technocamps

UNDEB EWROPEAIDD
EUROPEAN UNION

Llywodraeth Cymru
Welsh Government

Cronfa Gymdeithasol Ewrop
European Social Fund

Prifysgol Abertawe
Swansea University

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

PRIFYSGOL BANGOR UNIVERSITY

Cardiff Metropolitan University
Prifysgol Metropolitan Caerdydd

i.t.wales

PRIFYSGOL ABERYSTWYTH UNIVERSITY

PRIFYSGOL glyndŵr Wrecsam
Wrexham glyndŵr UNIVERSITY

University of South Wales
Prifysgol De Cymru

technocamps

Machine Learning in Secondary Education

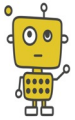
Machine Learning Across the CFW

Machine Learning is a tool that can be implemented across all the Areas of Learning and Experience, reinforcing learning in the classroom and improving digital literacy in the process.

In today's world digital literacy is an essential skill for learners to develop. The technological requirements for jobs are ever increasing, and a strong start in digital skills will prepare learners and give them an advantage.

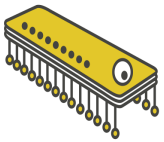
Expressive Arts

Health and Wellbeing



Humanities

Languages, Literacy and Communication



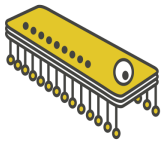
Mathematics and Numeracy

Science and Technology

Ideas for Machine Learning Across the Curriculum

Health and Wellbeing

- Predict Healthy Foods from Contents



Mathematics and Numeracy

- Make Predicitons from Statisitcs

Science and Technology

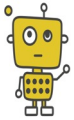
- Predicting Classes of Animals

Languages, Literacy and Communication

- Recognising Authors
- Decoding Secret Codes

Expressive Arts

- Recognising Artisits
- Recognising Musicians



Humanities

- Predicting Location of Landscapes

Using Machine Learning for Kids

Using Machine Learning for Kids

Machine Learning for Kids is a powerful tool that allows learners to train their own A.I. projects.

Educators can make an account which allows projects to be saved and class accounts to be established for group projects.

Learners are unable to make their own accounts, meaning the A.I. project itself only lasts 4 hours.

Note: the Scratch/Python code can be saved for future use, but will no longer have an A.I. to communicate with.

technocamps

Using Machine Learning for Kids

Go to

machinelearningforkids.co.uk

Click on "Get started"

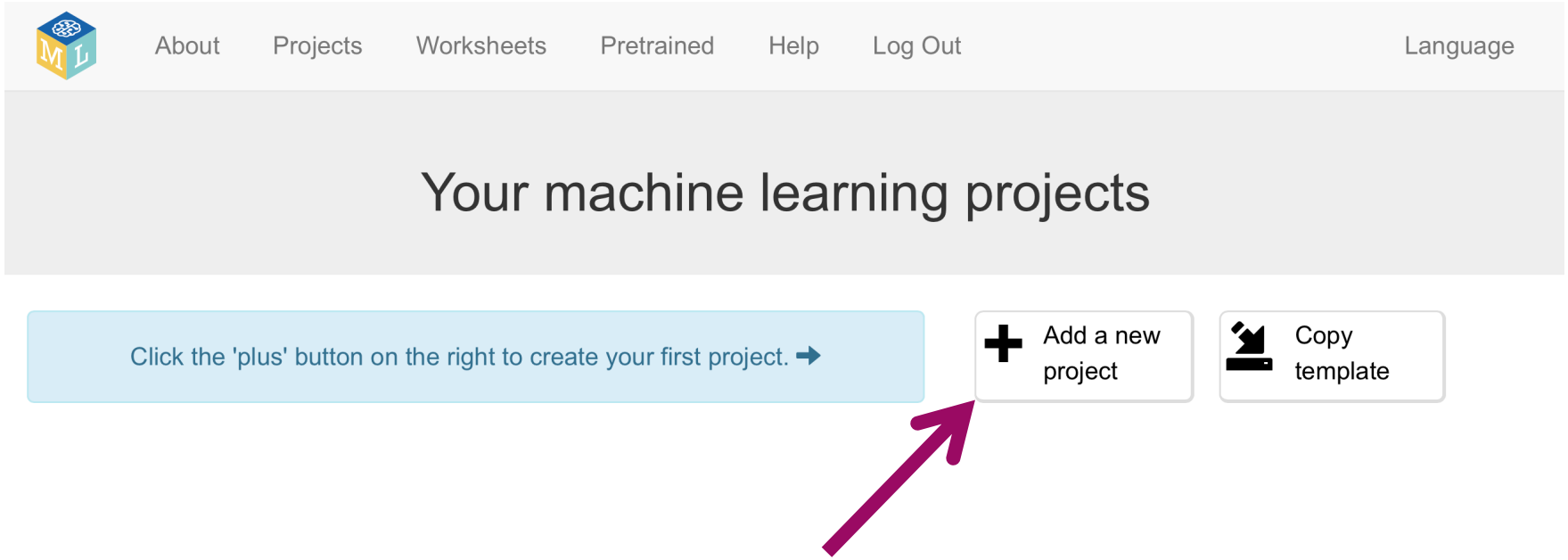
Click on "Try it now"

Recognising Artists

Making a Project

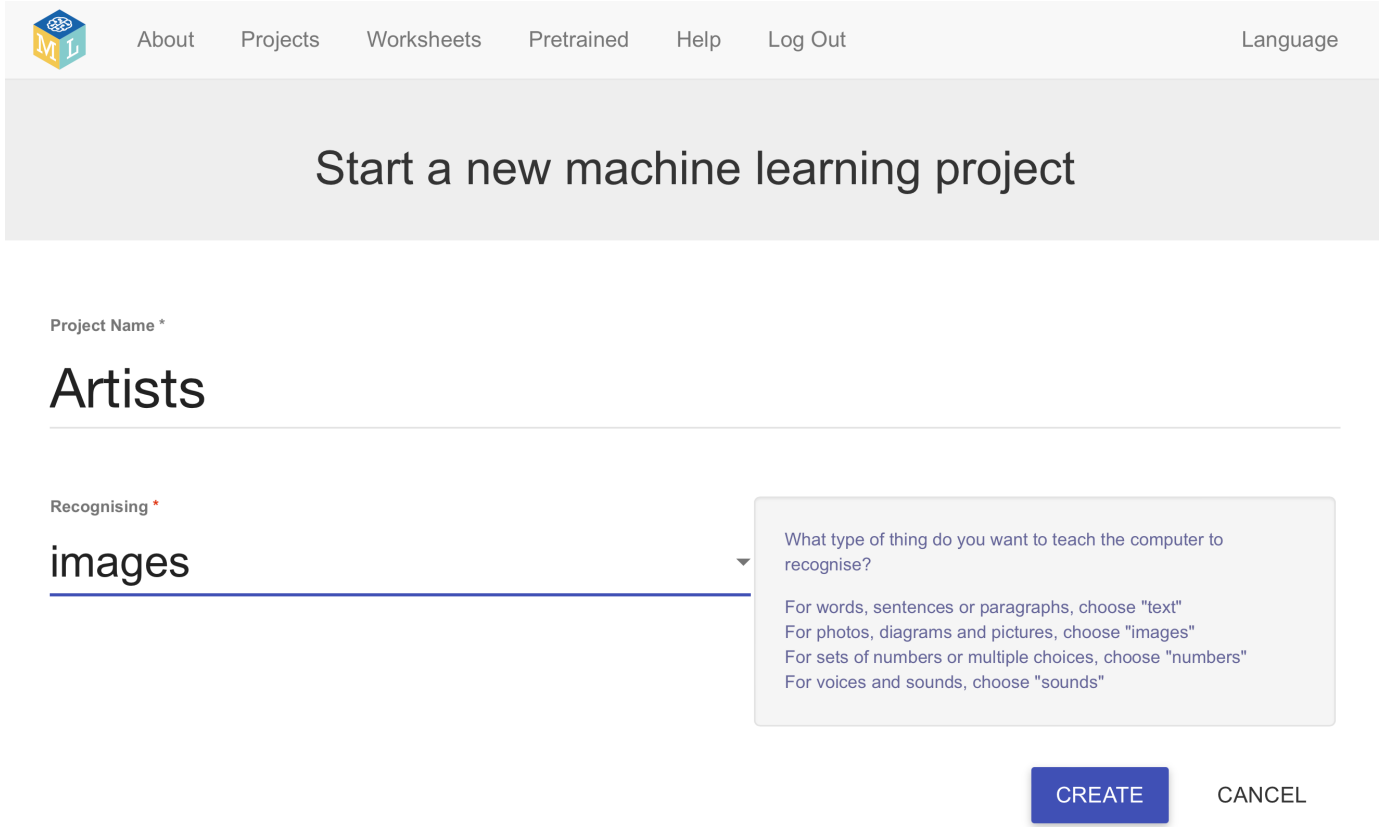
On your blank projects page, click "Add a new project" to start creating.

Note: trial users can only make one project at a time.



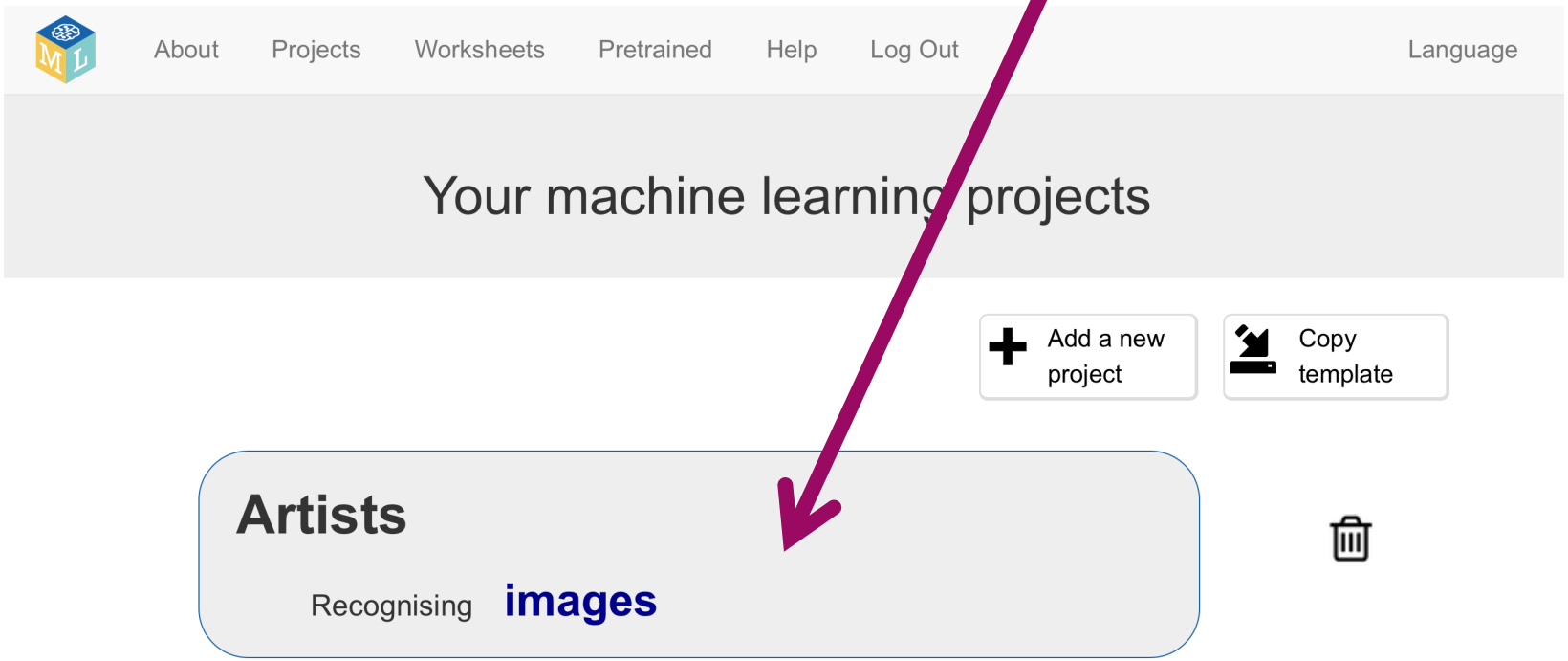
Making a Project

Create a new project called Artists, recognising Images.



