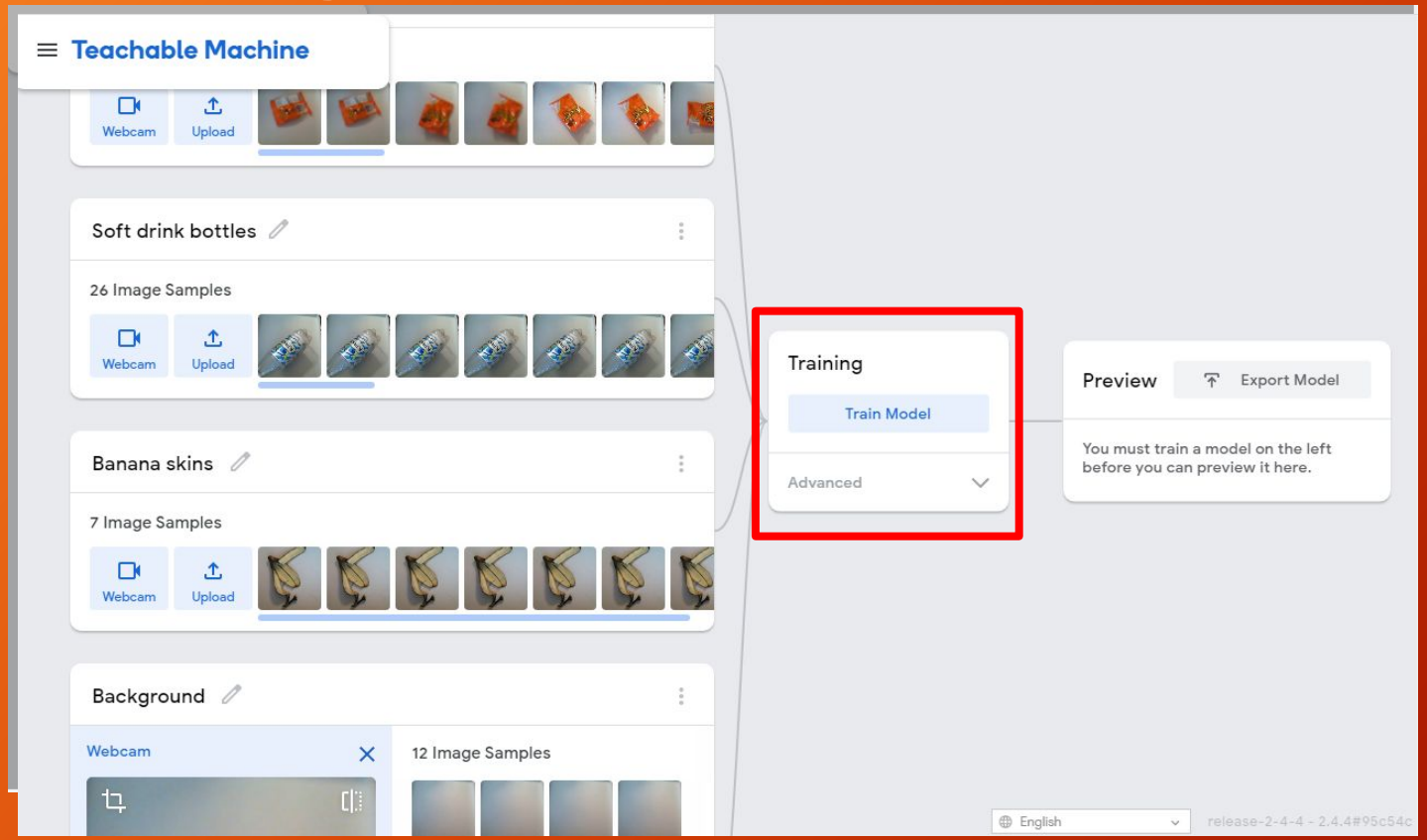
Training an AI model



TIPS...

Have all your data samples ready

Have your classes (buckets) worked out

https://teachablemachine.withgoogle.com/

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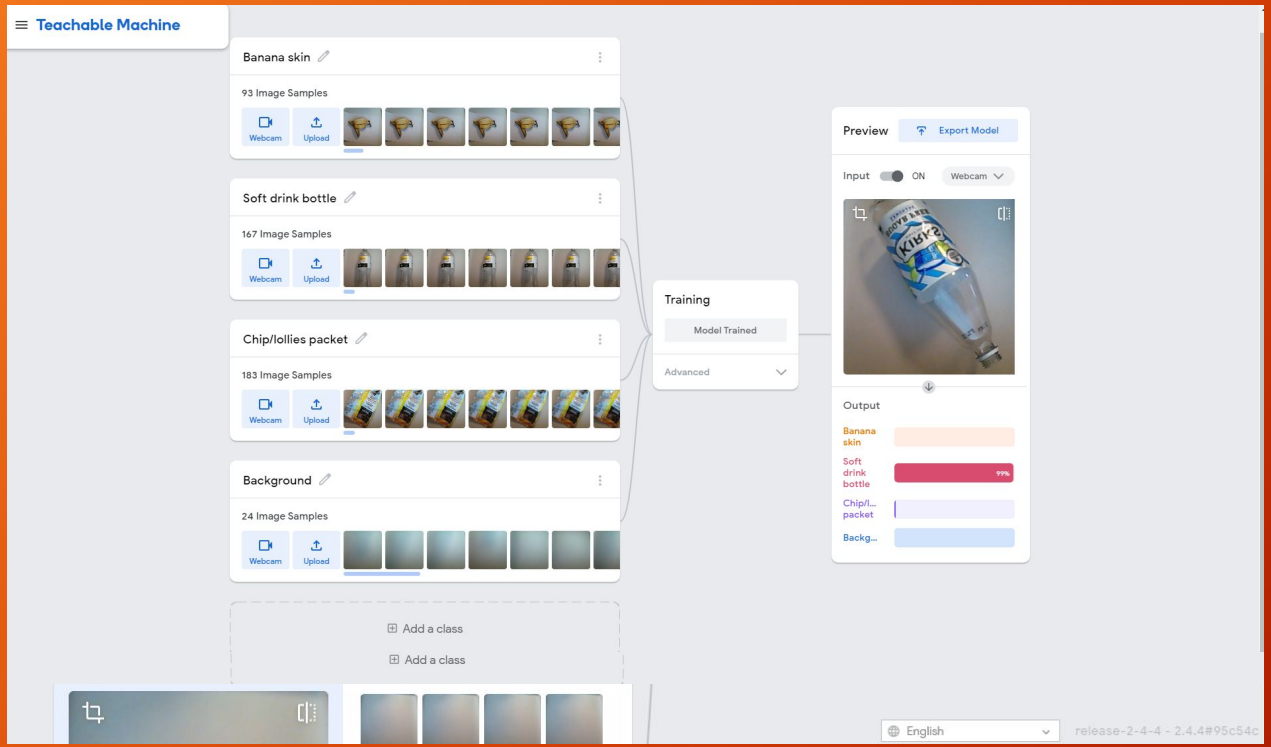
A trained AI model



Have something in place for the time taken to train the model.

... wait

https://teachablemachine.withgoogle.com/models/uWryl1Rue/

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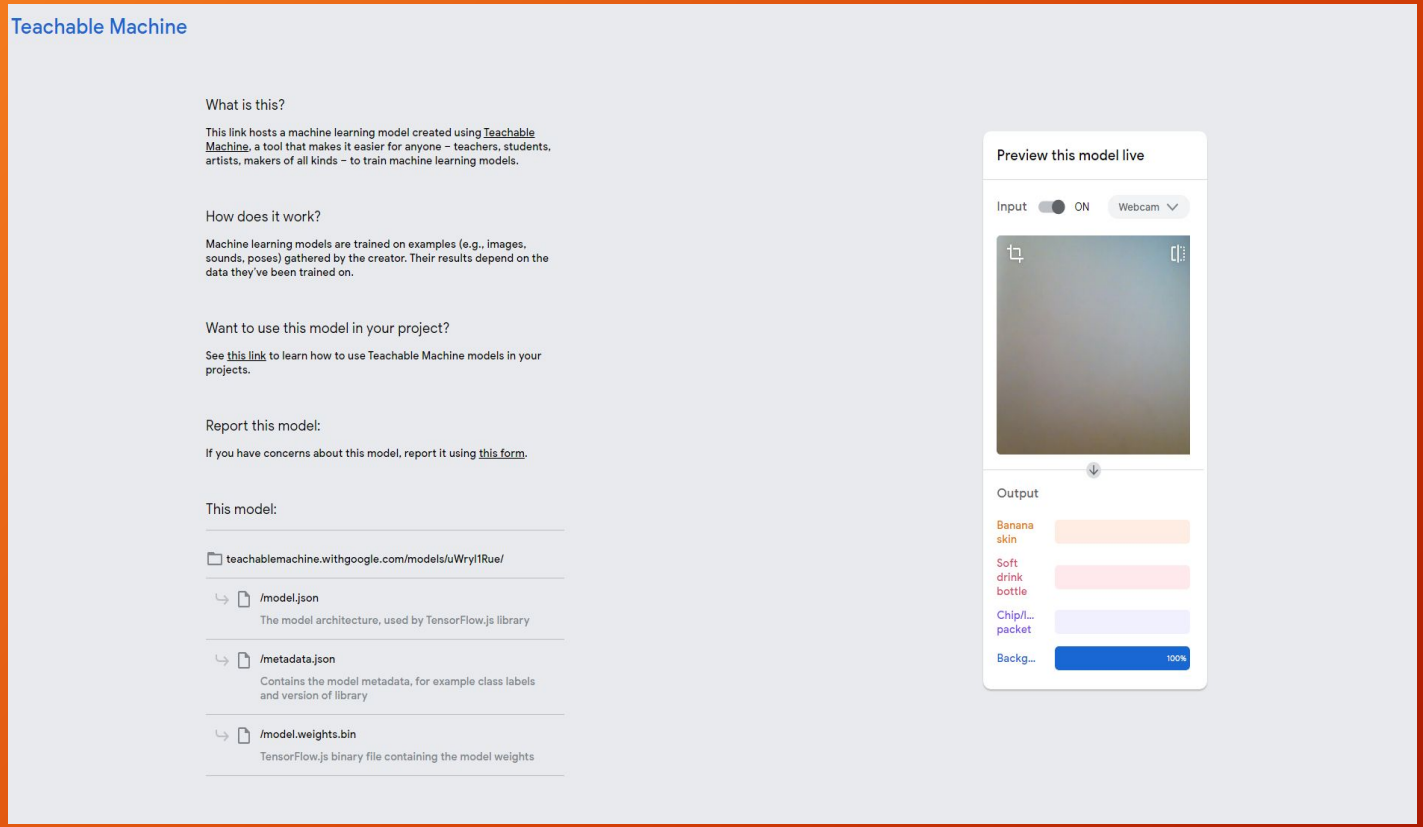
Exporting a trained AI model



