

technocamps



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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.

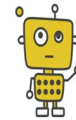
In today's world digital literacy is an essential skill for learners to develop. The technological requirements for jobs are ever increasing, and a strong start in digital skills will prepare learners and give them an advantage.



Expressive Arts



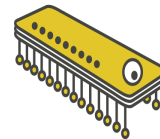
Health and Wellbeing



Humanities



Languages, Literacy and Communication



Mathematics and Numeracy



Science and Technology

Ideas for Machine Learning Across the Curriculum



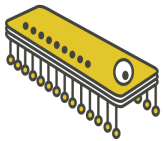
Health and Wellbeing

- Predict Healthy Foods from Contents



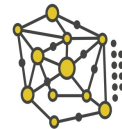
Languages, Literacy and Communication

- Recognising Authors
- Decoding Secret Codes



Mathematics and Numeracy

- Make Predictions from Statistics



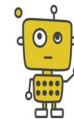
Expressive Arts

- Recognising Artists
- Recognising Musicians



Science and Technology

- Predicting Classes of Animals



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.

Using Machine Learning for Kids

Go to

machinelearningforkids.co.uk

Click on “Get started”

Click on “Try it now”

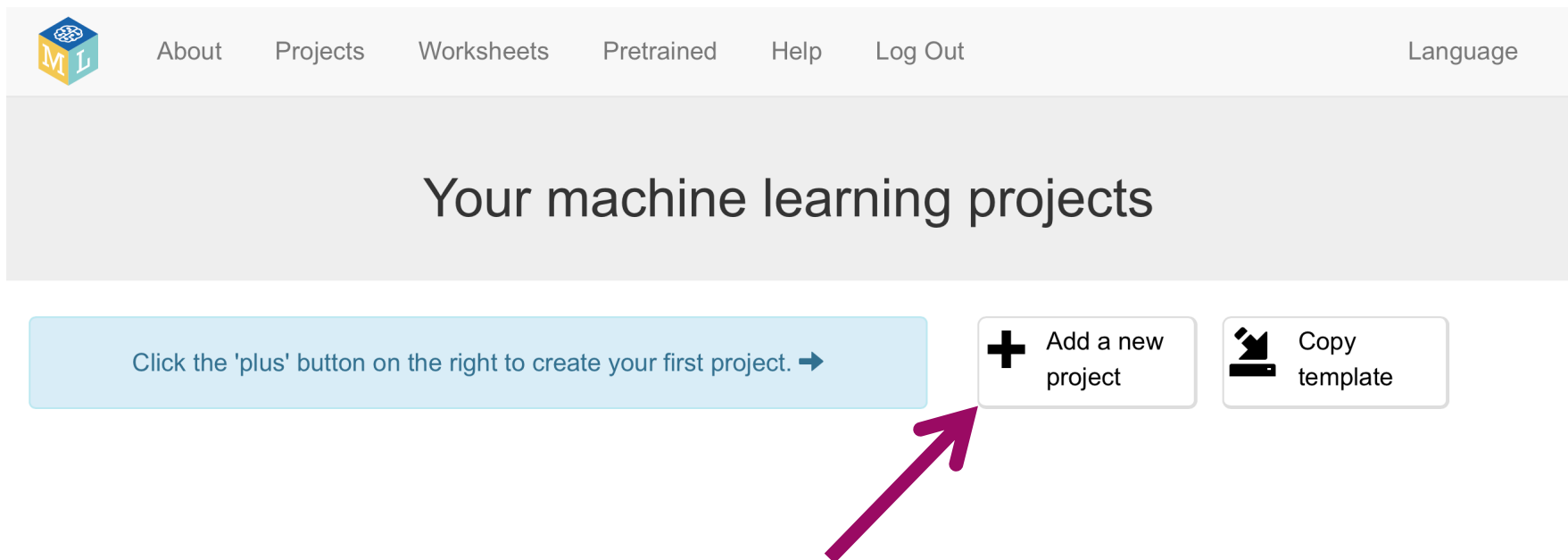


Recognising Artists

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.