Training Your Project

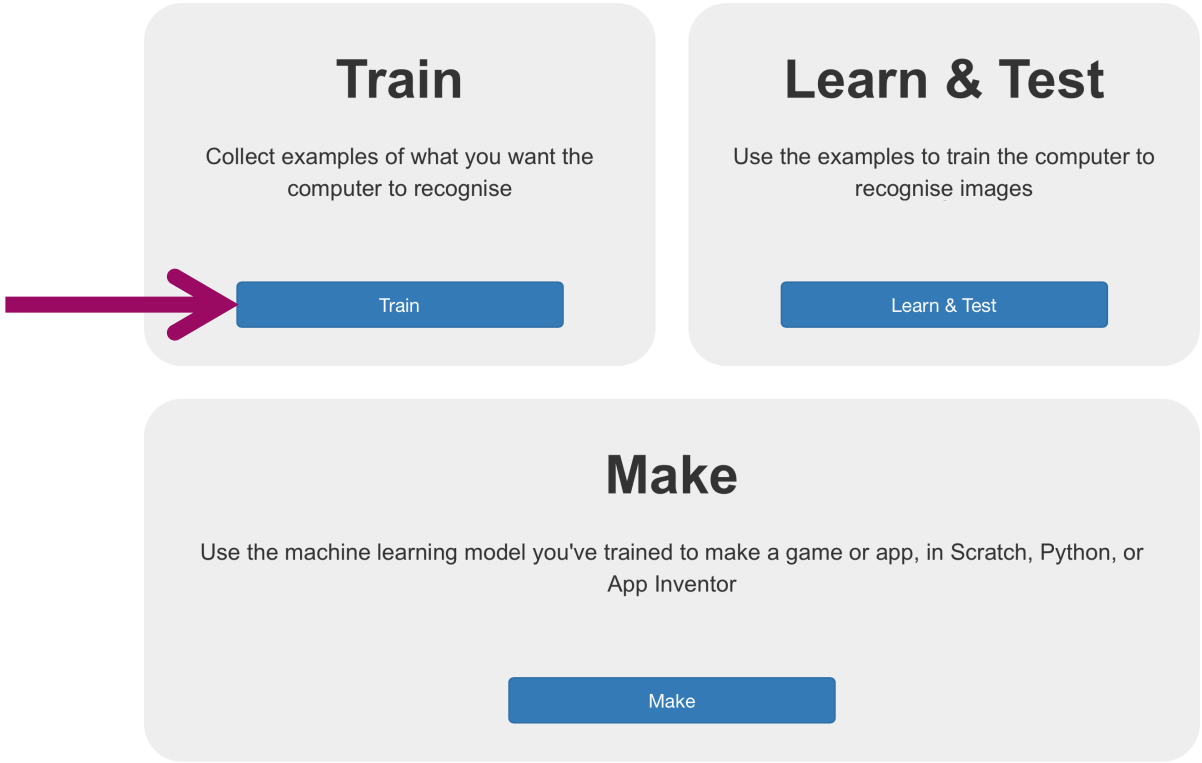
You'll be taken back to your Projects page, click on the project to open it.



Training Your Project

These are the three stages of making any project.

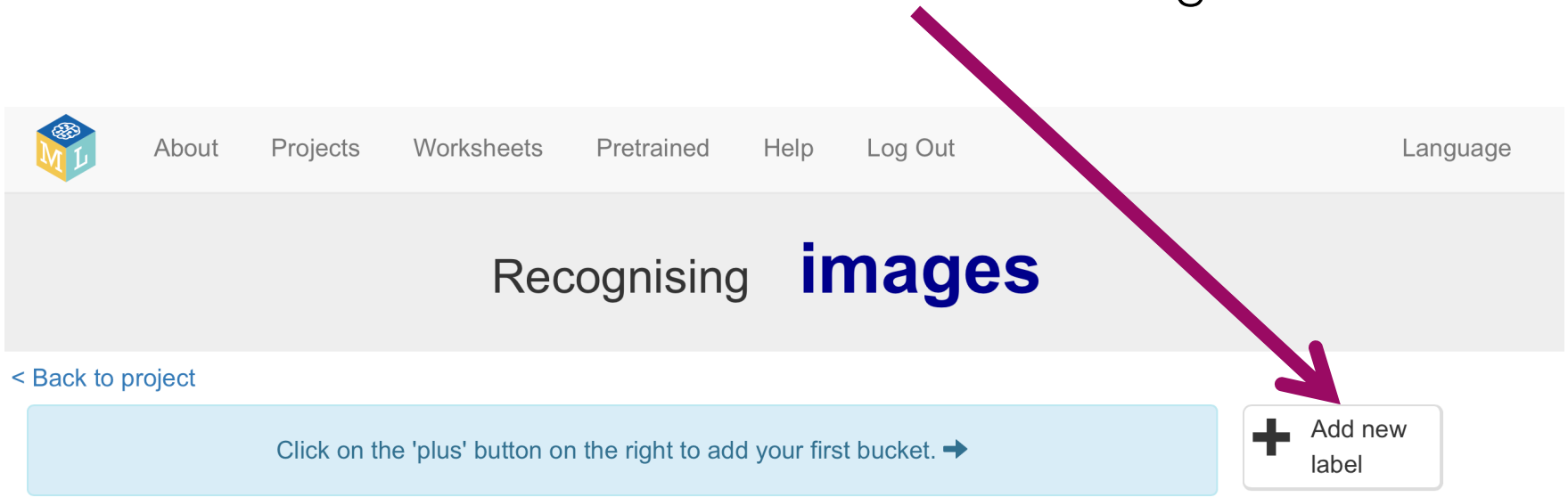
We will begin by Training our A.I.



Training Your Project

We will have to add **two** labels for our project, one for each artist we wish to train the A.I. to recognise.

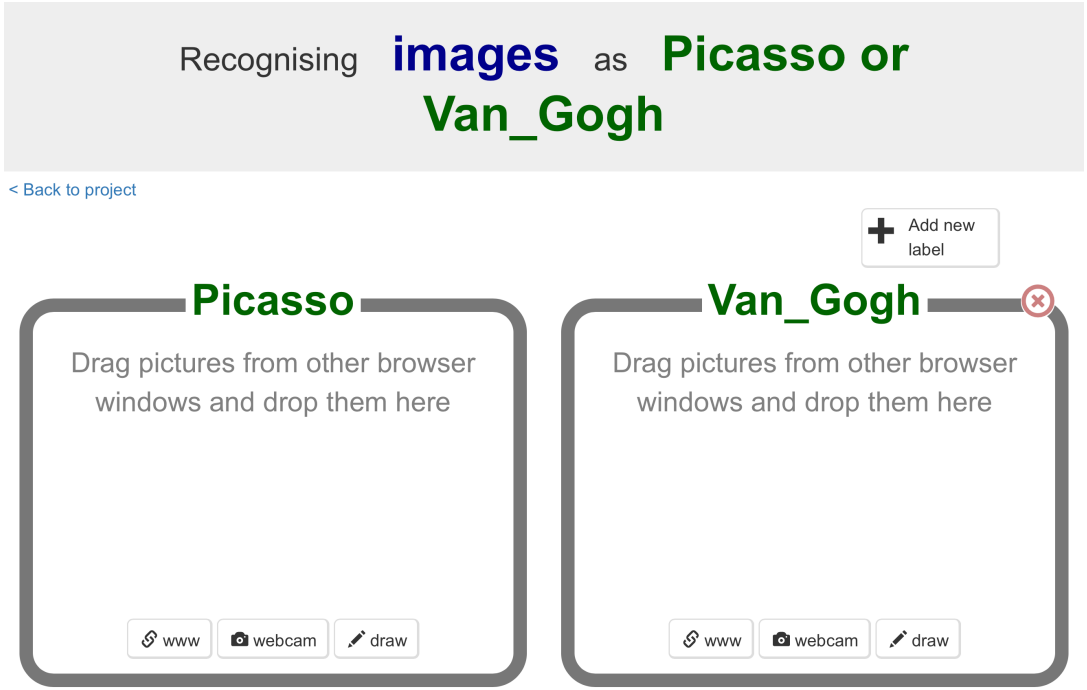
So we will call these labels “Picasso” and “Van Gogh”.



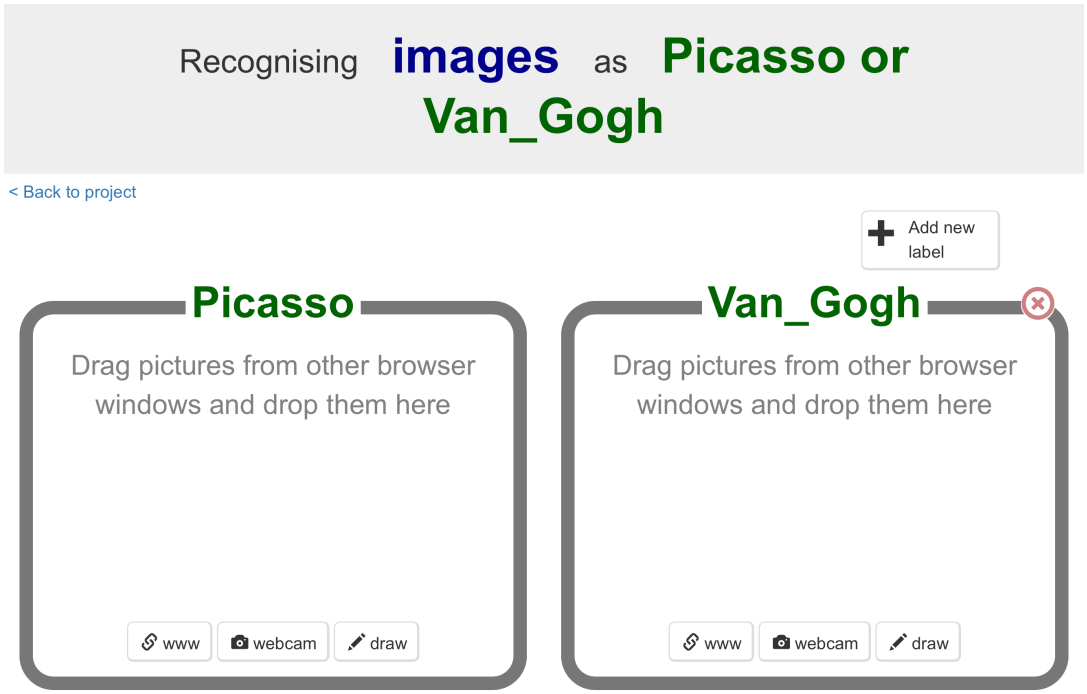
Training Your Project

Now we have a bucket where we can store images of each artist for the A.I. to learn from.

Your project should now look like this:



Training Your Project



Note: We can import images here from the web (or just drag and drop). However we can not upload directly.

This is true for examples of text and sound too.