Copy and save the URL.

Test in new browser

https://teachablemachine.withgoogle.com/models/uWryl1Rue/

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5 step process: Using an AI model in Scratch

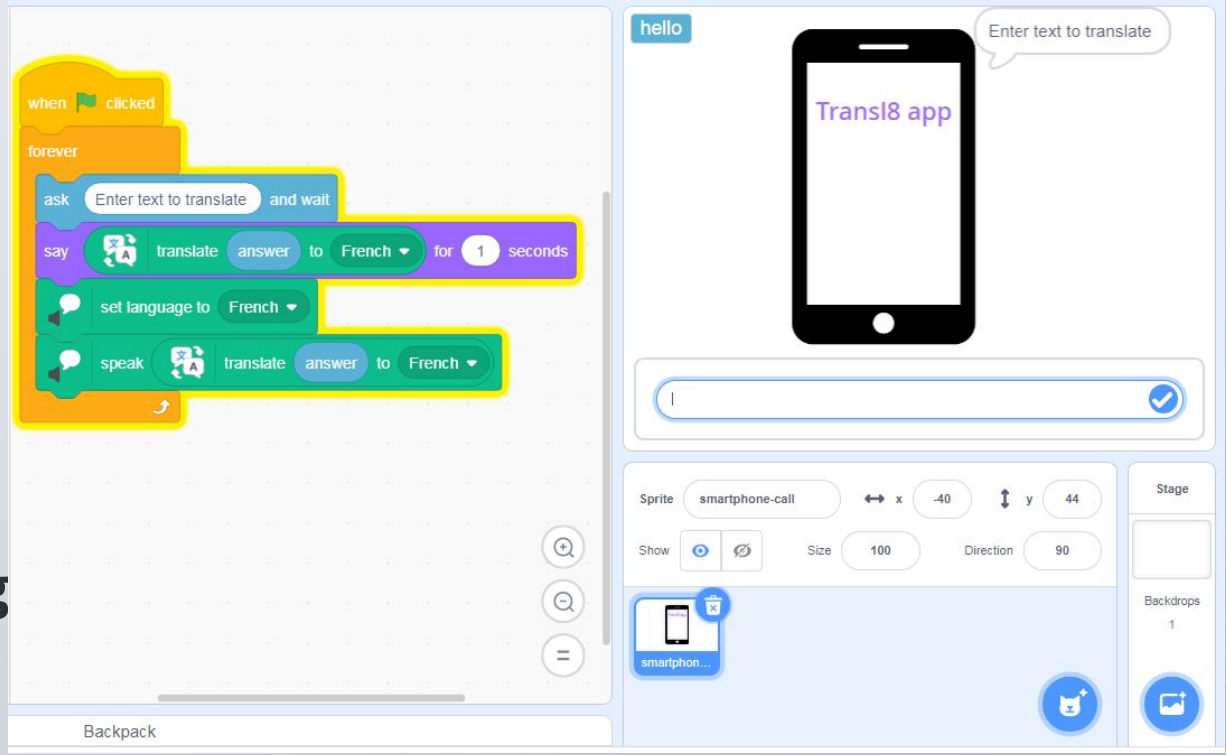
1. Define the problem and data requirements
2. Collect the data (folder)
3. Train and test the model (copy URL of model)
4. Design and represent the algorithm
5. Build the program (user input) then modify to include AI model (URL)

Design thinking

Build on this basic translating app to include other languages.

We draw on:

- **design thinking** skills for layout (how it will look)
- **computational thinking** to program the solution (how it will work).



https://scratch.mit.edu/projects/559665569/editor/

Design our algorithm

START...

Repeat

    User selects from three options (Flags)

    Check selection: yes or no

    If answer = yes

        Ask for text to be translated

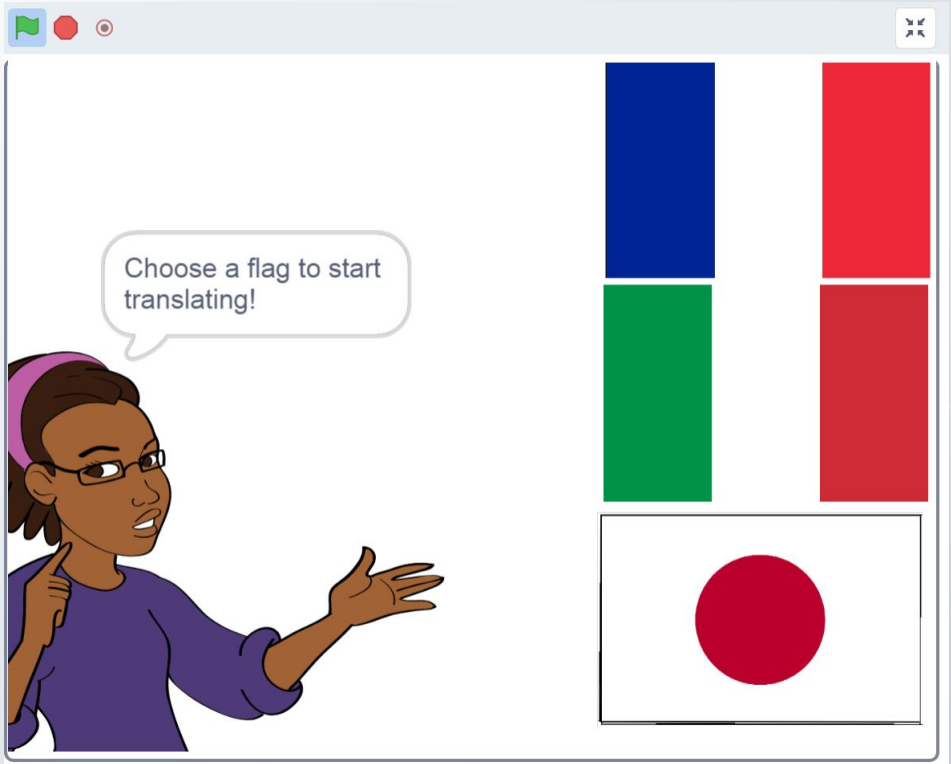
        Say (Print) translated text

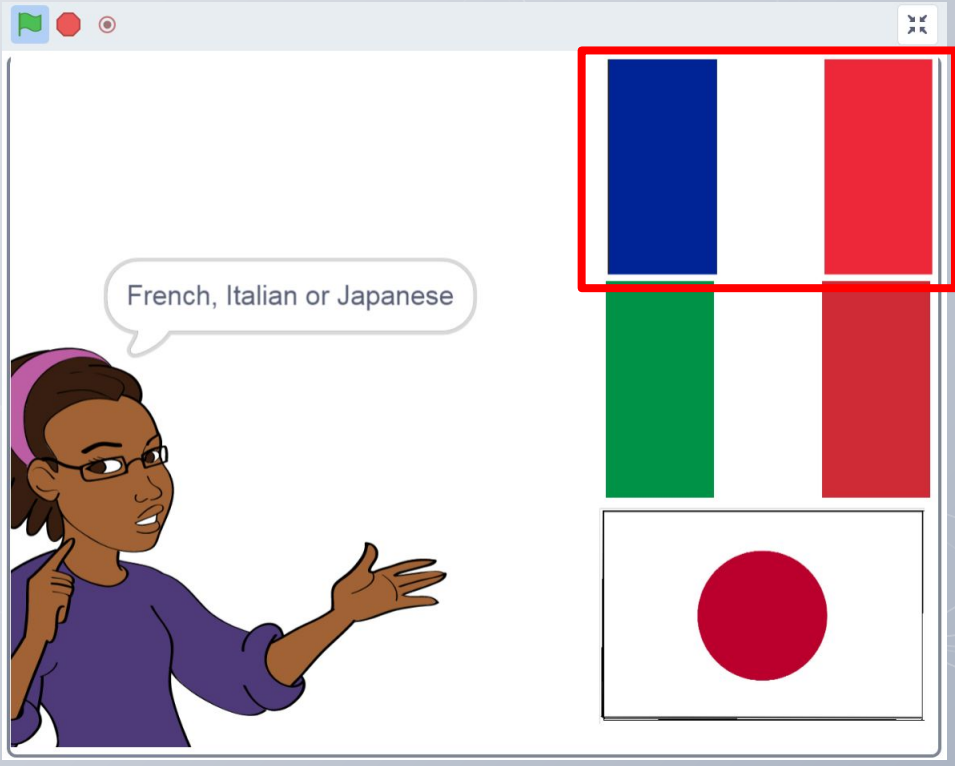
        Speak translated text

    END If (answer = no)