[About](#)
[Projects](#)
[Worksheets](#)
[Pretrained](#)
[Help](#)
[Log Out](#)
[Language](#)

Start a new machine learning project

Project Name *

Artists

Recognising *

images

What type of thing do you want to teach the computer to recognise?

For words, sentences or paragraphs, choose "text"

For photos, diagrams and pictures, choose "images"

For sets of numbers or multiple choices, choose "numbers"

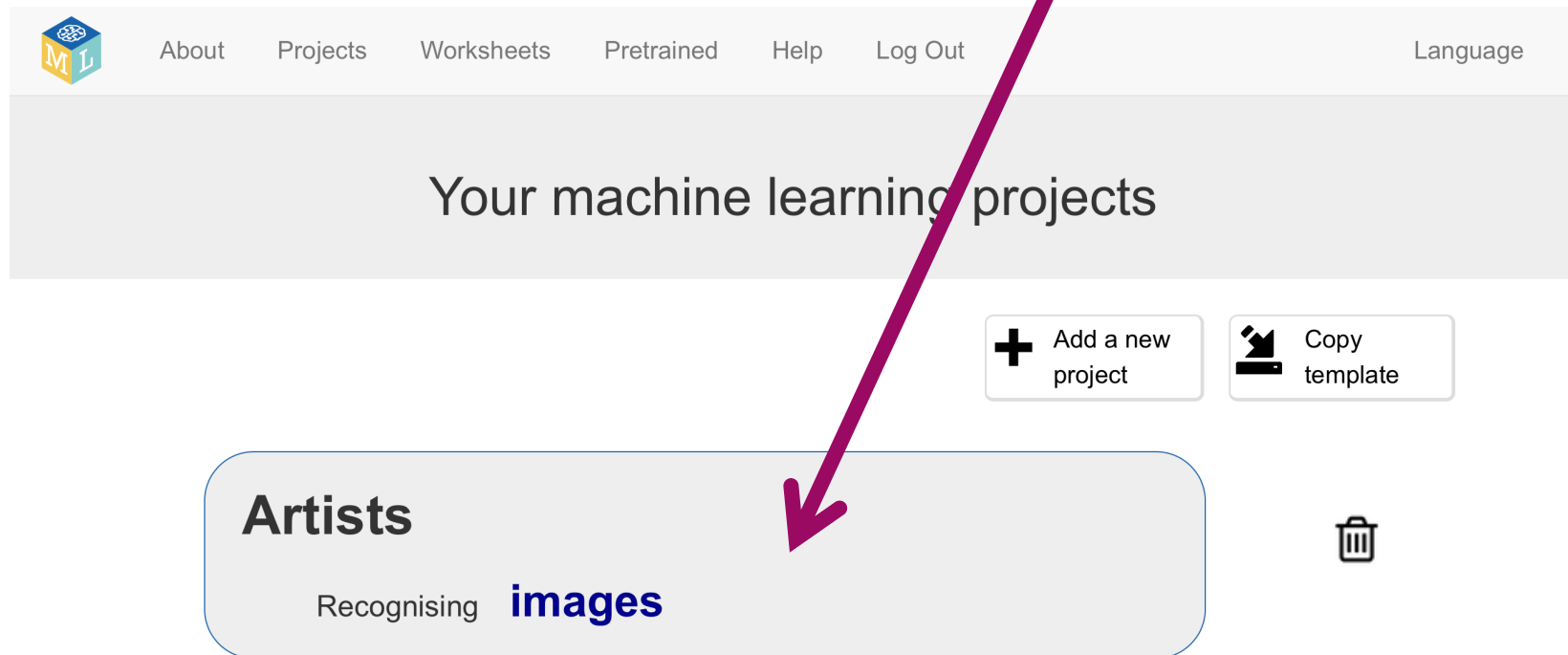
For voices and sounds, choose "sounds"