Downloading the Data Set

Today we will train our project from within Scratch. This will

1) Save us time by not searching for images
2) Show us how to use more of the features available

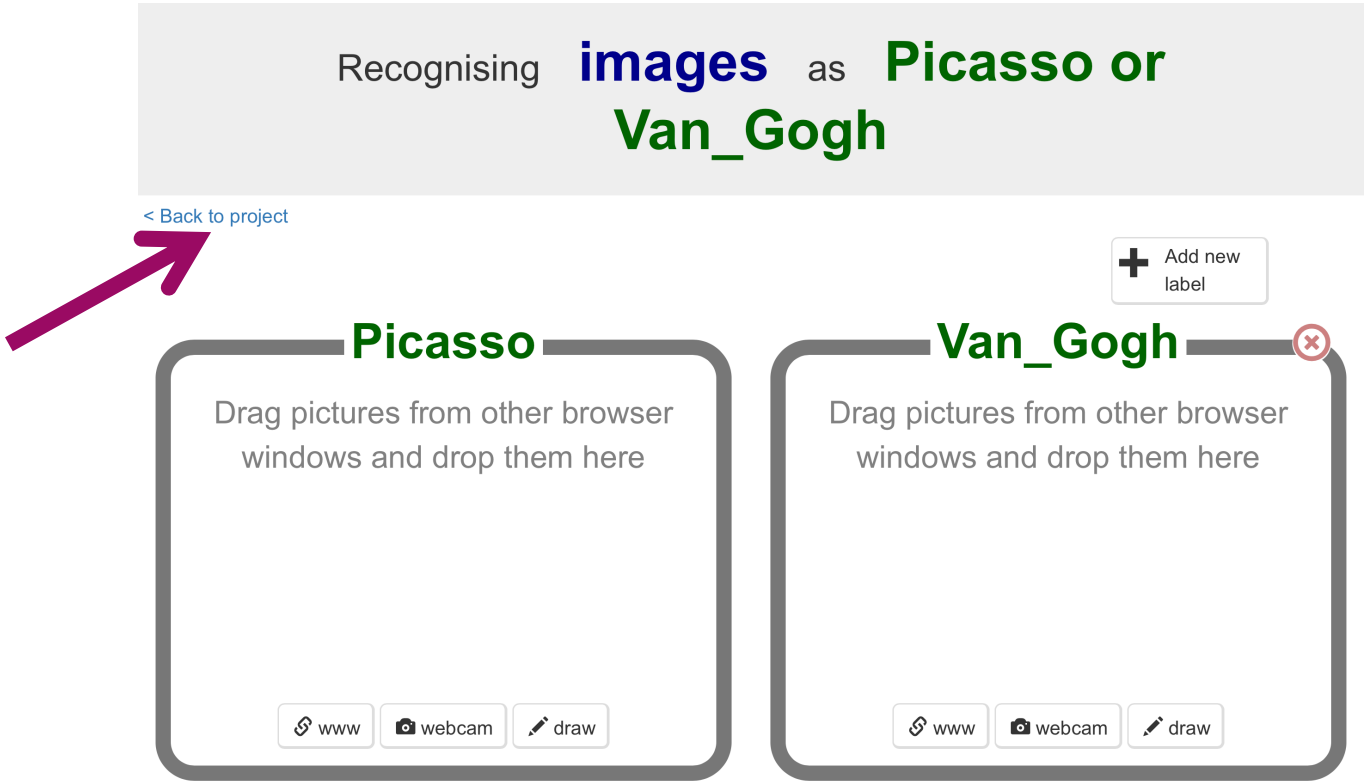
In class this would serve well as a research lesson to find many images by an artist.

You can download the images at:

tc1.me/.

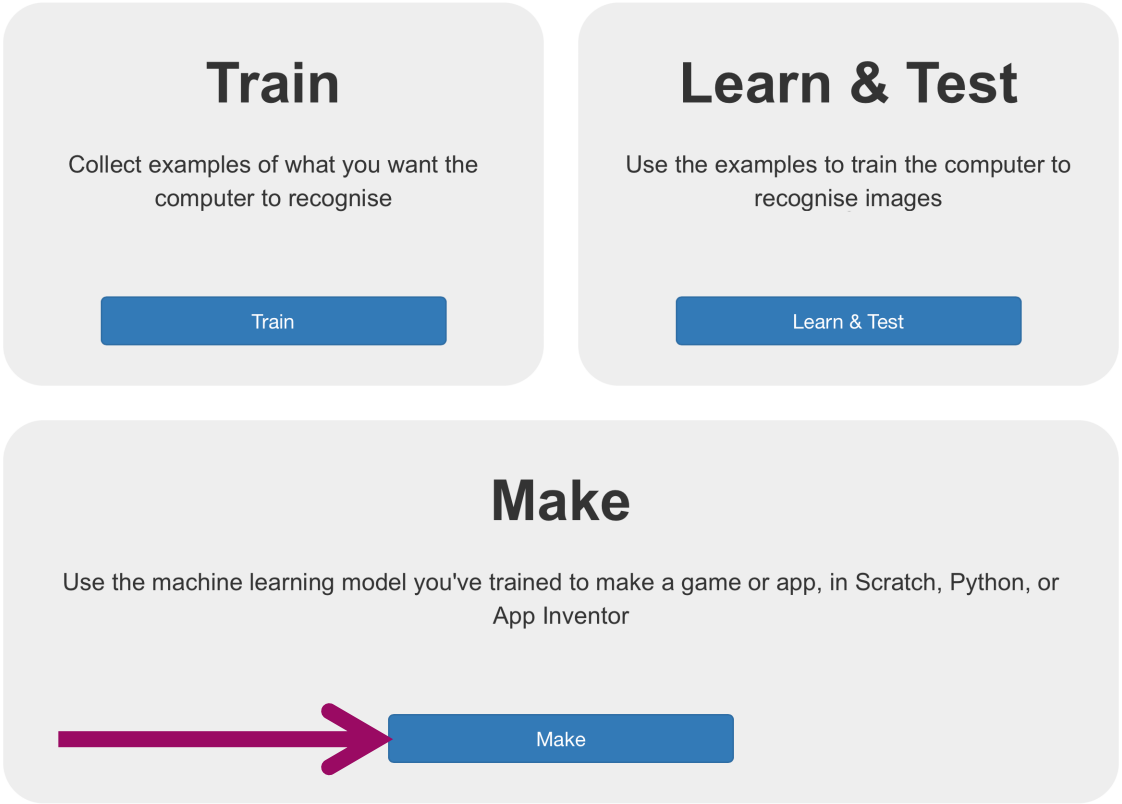
Making Your Project

Once we have begun downloading the data set, we can click back to project to return.



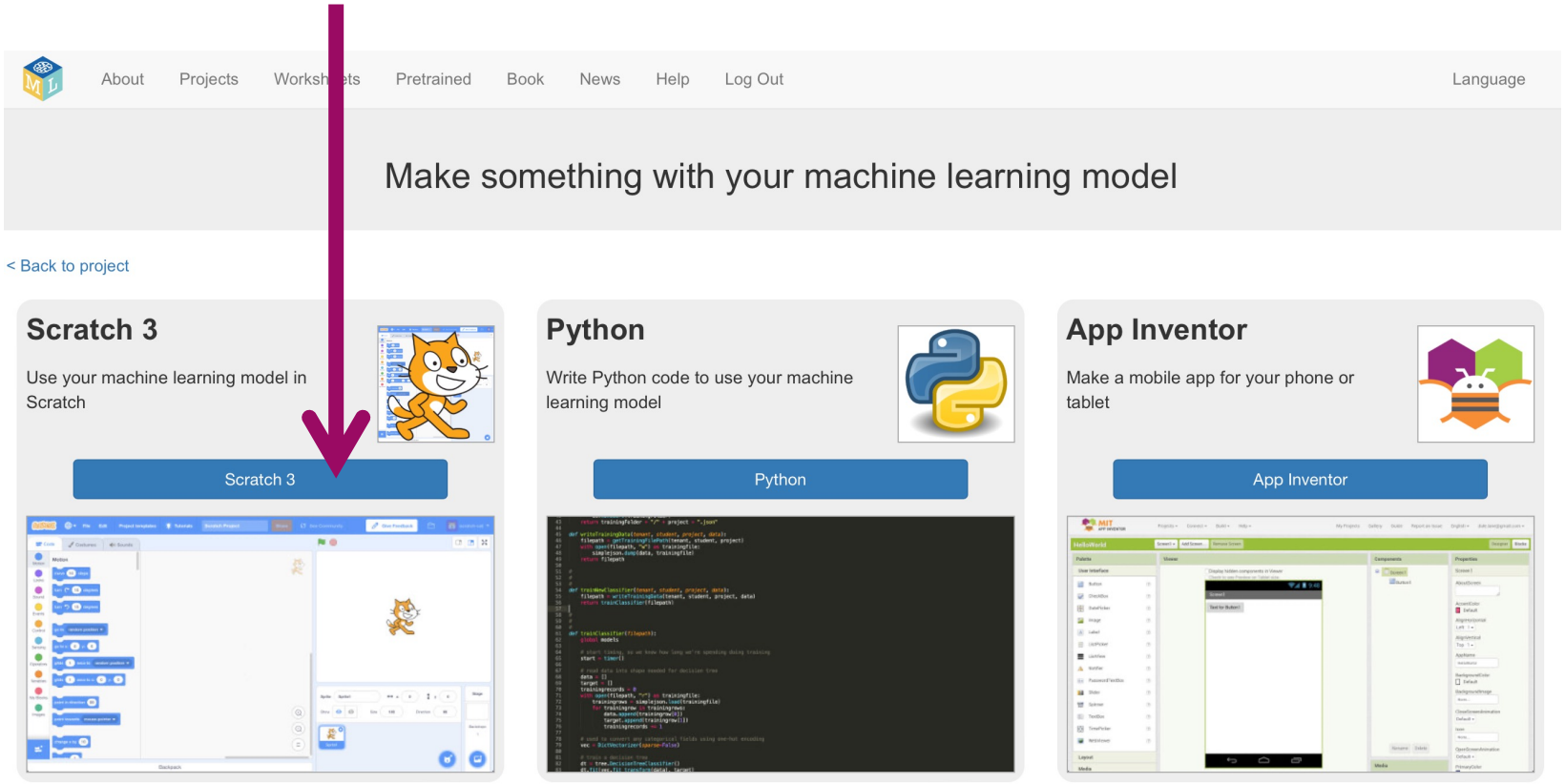
Making Your Project

Now you can click on Make.



Making Your Project

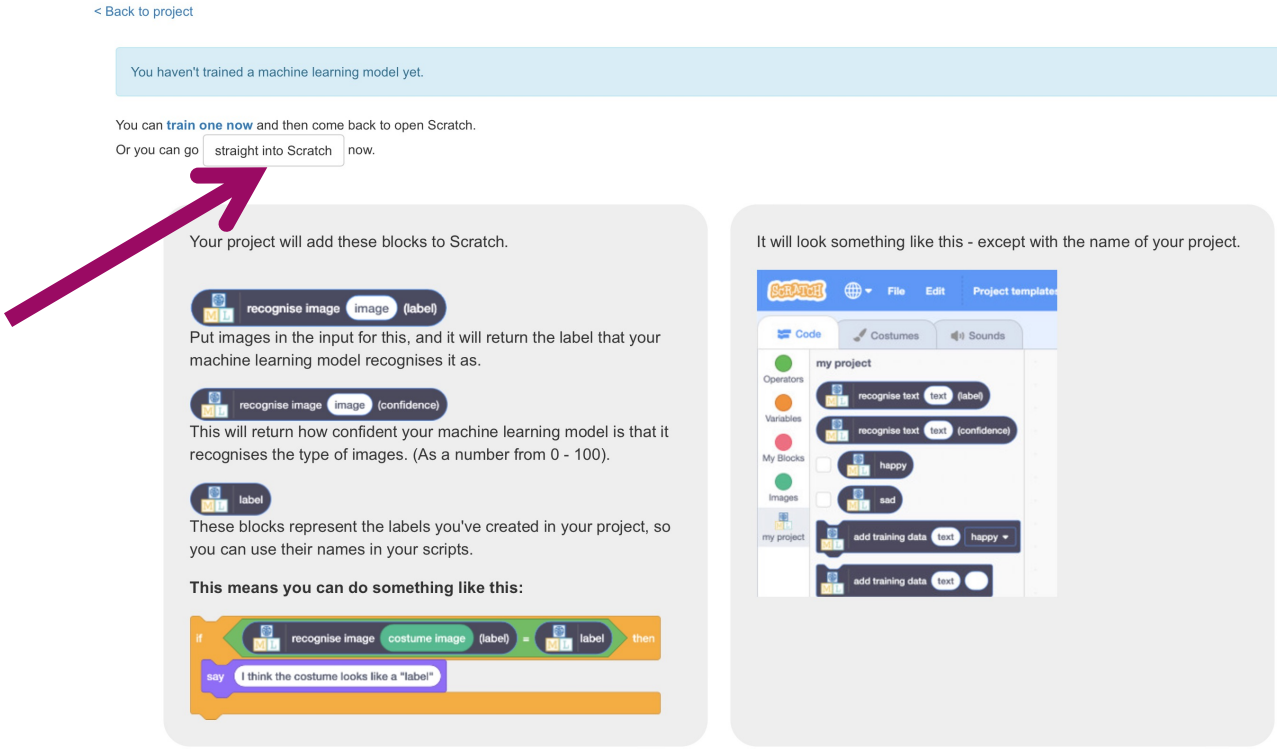
Today we will be making our Project in Scratch 3.