END Repeat

Design thinking: user input





Source: Flagpedia

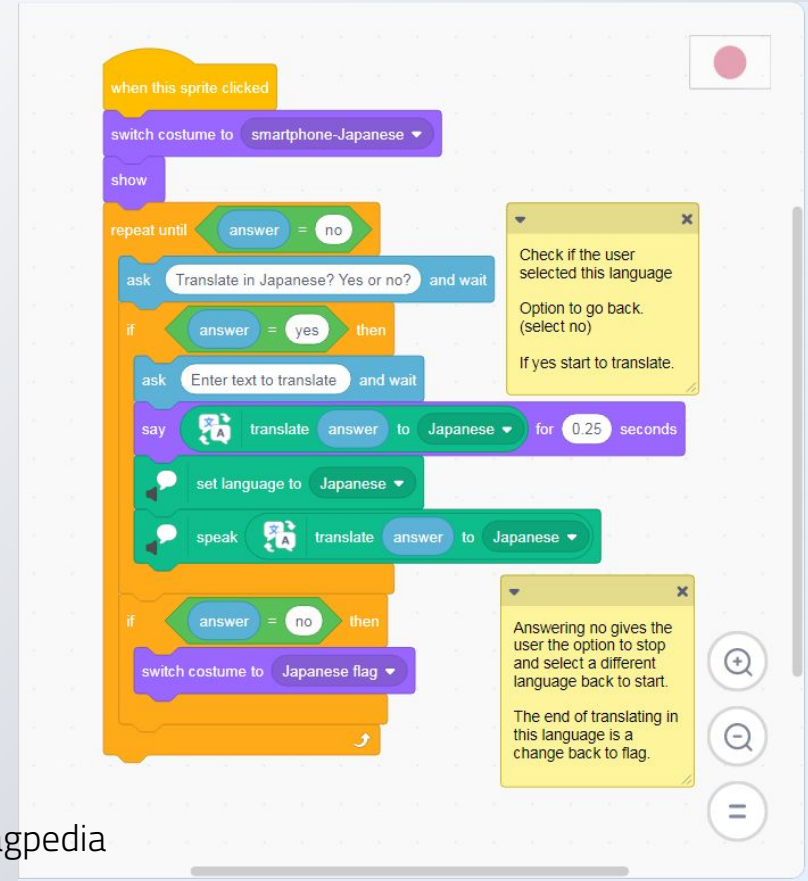
Design thinking: user input

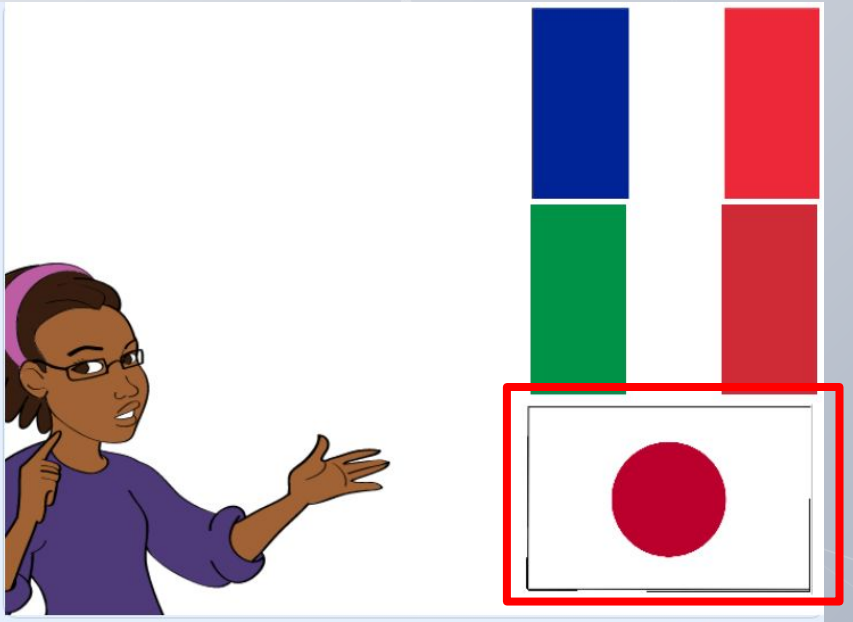
When sprite is clicked…
check whether user meant to choose the language.

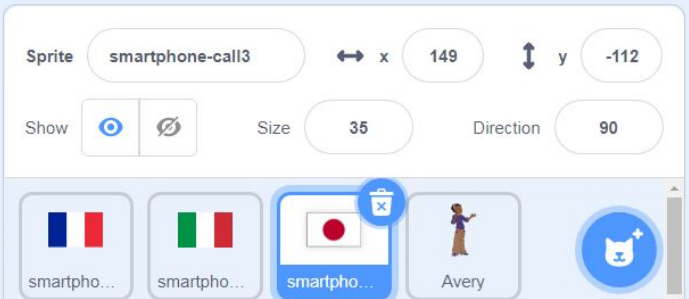
If **no…** go back. (also use as the way to exit the language)

If **yes**… start to translate.