CREATE

CANCEL

Training Your Project

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



The screenshot shows the TechnoCamps interface. At the top is a navigation bar with a logo (a cube with 'M' and 'L') and links for 'About', 'Projects', 'Worksheets', 'Pretrained', 'Help', 'Log Out', and 'Language'. Below this is a large grey header with the text 'Your machine learning projects'. To the right of this header are two buttons: '+ Add a new project' and 'Copy template' (with a document icon). Below the header is a list of projects. The first project is 'Artists', which is highlighted with a red arrow pointing to it. Below the project name 'Artists' is the text 'Recognising images'. To the right of the project card is a trash can icon.

ML

About Projects Worksheets Pretrained Help Log Out Language

Your machine learning projects

+ Add a new project

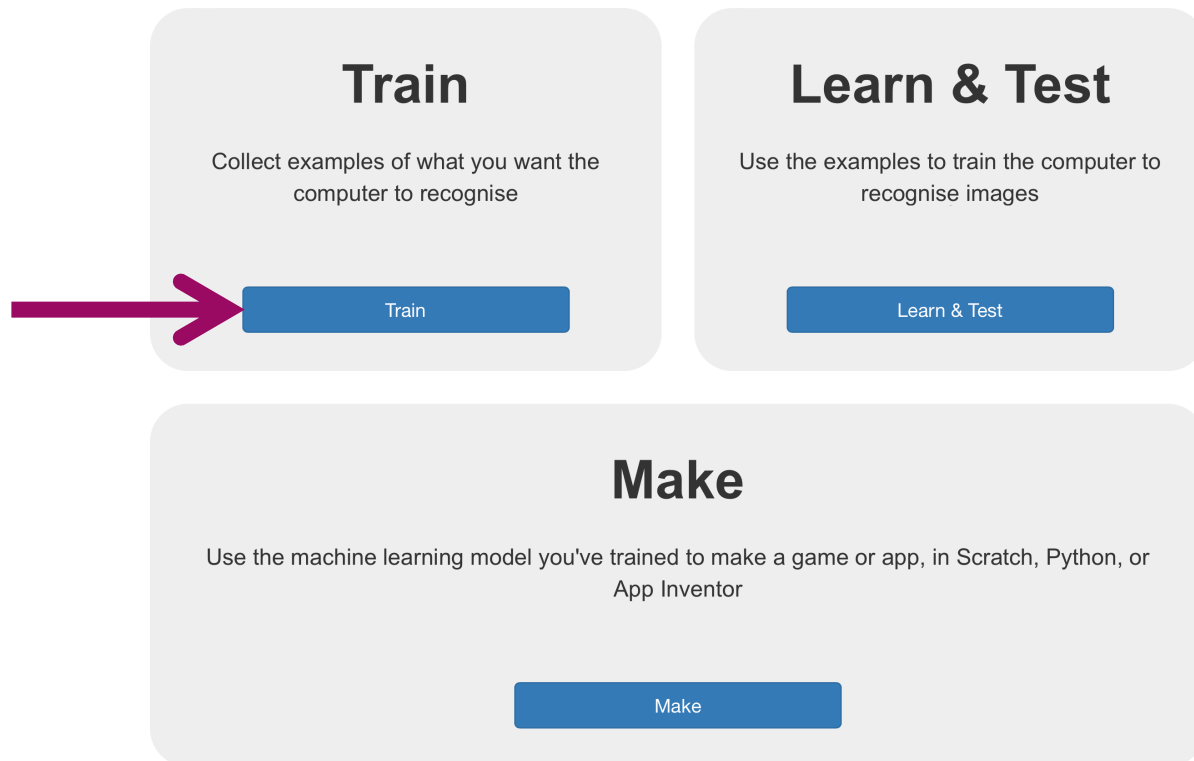
Copy template

Artists

Recognising **images**

Training Your Project

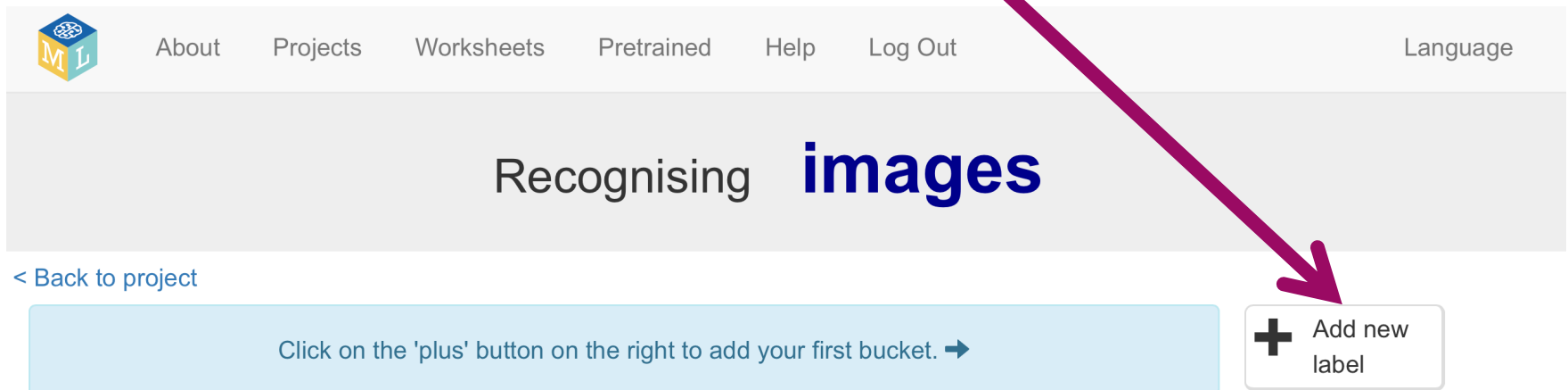
These are the three stages of making any project.
We will begin by Training our A.I.



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”.