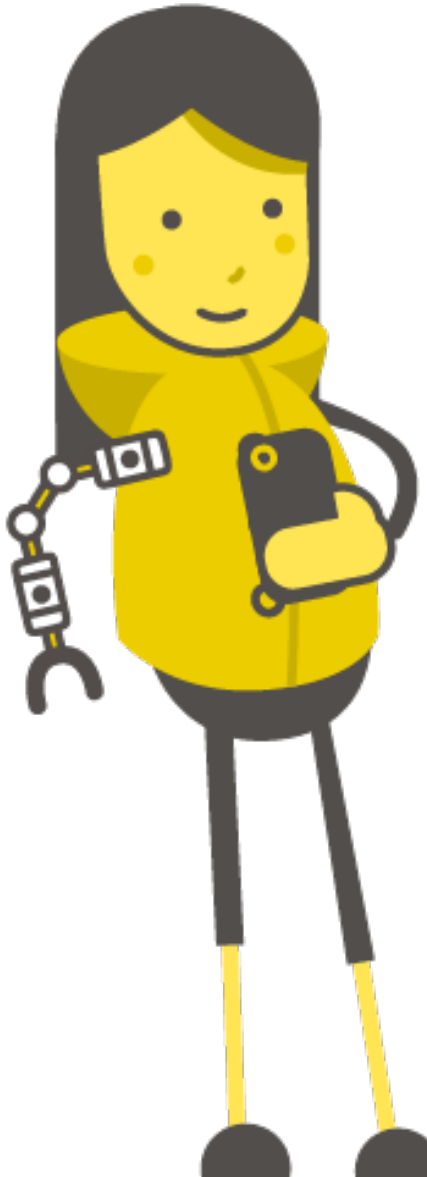
Making Your Project

As we have not trained our project yet, we get a warning.

In class we may have done this and just get the option to open.



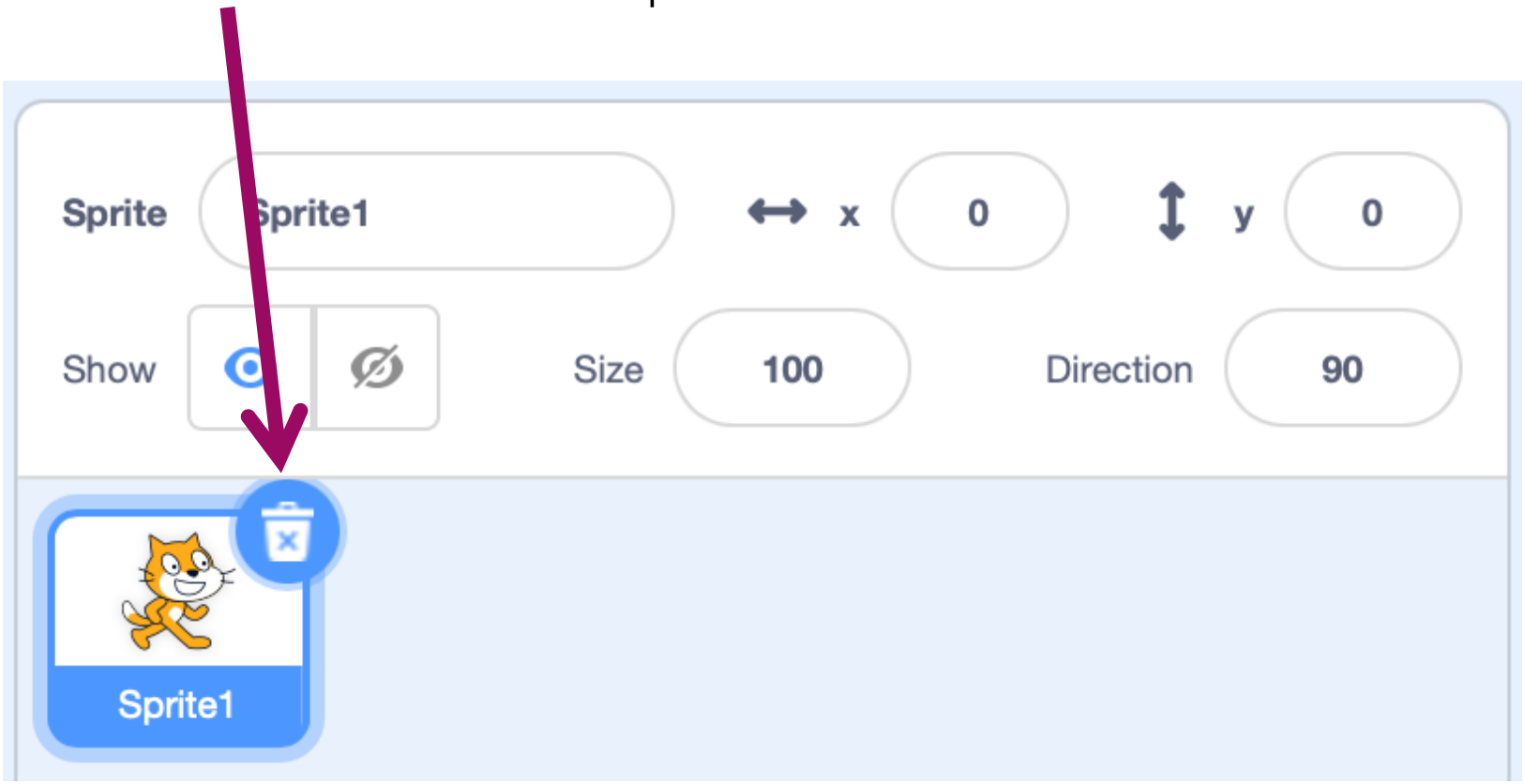
technocamps



Machine Learning in Scratch

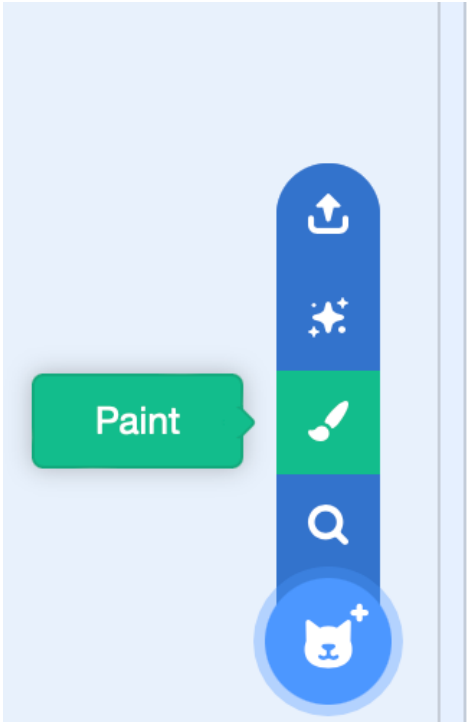
Deleting Sprites

To begin we will delete the default sprite for Scratch, by clicking the rubbish can next to the sprite.



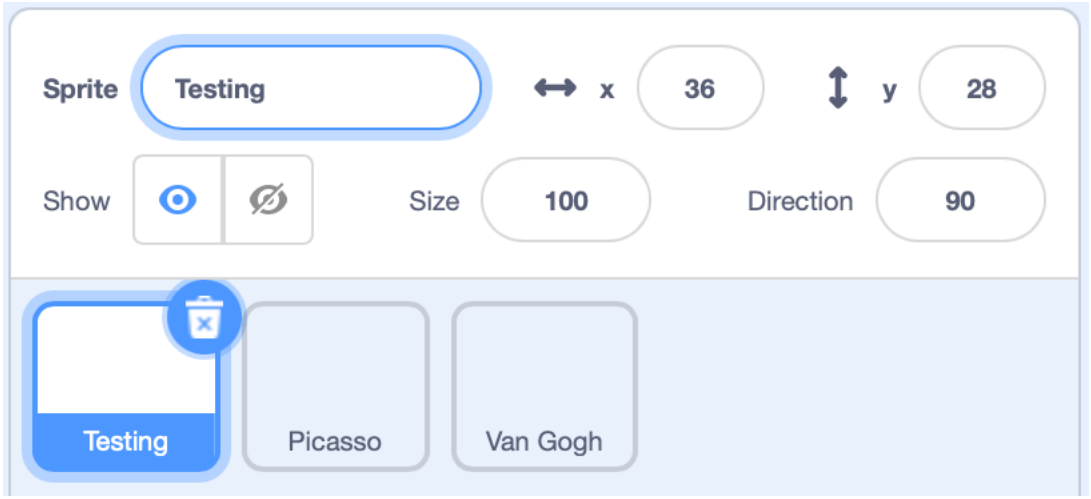
Creating Sprites

Down in the bottom right corner we can hover over the “Choose a Sprite” button for more options. Then choose ”Paint”.



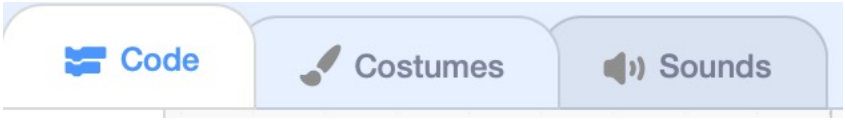
We will not paint a Sprite, just repeat this three times and name the sprites:

Testing, Picasso and Van Gogh.

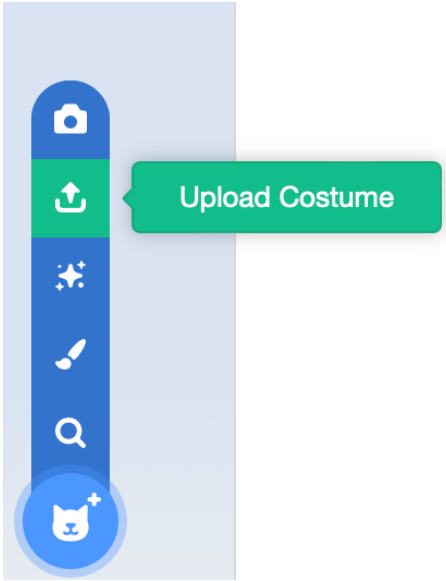


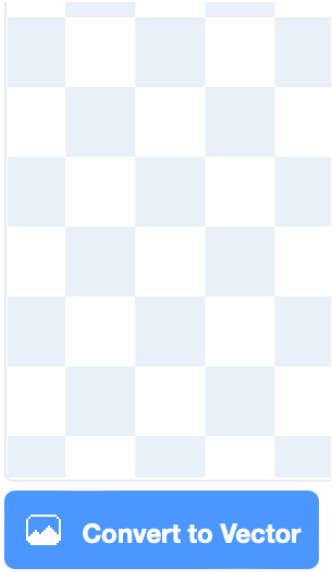
Uploading Images

Select your Testing sprite and in the top left corner choose "Costumes".



In the bottom left corner hover over the "Choose a Costume" button and select "Upload Costume".

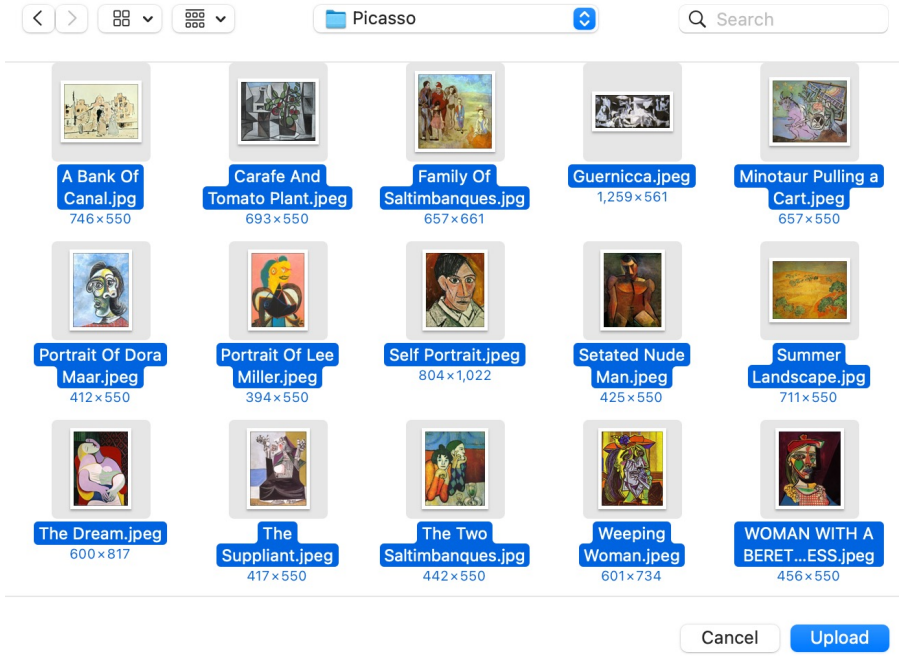




Uploading Images

Select all images within the testing folder downloaded and click upload.

Repeat this process for the Picasso and Van Gogh sprites, uploading the images from the relevant folders.