Design thinking

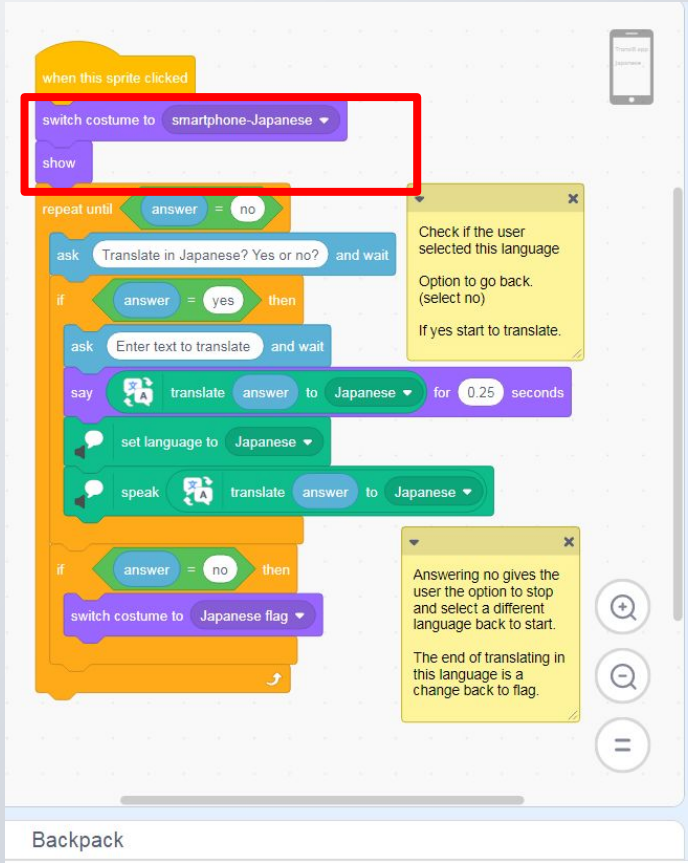


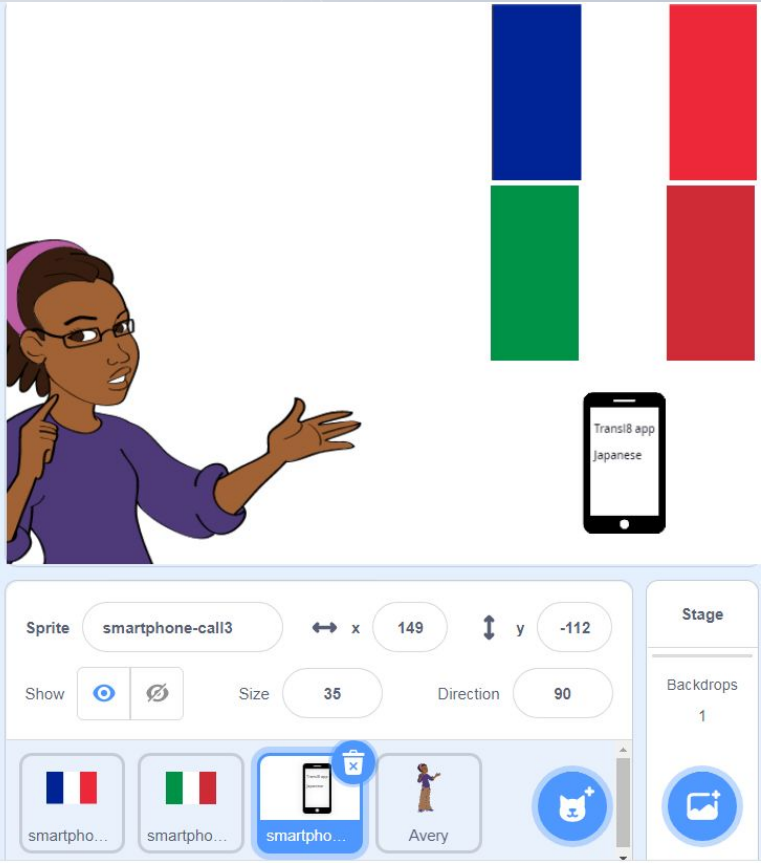




Source: Flagpedia

Design thinking





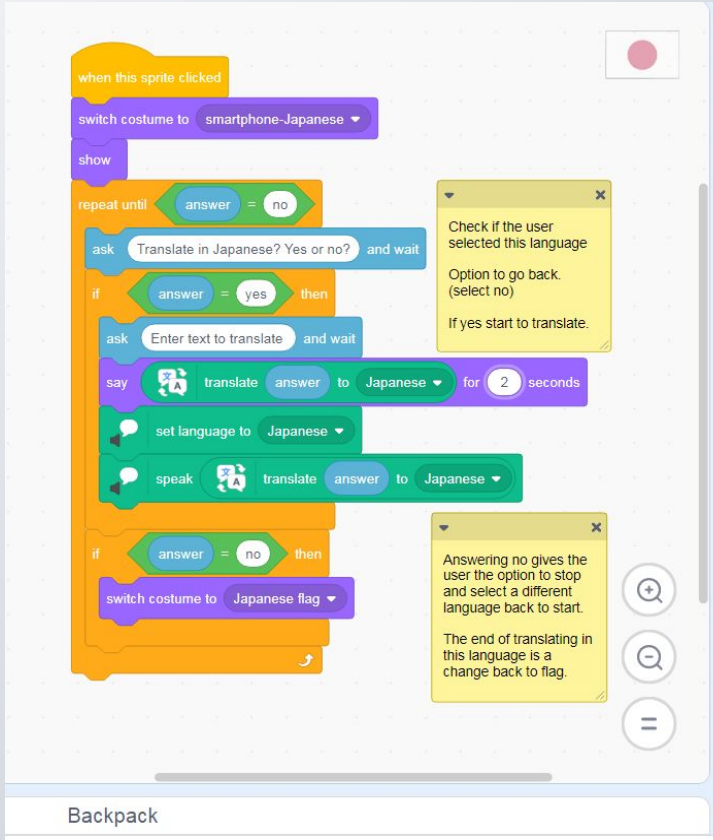
Source: Flagpedia

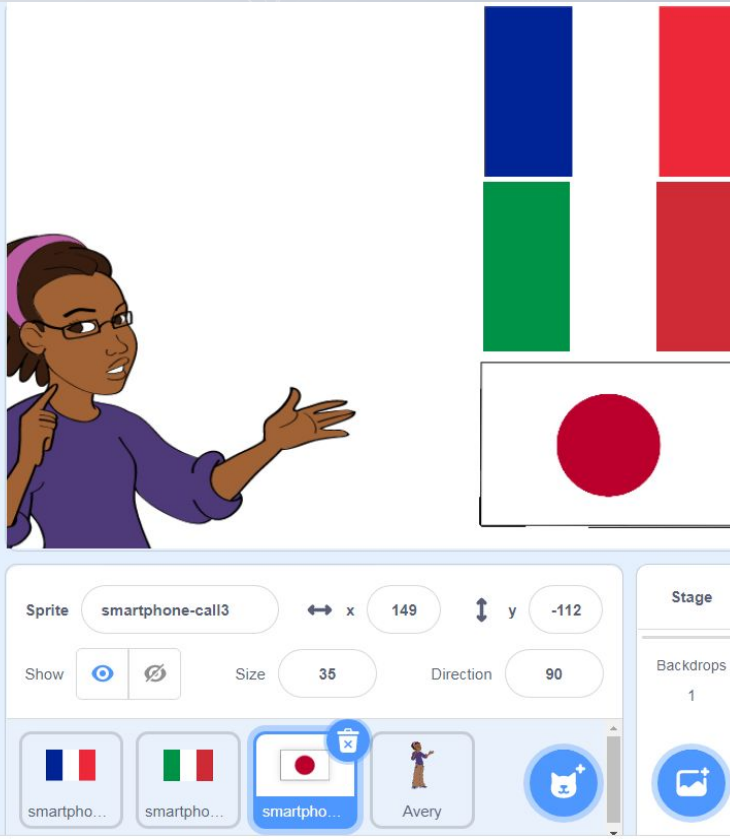
Design thinking

Use of repeat until block…

- Repeats the program until a condition is met

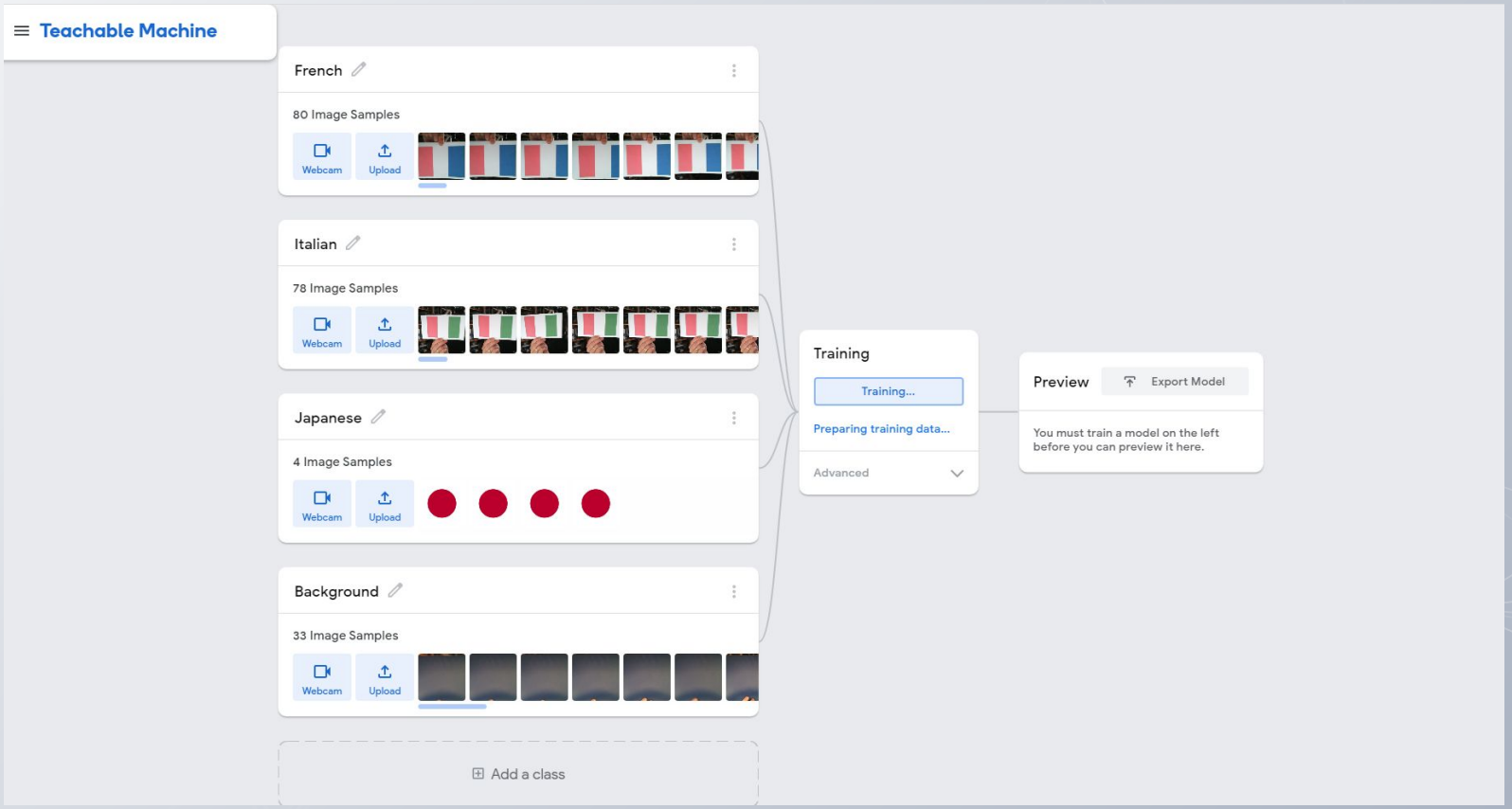
Combined with an operator block 





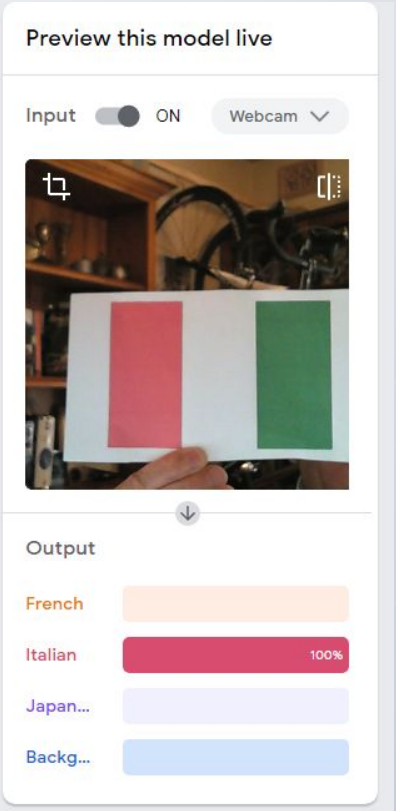
Source: Flagpedia

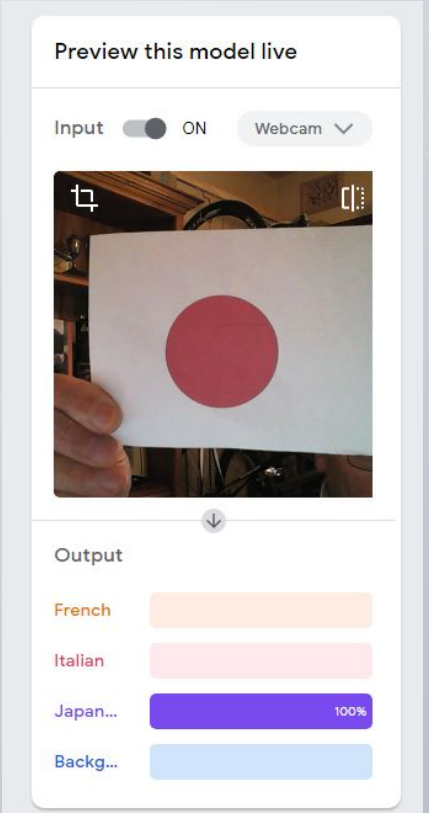
An AI that recognises flags

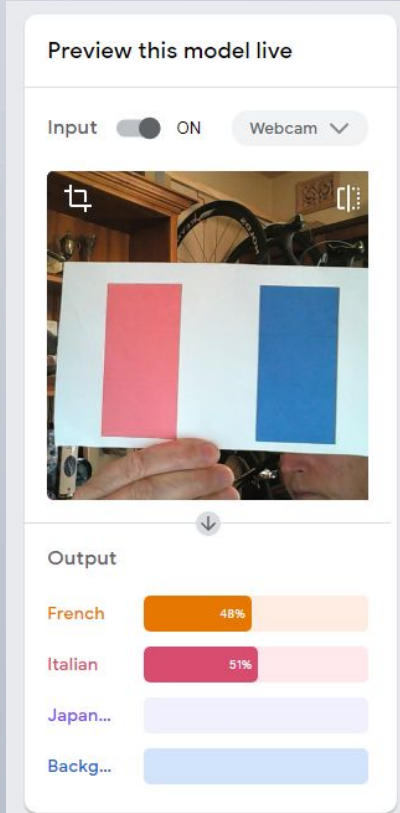


Source: Flagpedia