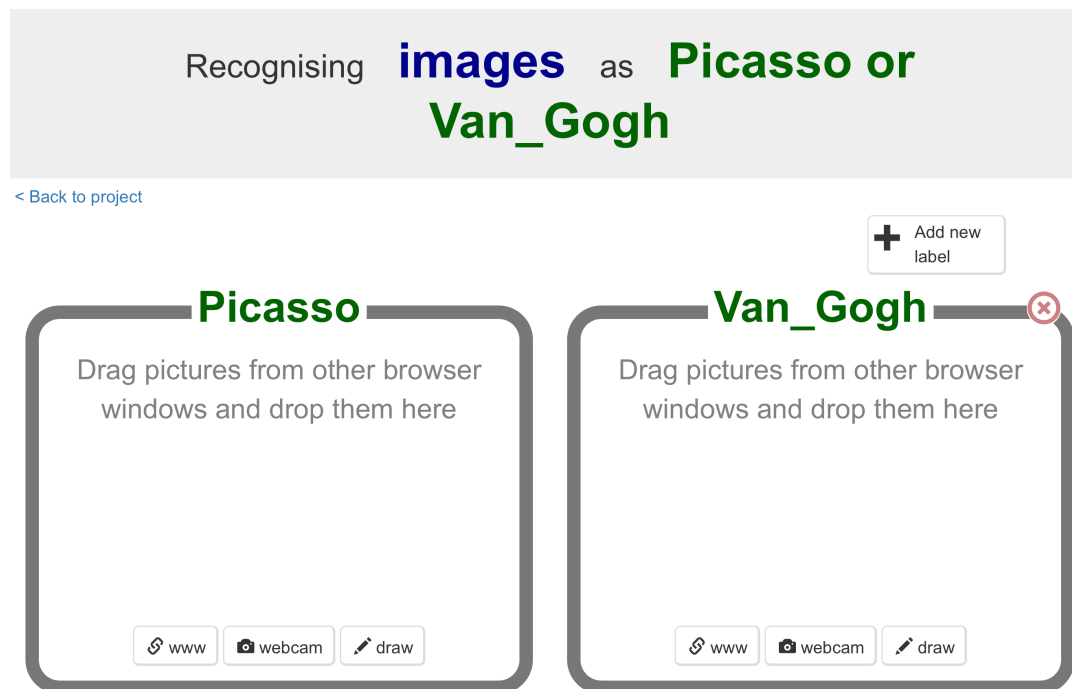


The screenshot shows the TechnoCamps interface. At the top, there is a navigation bar with links: About, Projects, Worksheets, Pretrained, Help, Log Out, and Language. Below this, the main heading is "Recognising **images**". A purple arrow points from the text "So we will call these labels “Picasso” and “Van Gogh”." to a button labeled "+ Add new label". Below the heading, there is a light blue box with the text "Click on the 'plus' button on the right to add your first bucket. ➔".