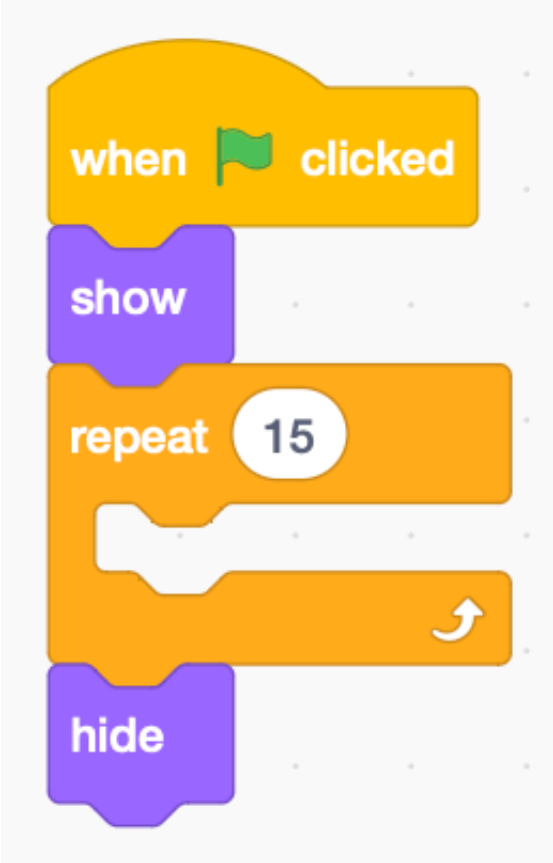


Picasso Sprite

Find these blocks in the palette and drag them into the coding area (of the Picasso sprite).

Picasso Sprite

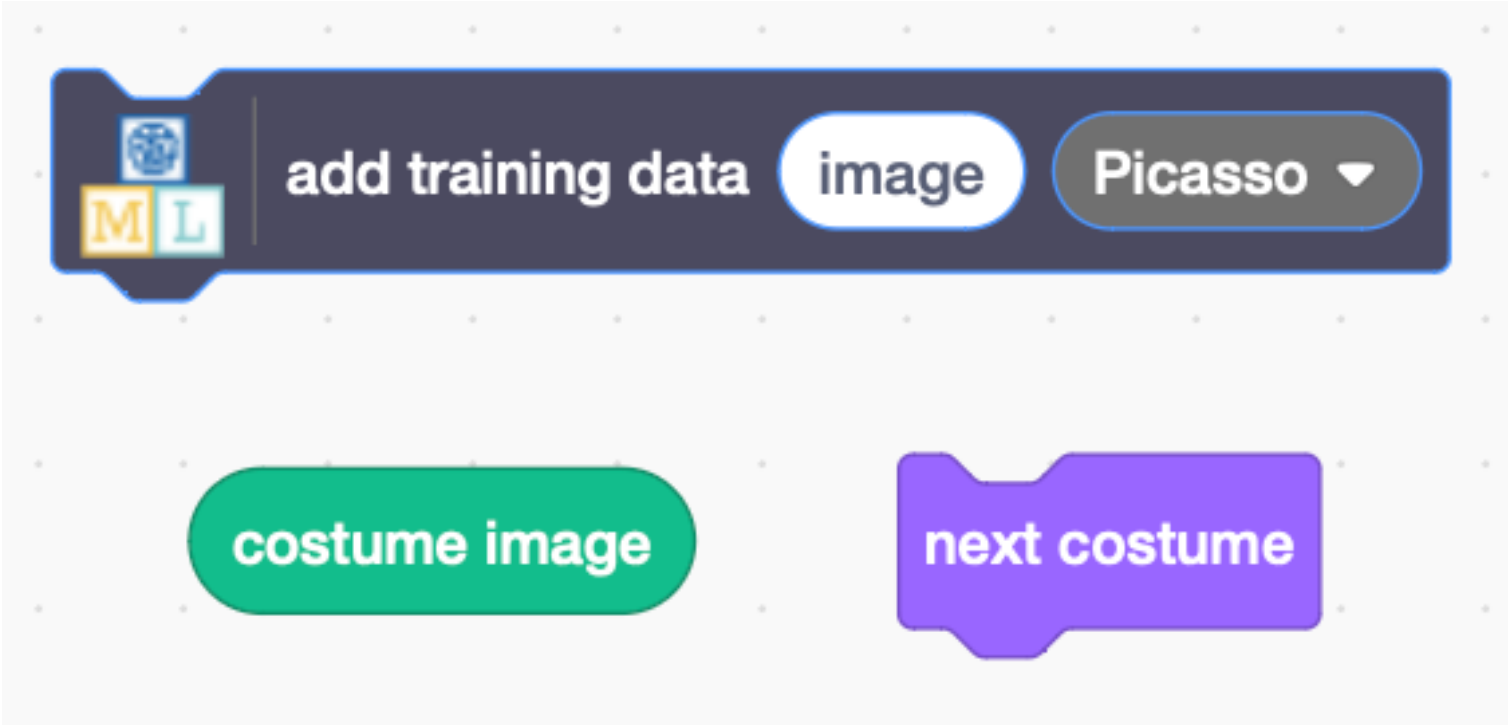
Assemble the blocks as shown.



Picasso Sprite

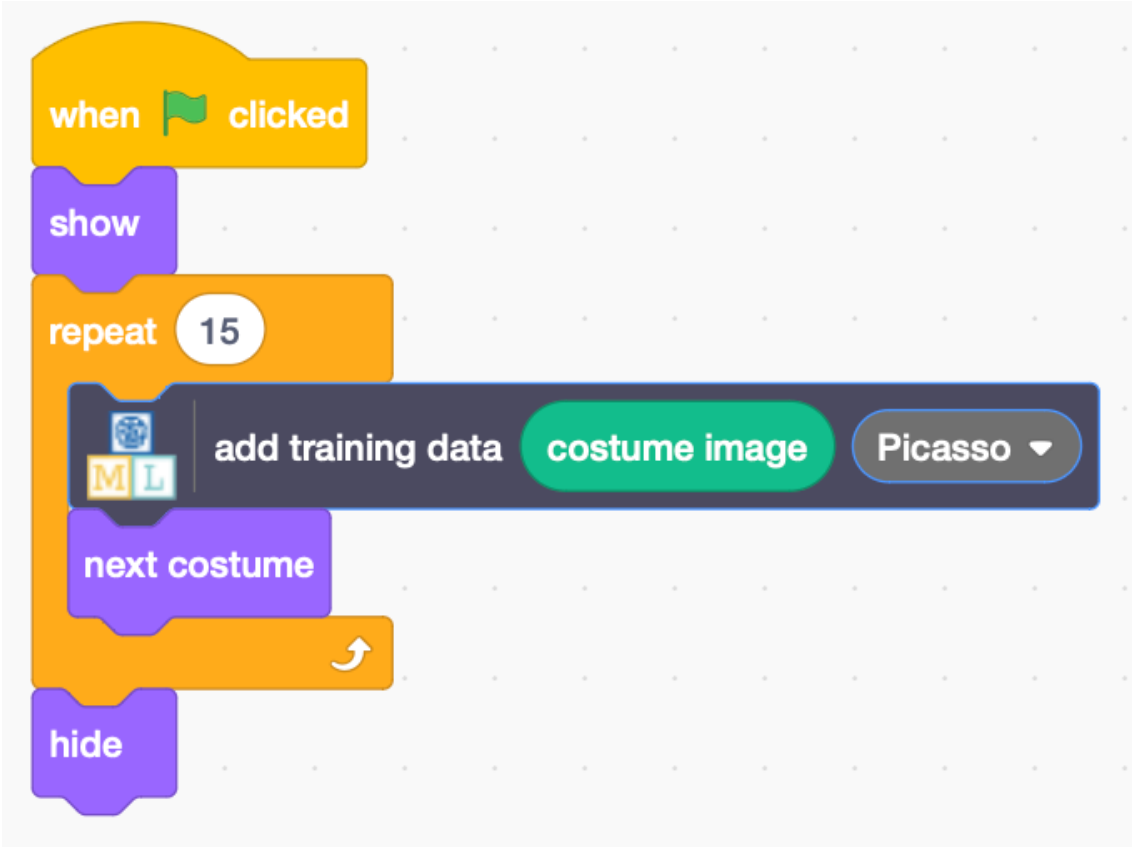
Find these blocks in the palette.

Note: The "add training data" block has a drop down which can be changed.



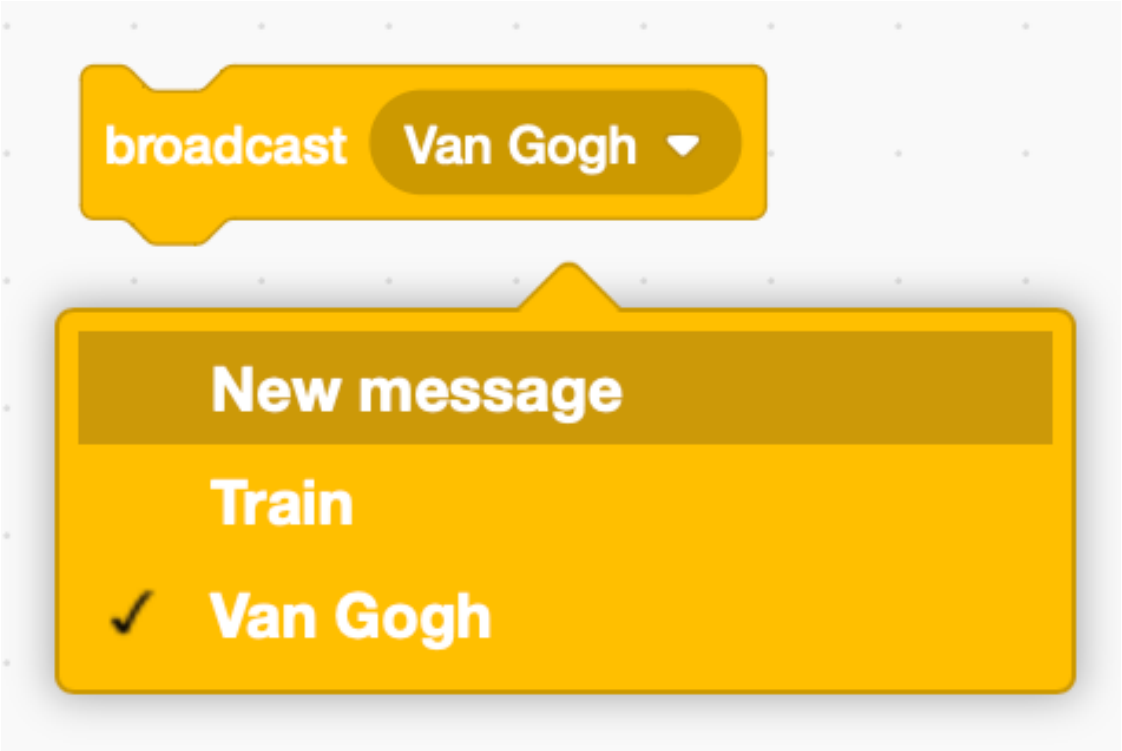
Picasso Sprite

Add these blocks into the repeat block.