An AI that recognises flags

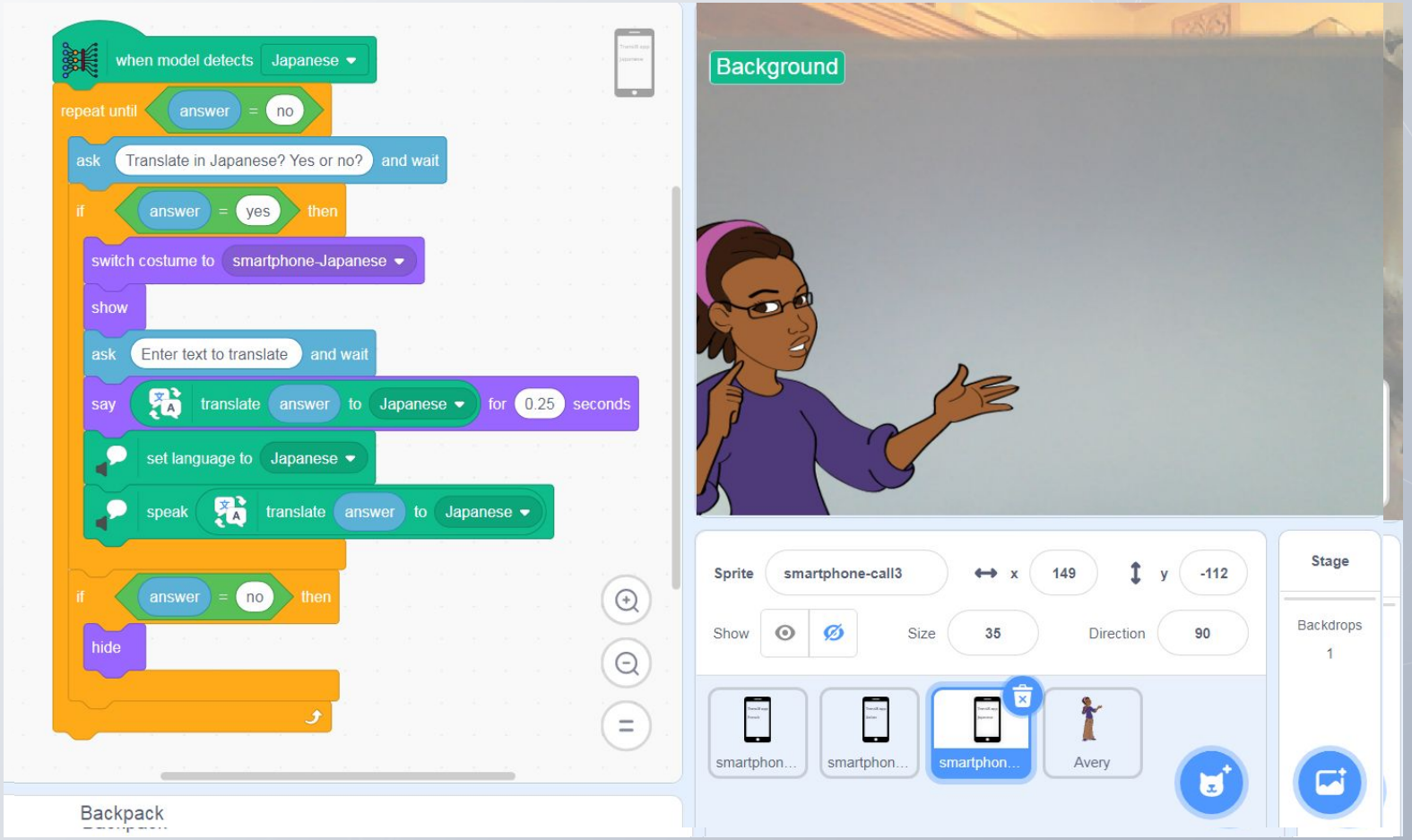






Source: Flagpedia

Using the AI model



Design our algorithm

START...

Repeat

    User selects from three options (Scissors, paper, rock)

    Check selection: yes or no

    If answer = yes

        Computer randomly selects one option

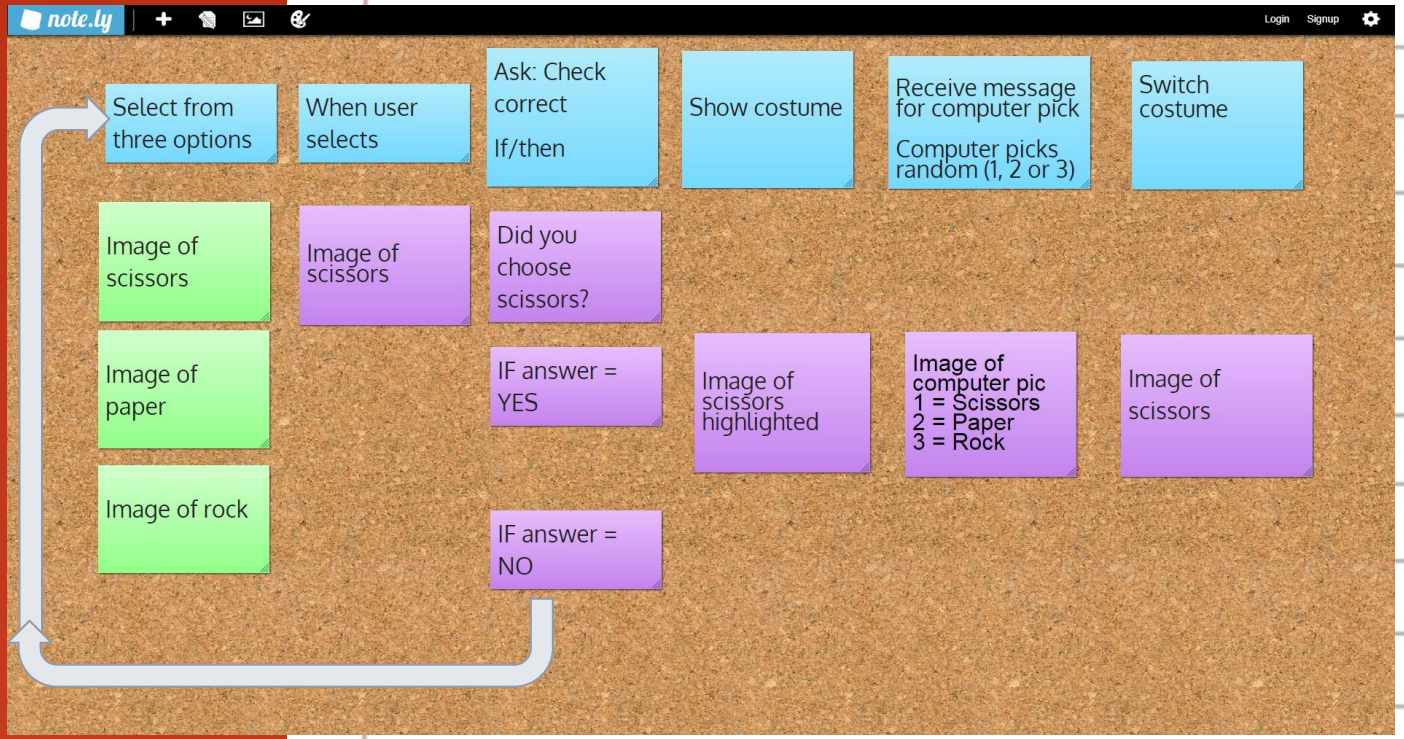
        Show computer selection

        Compare user choice against computer choice

    END If (answer = no)

END Repeat

Design our algorithm



Setting up program for ML model

START… Ask a question to enable input

Paper, scissors, rock?