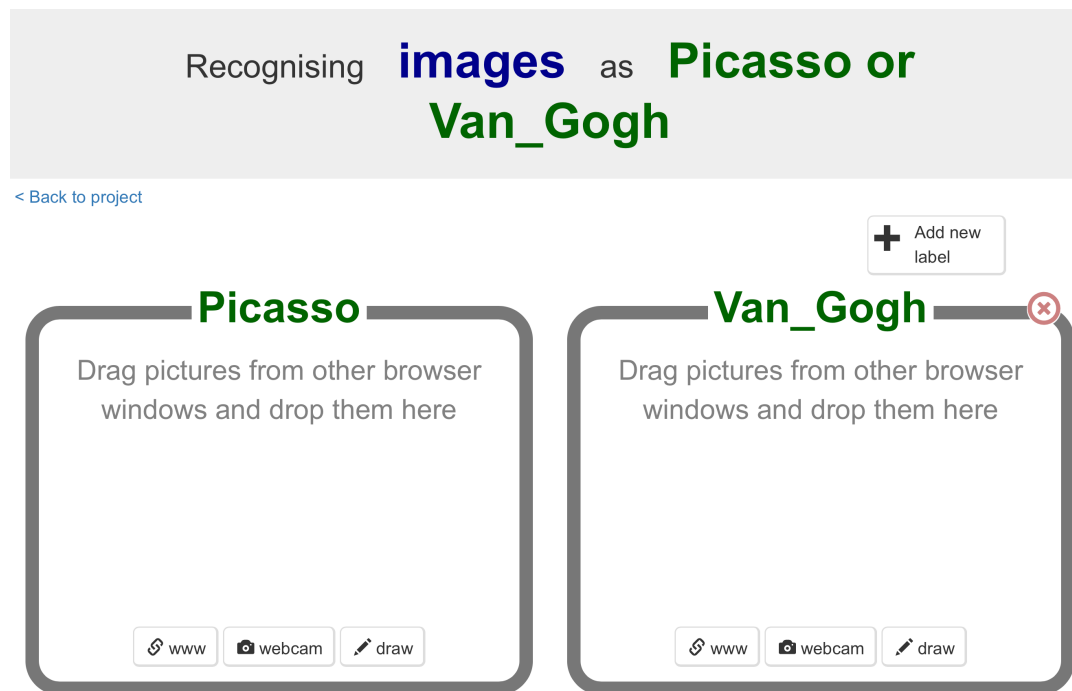
Training Your Project

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

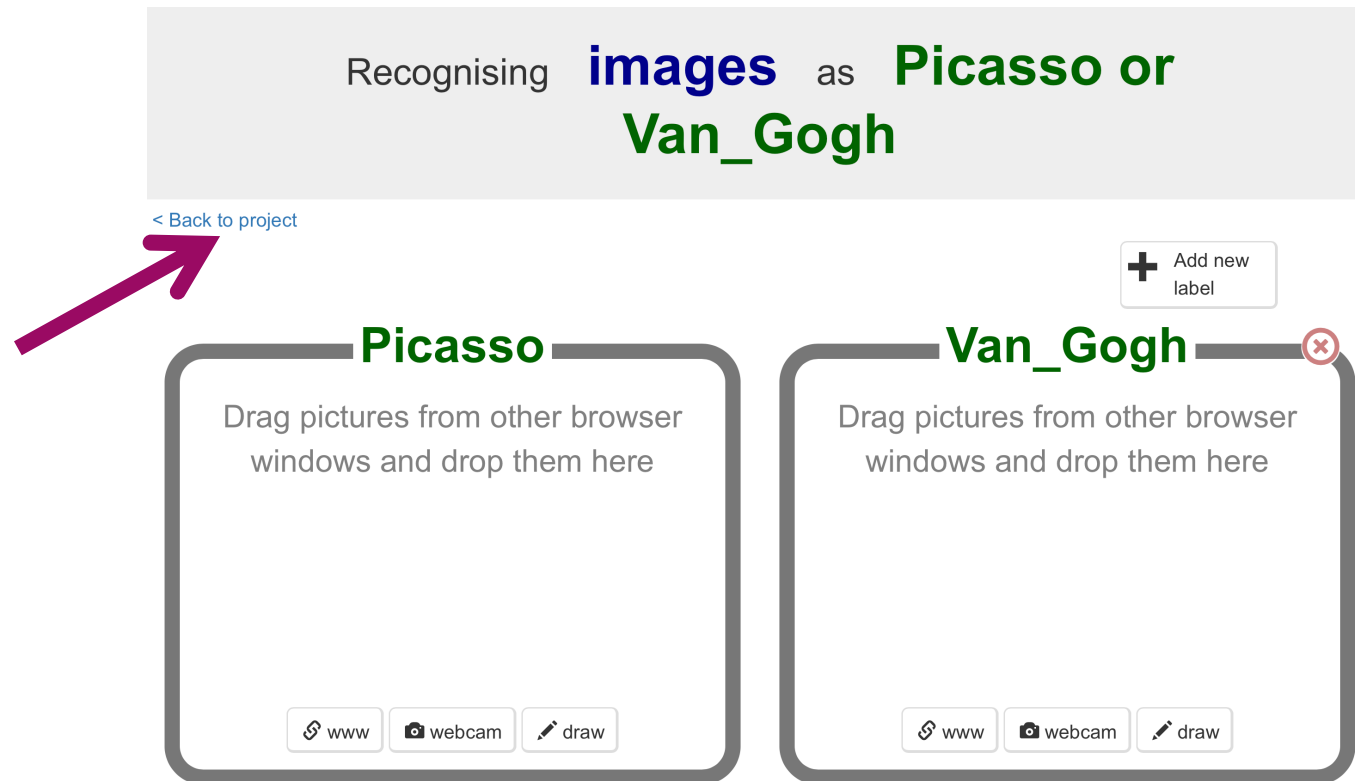
In class this would serve well as a research lesson to find many images by an artist.

You can download the images at:

[tcl.me/.](https://tcl.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.