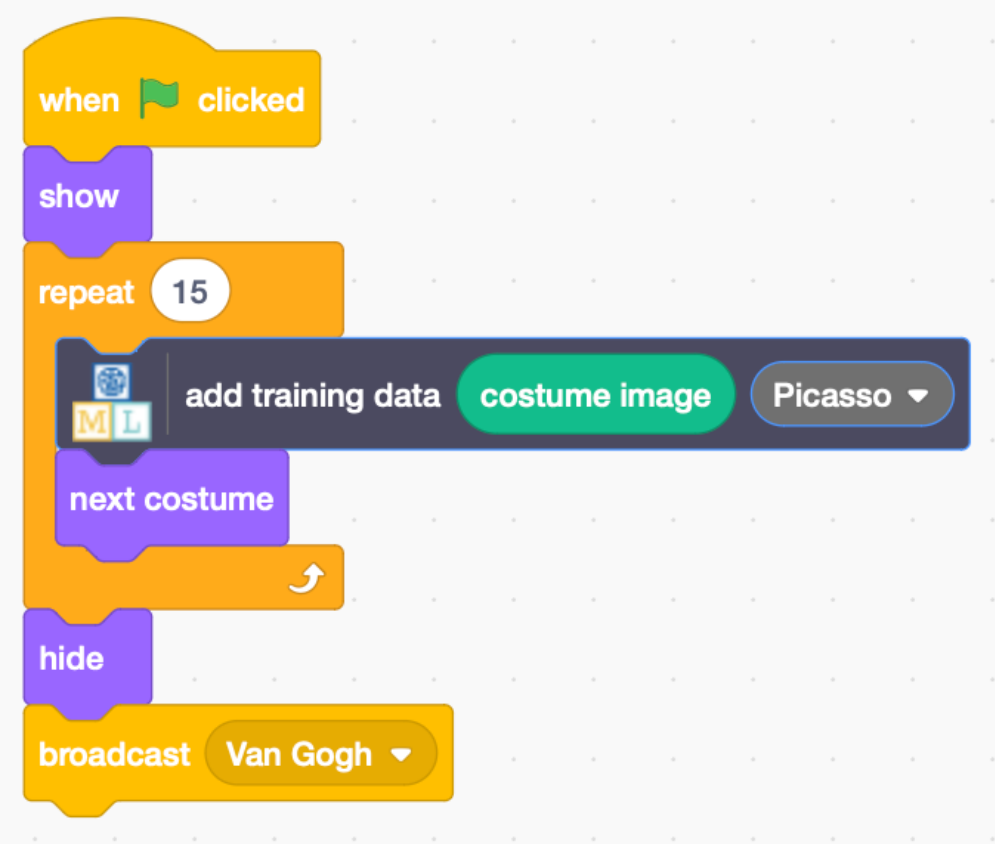
Picasso Sprite

Find the "broadcast" block. Create a new message called Van Gogh, that will instruct the next piece of code to begin.



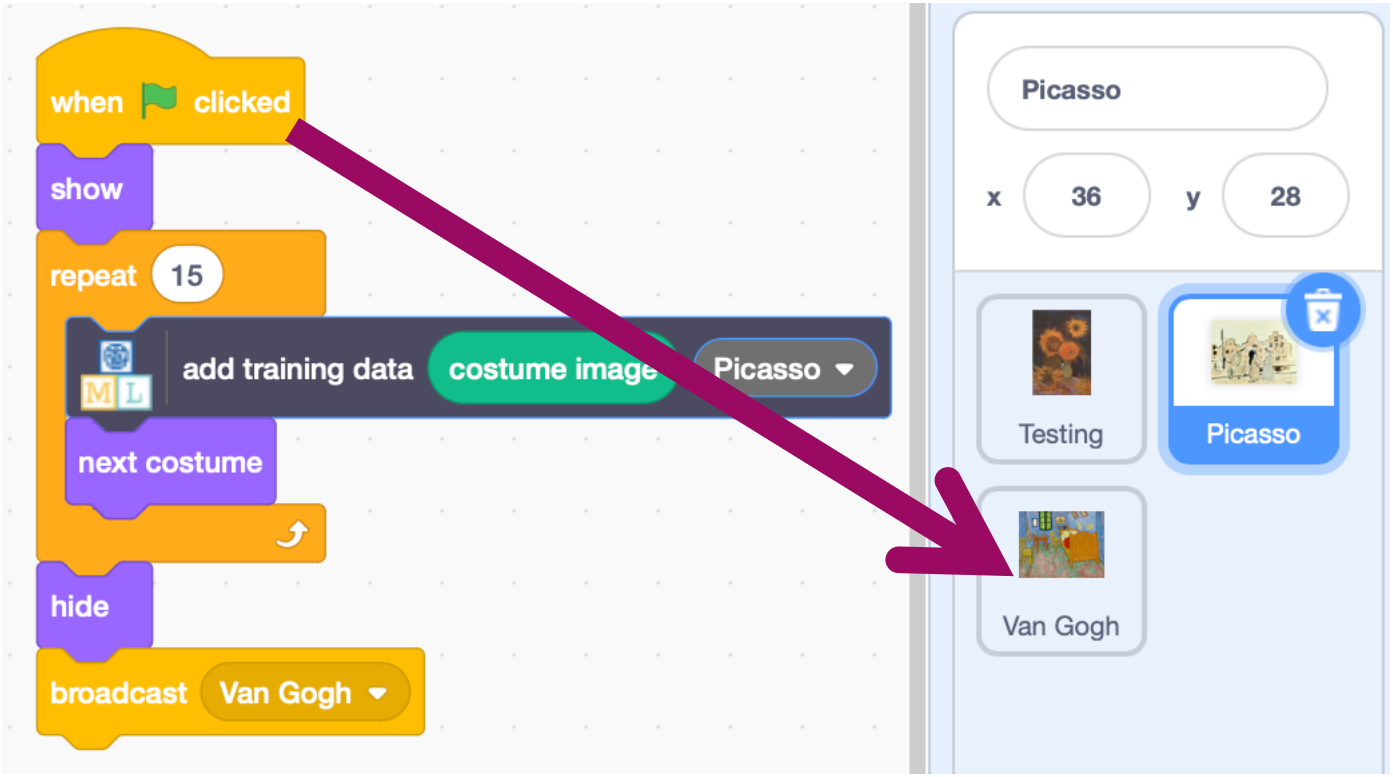
Picasso Sprite

Add the broadcast block to the end of the code.



Van Gogh Sprite

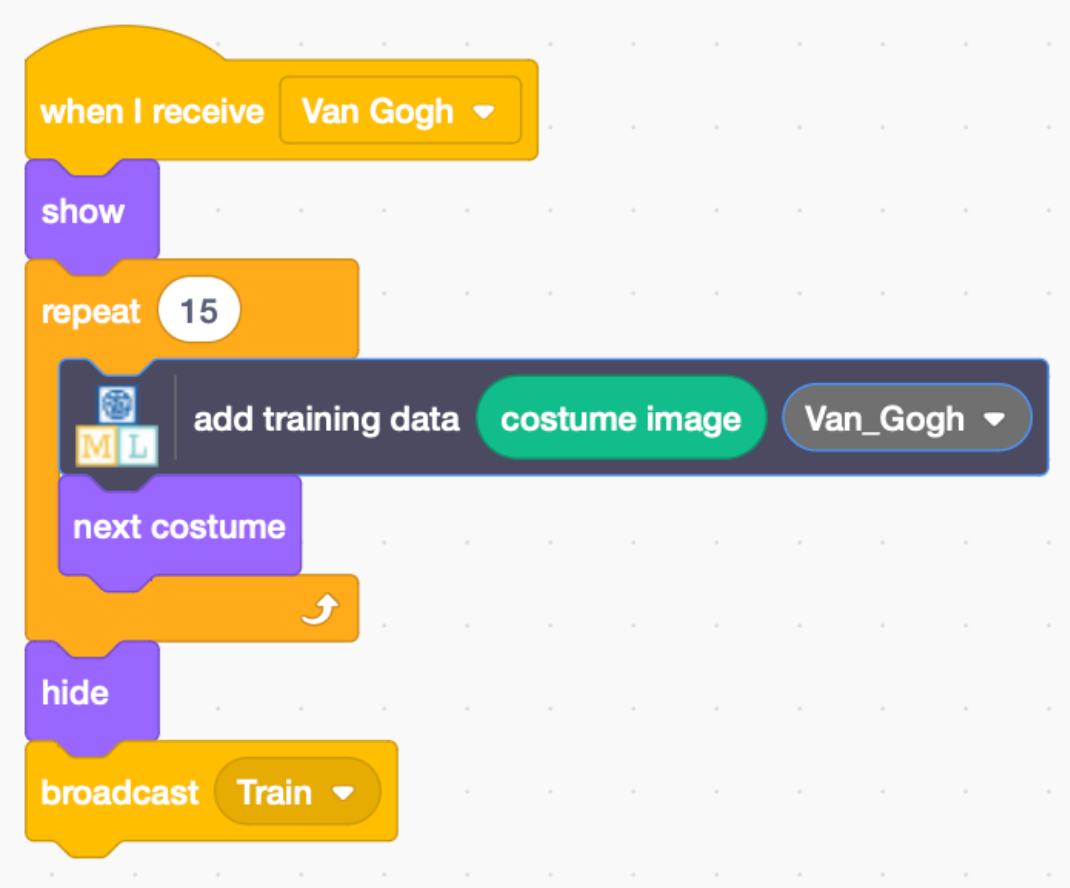
Drag the code of the Picasso sprite into the Van Gogh sprite. This will duplicate the code within the sprite.



Van Gogh Sprite

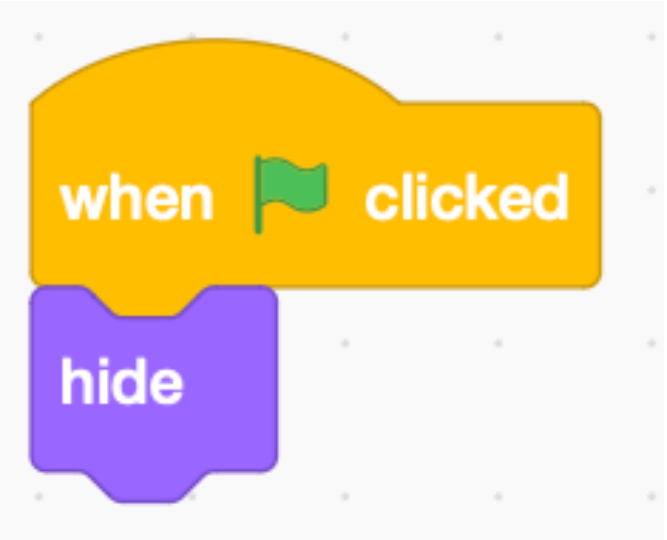
In the Van Gogh sprite, change:

- The initial block to a "when I receive" Van Gogh
- The "add training data" block to Van Gogh
- Add a new message to the broadcast block titled "Train"



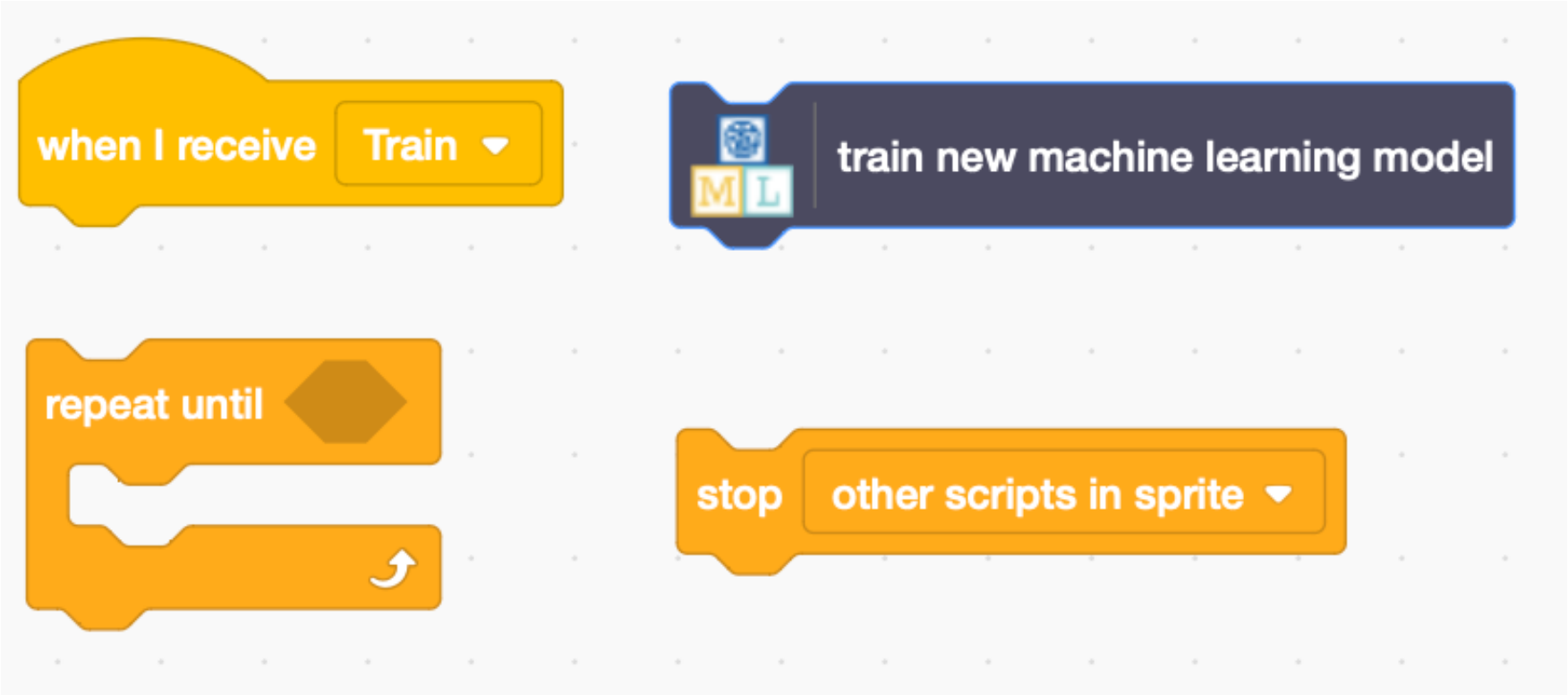
Testing Sprite (Start)