Users selects from three options

Check selection: Did you choose ‘Rock’? Yes or no (if no choose again)

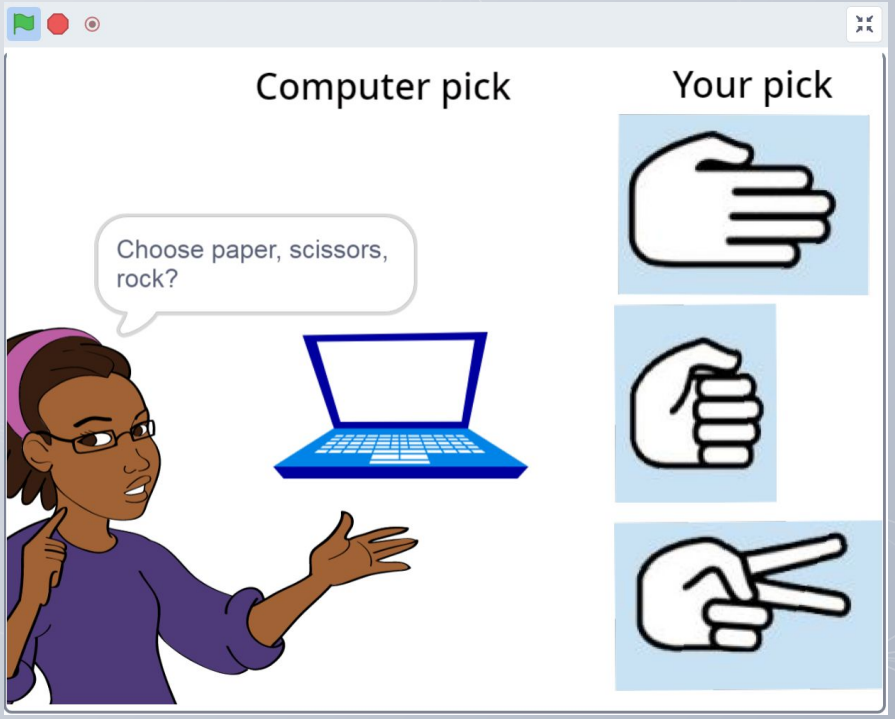
If yes compare to computer choice: (Create a variable Computer pick: Random 1, 2 or 3)

If/then (if computer pick = 1, show paper etc)

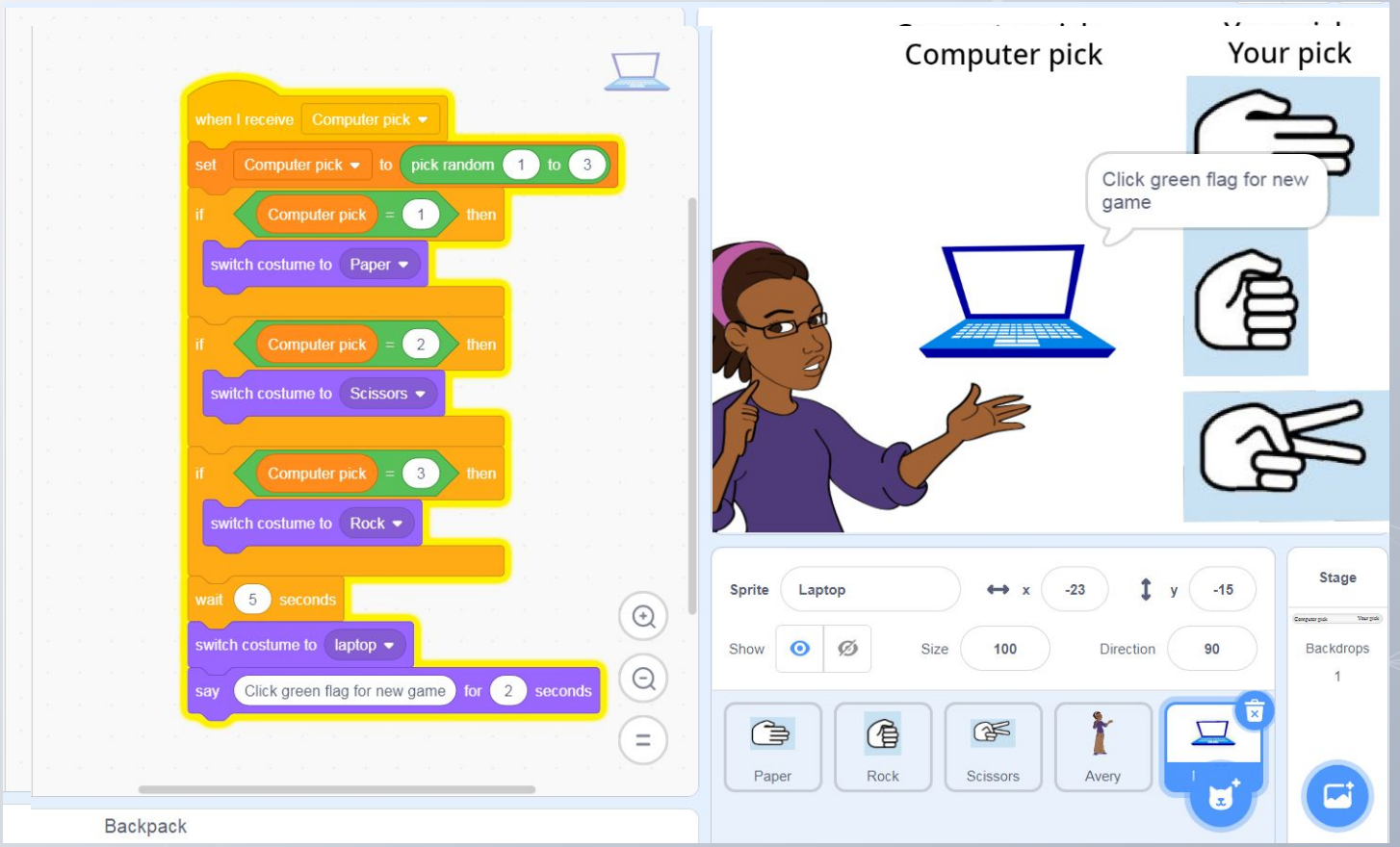
Compare computer pick to user pick

END

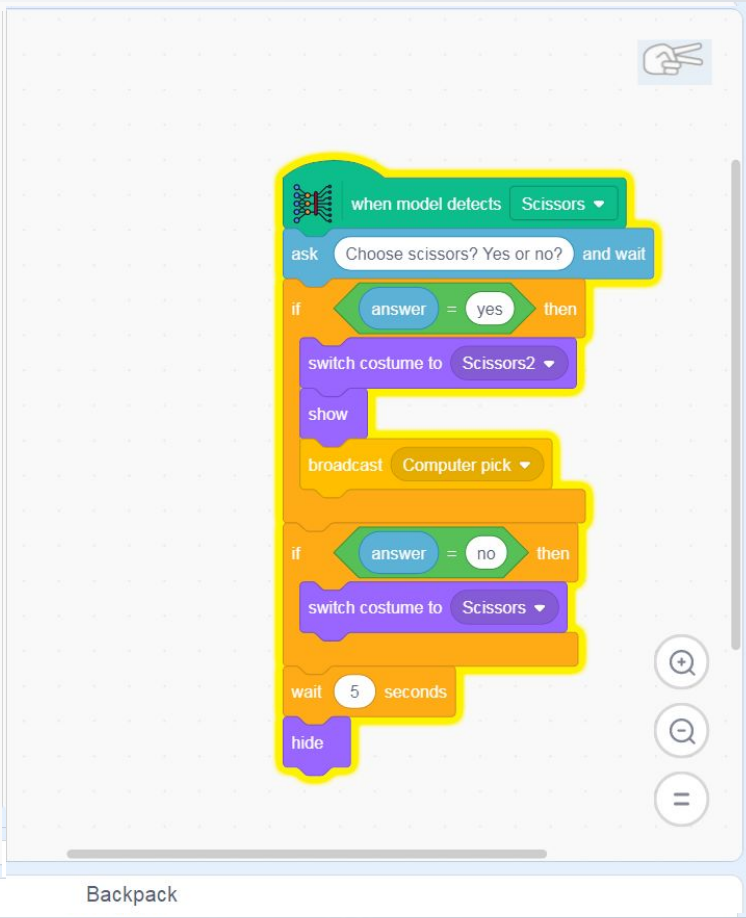
Design thinking: user input

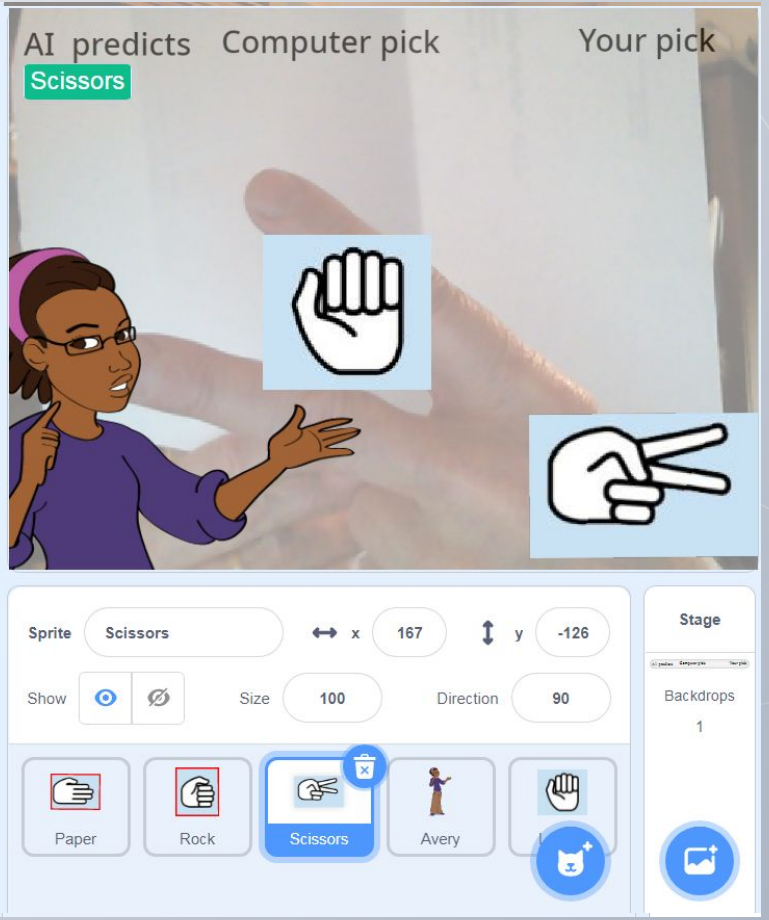


Design thinking: user input select image



Using AI model as input





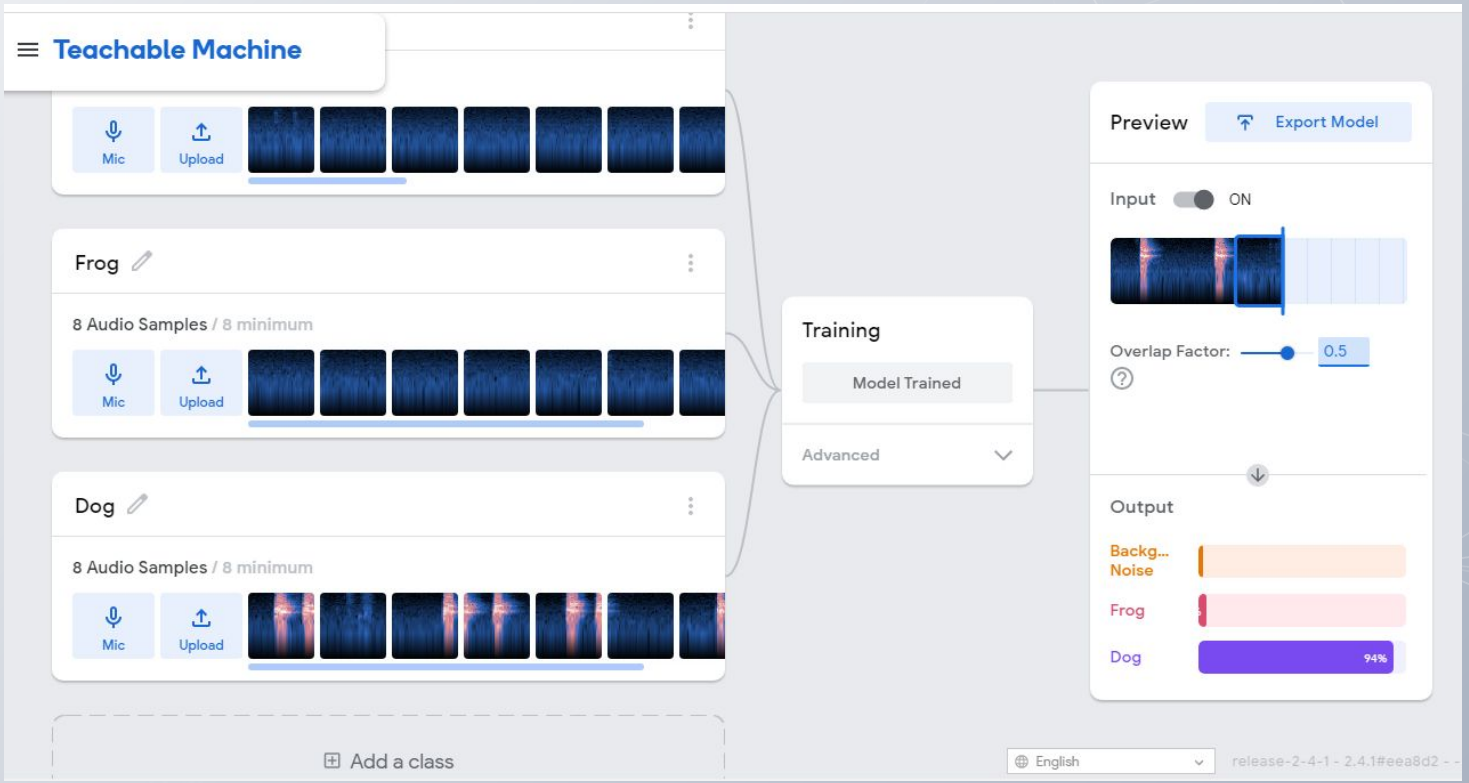
Sound recognition

The ability of machines to recognise sounds including speech (part of **NLP Natural Language Processing**).

An AI that recognises sounds

94% certain that the sound is a dog

A challenge to use this app in a noisy classroom!



E-safety: risk assessment

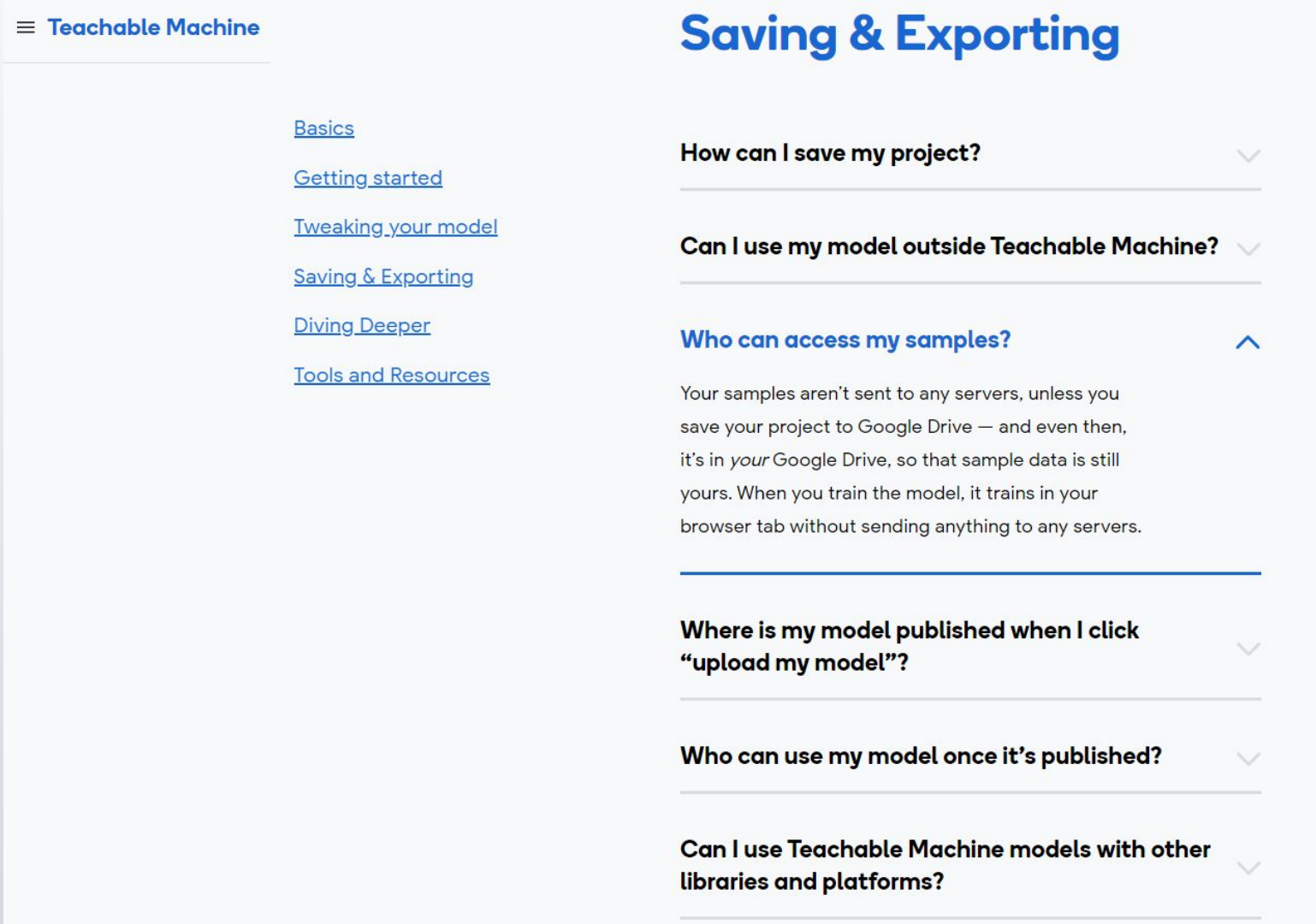
Risk identified: take appropriate action to mitigate risks before using