Find these blocks in the palette and assemble as shown:



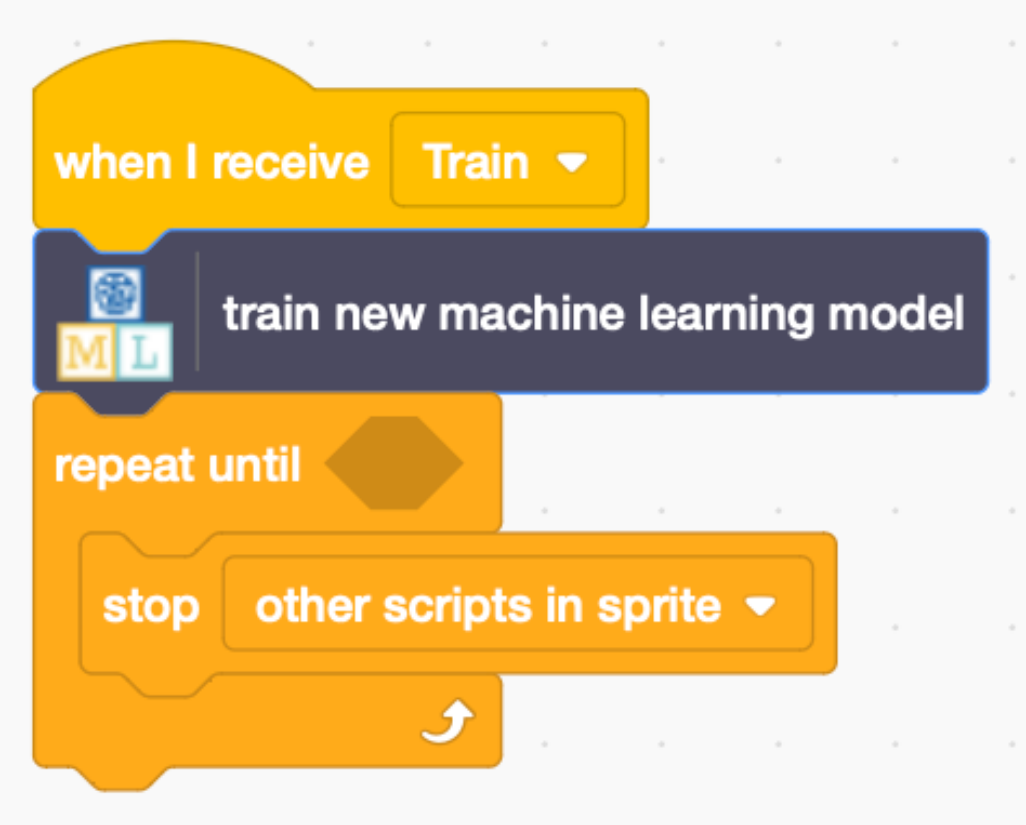
Testing Sprite (Train)

Find these blocks in the palette:



Testing Sprite (Train)

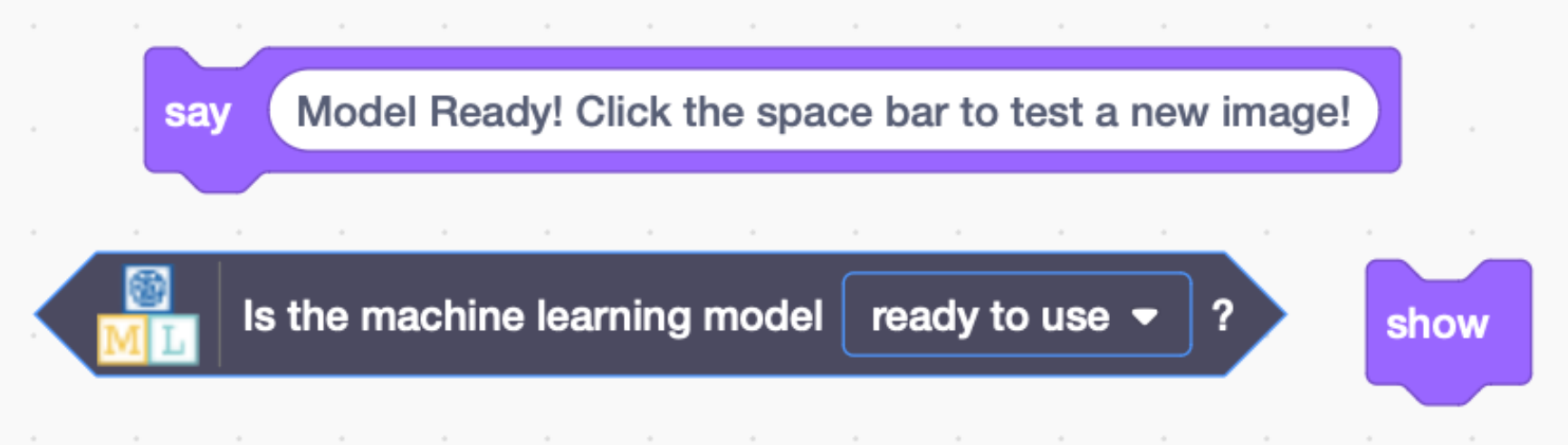
Assemble the blocks as shown:



Testing Sprite (Train)

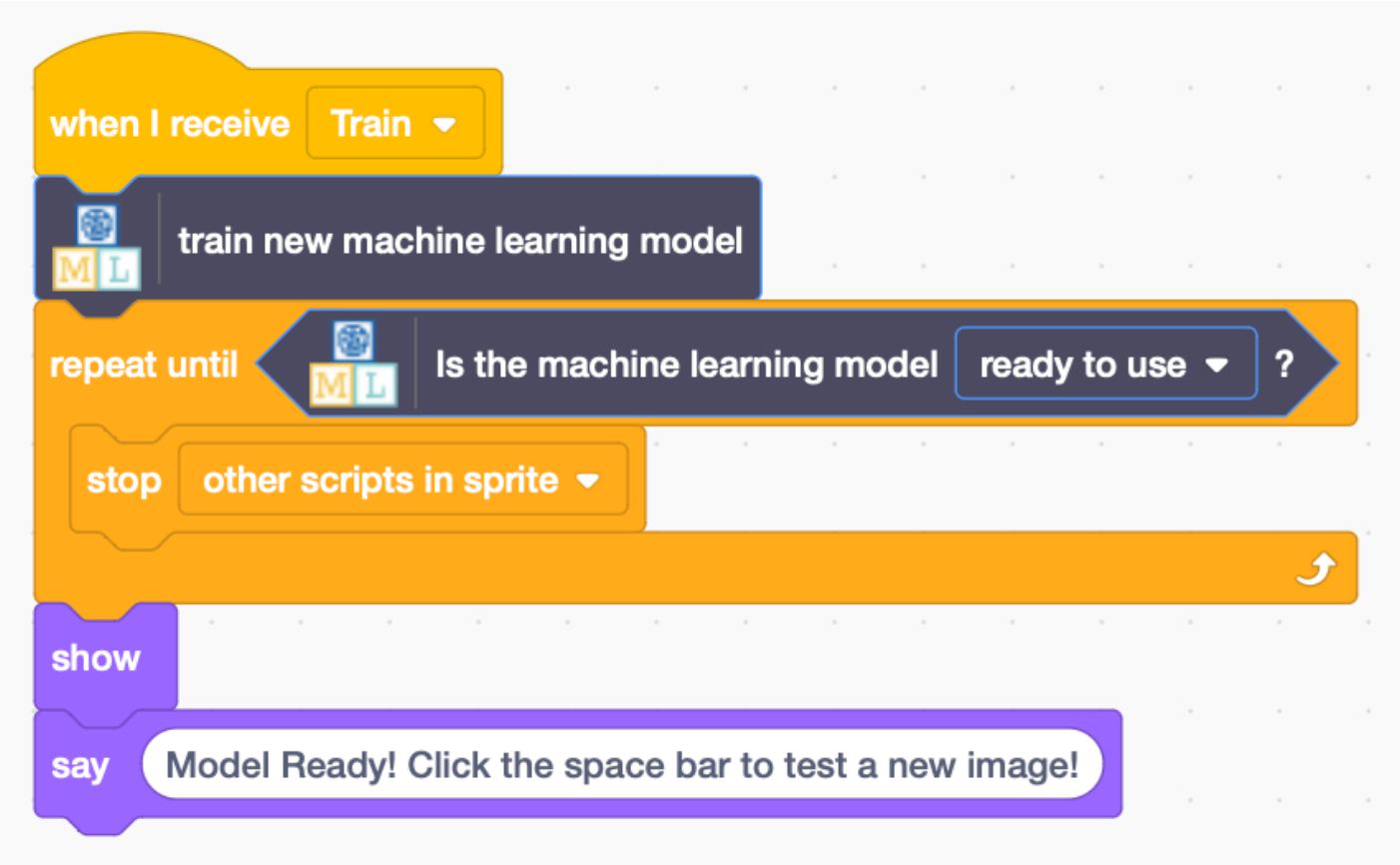
Find these blocks in the palette:

Note: The message in the say block can be changed.



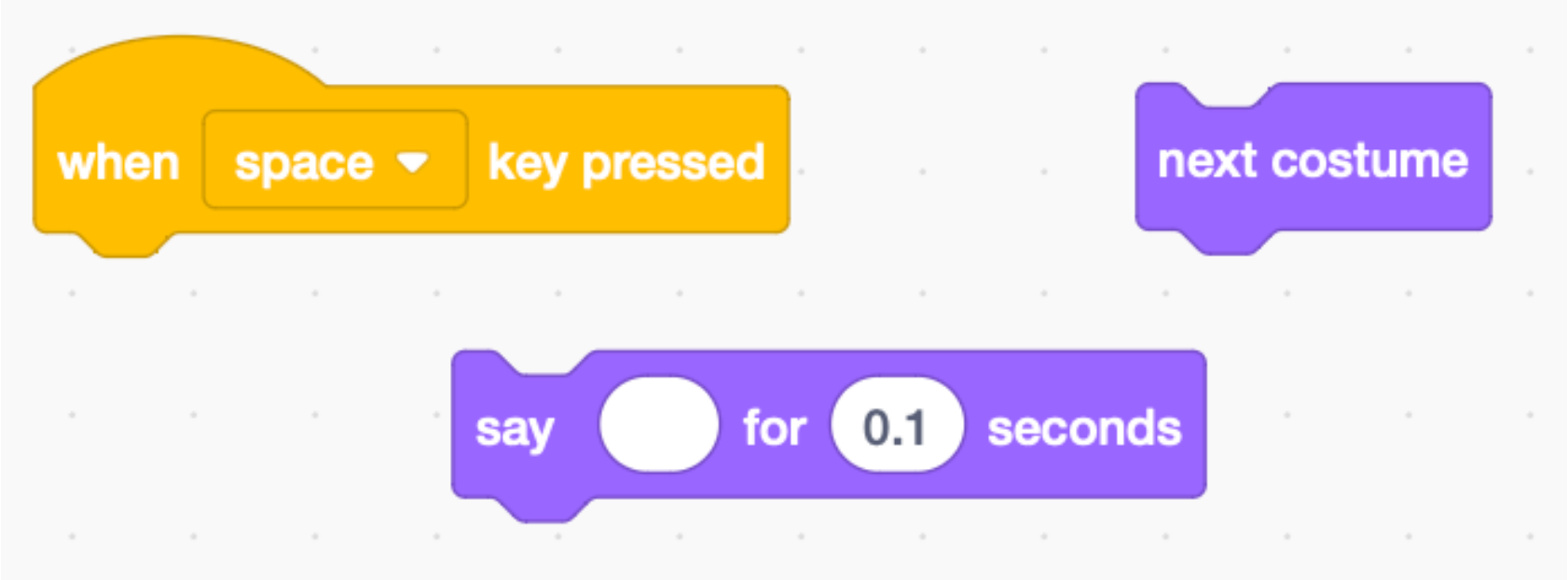
Testing Sprite (Train)