Proceed with caution: continue to monitor for risks

Consider	Yes	No	Suggestions to mitigate risks
Will students' personal information be publicly displayed (e.g. photograph, date of birth, gender or name of school)?	☐	☐	• Obtain consent from students and their parents/carers before displaying personal information online. • Where possible, de-identify student information.
Can external, unauthorised users communicate with students?	☐	☐	• Install appropriate technologies to monitor and filter activities on school ICT systems. • Teach students strategies to report external, unauthorised communication and block inappropriate content or contact.
Does the platform encourage students to use their existing email or social networking accounts for sign in or use?	☐	☐	• Often platforms also have the option to sign up or log in using unique usernames and passwords. While using existing social networking accounts might be quicker, unique logins are a safer option. • Teach students the importance of strong passwords and not sharing passwords.
Are student profiles linked to apps that can display their location?	☐	☐	• Teach students strategies to turn off location services functions, or to block apps that have these turned on.
Does the education department prohibit the use of this technology or platform?	☐	☐	• If the education department's policies prohibit the use of this technology or platform it is recommended not to use it.
Can students access inappropriate content using this technology or platform?	☐	☐	• Install appropriate technologies to monitor and filter activities on school ICT systems. • Encourage help-seeking behaviours so students know the steps to take if they come across inappropriate content.

Risk assessment

Check FAQ, for privacy issues:



Student project

Coming up with their own AI app idea

Our team is...	
We're creating an AI model that...	(the target user)
to help people to...	(the problem/challenge)
by providing them with...	(the possible solution)

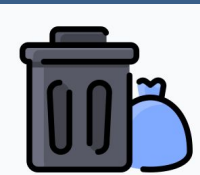
Assessment

Artificial Intelligence is a rich field for assessment opportunities.

Here are a few examples in the core concept areas of data, algorithms and implementation

Data representation and algorithms

AI model

Prediction	When model detects, Show	Say for 2 seconds	Change costume, wait, then hide
Chip packet		If that is a chip packet its made of non-recycled plastic. Put in rubbish bin	
Soft drink bottle		If that is a soft drink bottle its made of PET plastic. Put in recycling bin	
Banana skin		If that is a banana skin its organic. Put in green waste of compost	

Icons: Flaticon

Data representation and algorithms

AI model

Prediction

Chip packet

Ask: Check correct If/then

Show costume

Say for 2 seconds

Change costume, wait then hide

Is this a chip packet?

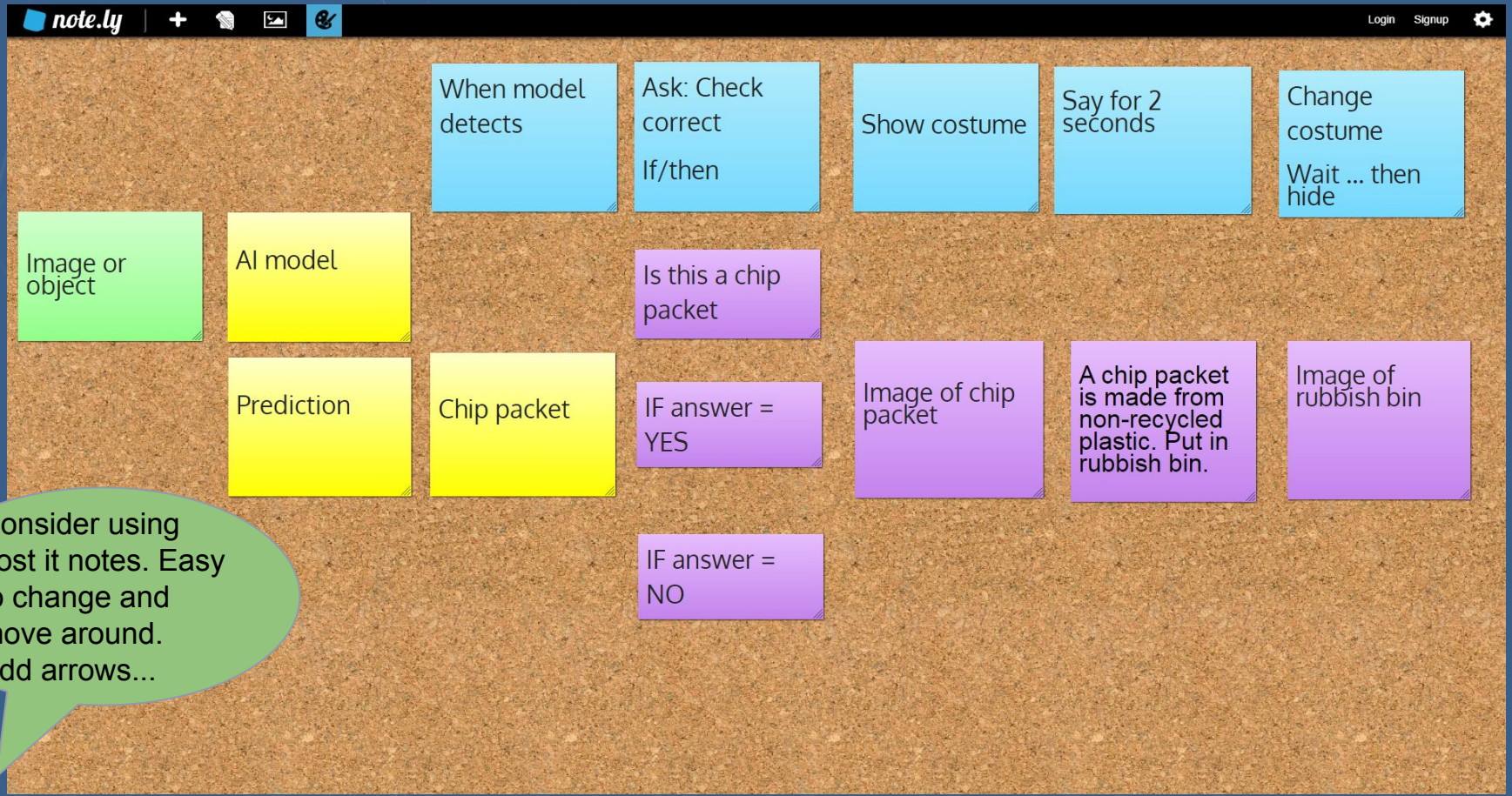
IF answer = Yes

A chip packet is made from non-recycled plastic. Put in rubbish bin.

IF answer = No

Icons: Flaticon

Formative assessment



Data representation and algorithms

AI model

Prediction

Class 1

Class 2

Class 3

Consider providing a template.
Take away or add columns

Data representation Algorithms, Implementation

Evidence of learning:

Trained and tested AI model
Plan of the training data
How well did they avoid bias?
How well did their model work? (Star rating)

Think aloud (student records a video of the AI model in action with commentary or as an interview with the teacher.

Artificial Intelligence lesson plans

Humans display natural intelligence in contrast to machines that demonstrate artificial intelligence (AI).

AI has various definitions however for our purposes we are using the definition 'any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals' [1]. Read more...

The following lesson ideas cover a range of specialisations and subsets as indicated by the colour coding. Click on the coloured squares to learn more about each definition.

Machine learning | Supervised learning | Natural language processing | Computer vision | Classification | Clustering

Lesson plans

Artificial Intelligence

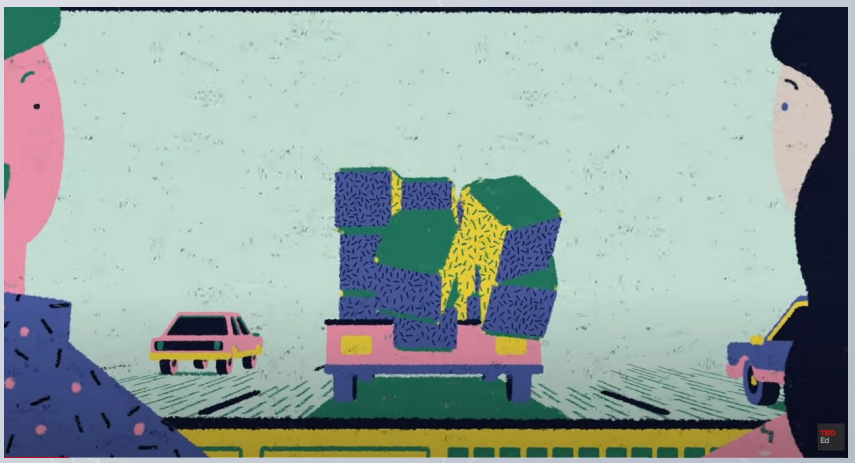
Access DT Hub AI lesson plans

Cliffhanger ...

Join us next week, when Martin and Karsten explore some captivating ethical dilemmas of AI.

This will be the final webinar in this series.

POLL: pls let us know how we did in meeting your needs



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