Add these blocks into the code as shown:



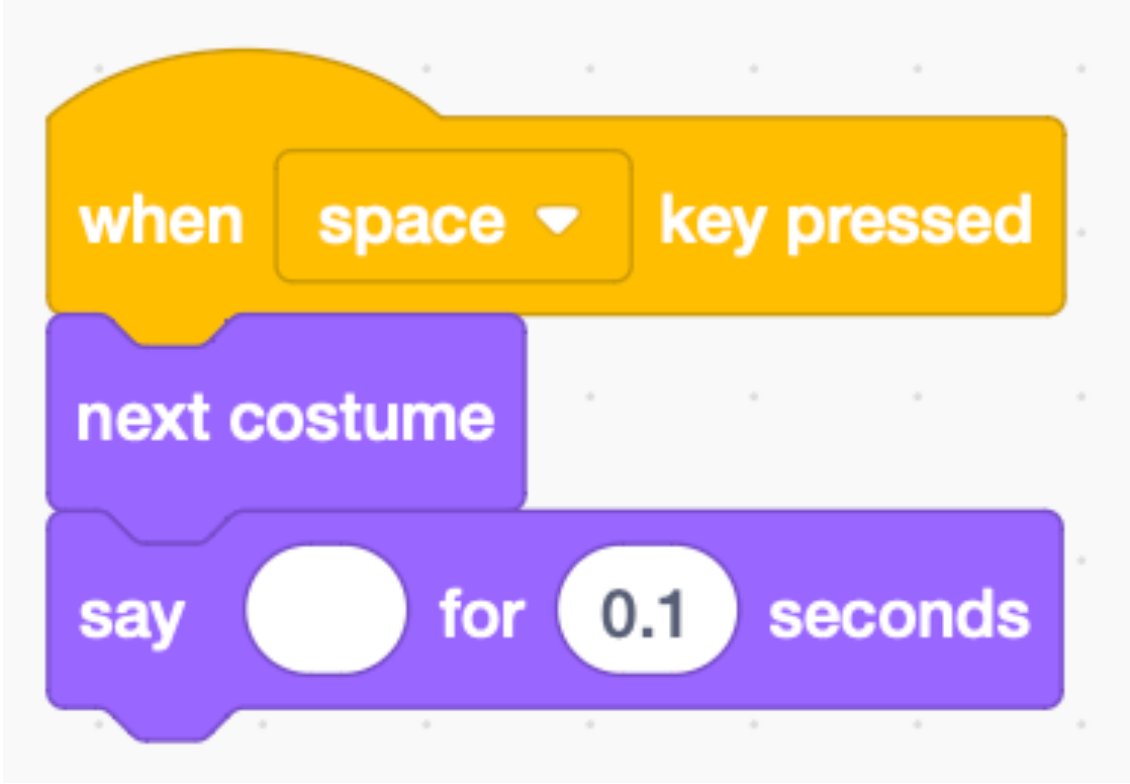
Testing Sprite (New Image)

Find these blocks in the palette:



Testing Sprite (New Image)

Assemble the blocks as shown:



Testing Sprite (New Image)

Find these blocks in the palette:

Testing Sprite (New Image)

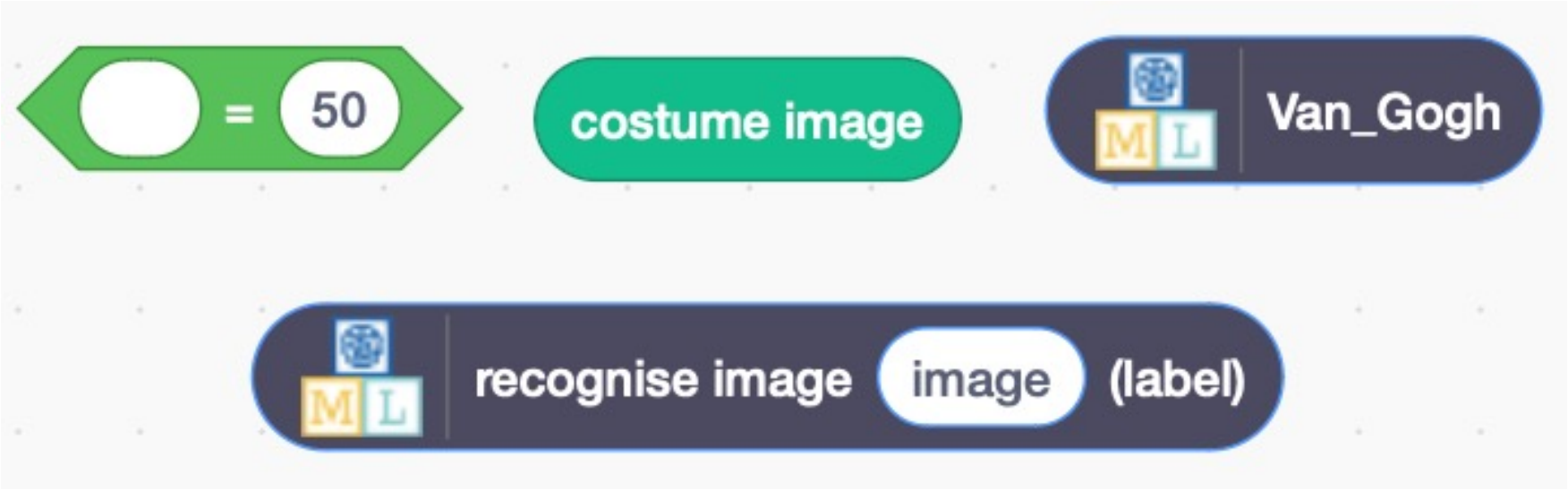
Assemble the blocks as shown:

Testing Sprite (New Image)

Add these blocks into the code as shown:

Testing Sprite (New Image)

Find these blocks in the palette:

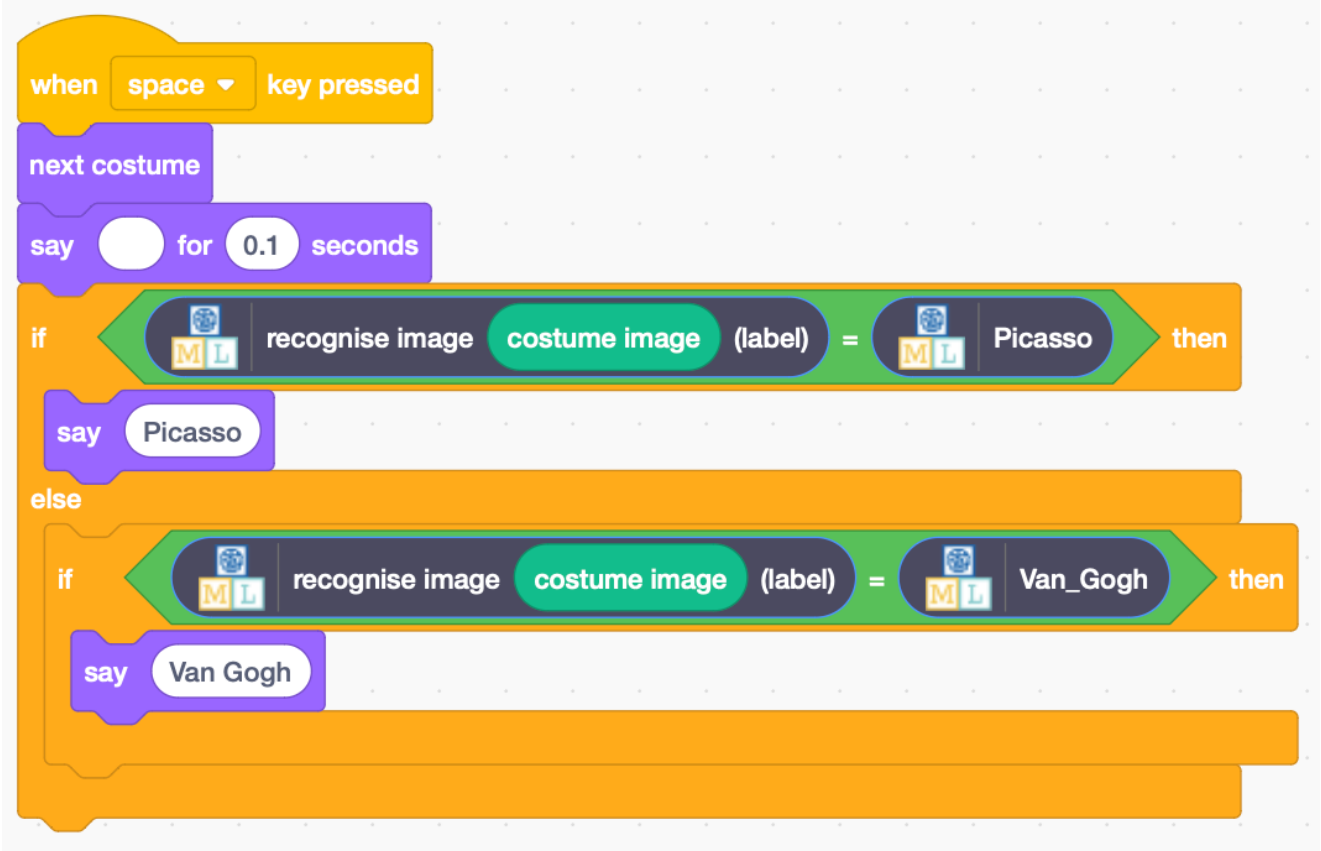


Testing Sprite (New Image)

Assemble the blocks as shown, and then duplicate while replacing Van Gogh with the Picasso block

Testing Sprite (New Image)

Add these blocks into the code as shown:



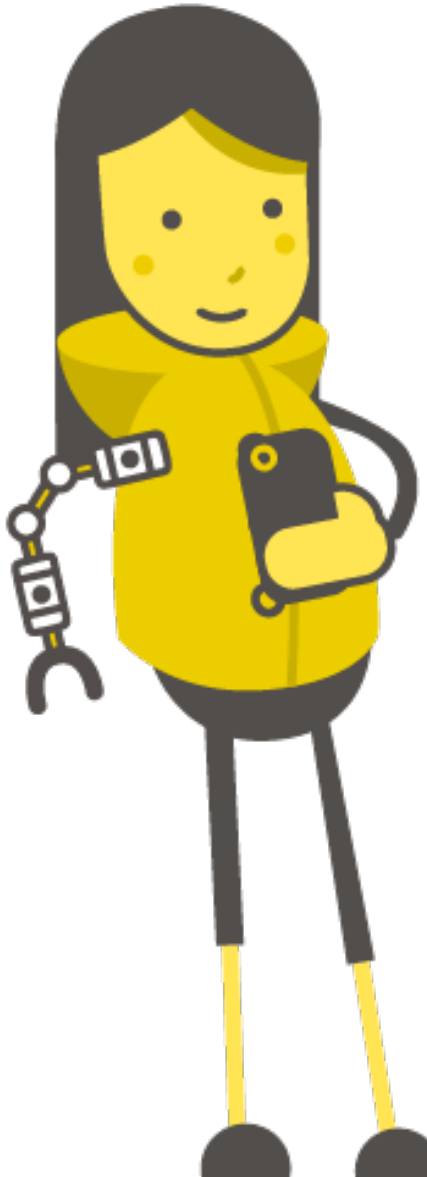
Extensions

Learners can try drawing their own pictures in the style of an artist, either on paper or directly within Scratch, and see if the A.I. correctly identifies the style.

The confidence level of the A.I. can be checked and either displayed on screen or used as an extra filter (i.e. program says it's unsure below 50% confidence)

The testing images can be sent back into the A.I. as further training data to try and improve its accuracy.

technocamps



Machine Learning Using Python

Machine Learning Using Python

It is possible to use Python code to access the Machine Learning for Kids AI that you have trained.

This can allow older GCSE groups to explore the uses of Python and gain further experience in programming.

Two files are given by MLfK; one that is simple and editable to access files/folders, train and test the AI; and one that is complex and contains the necessary code that the pupils do not need to change.

Machine Learning Using Python

However, using Python requires several libraries to be installed and can be quite painful to get working initially. This is obviously not possible for all schools.

The Scratch content is still valuable for learners working toward Progression Step 4 and still teaches the ideas behind Machine Learning. Complex programs utilising this AI can still be constructed within Scratch!