Train

Collect examples of what you want the computer to recognise

Train

Learn & Test

Use the examples to train the computer to recognise images

Learn & Test

Make

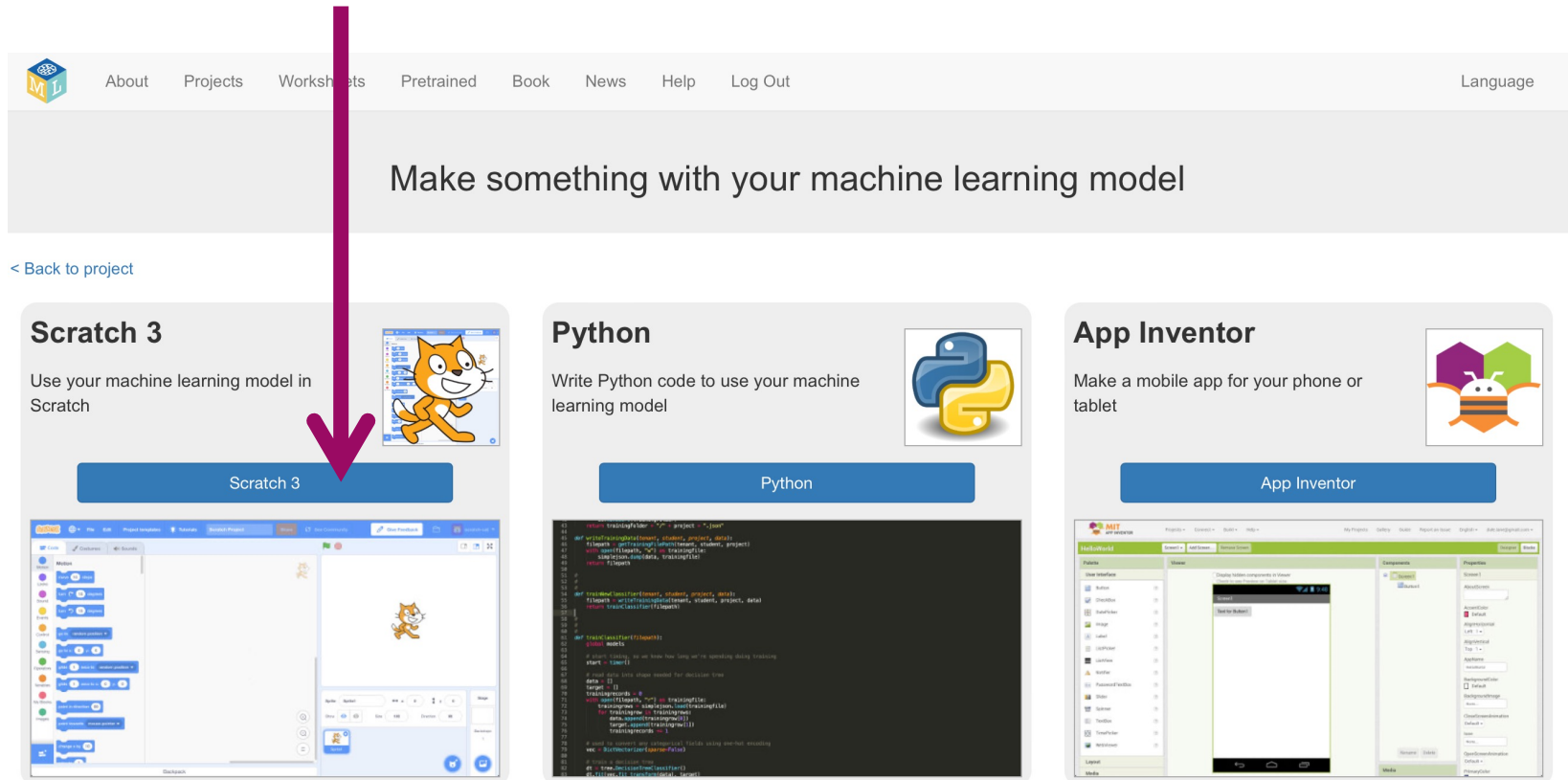
Use the machine learning model you've trained to make a game or app, in Scratch, Python, or App Inventor

Make



Making Your Project

Today we will be making our Project in Scratch 3.



The screenshot shows the top navigation bar of the ML Playground with links: About, Projects, Worksheets, Pretrained, Book, News, Help, Log Out, and a Language dropdown. Below the navigation bar is a large grey banner with the text "Make something with your machine learning model". Underneath the banner is a link "< Back to project".

There are three main options displayed in grey boxes:

- Scratch 3**: "Use your machine learning model in Scratch". It features the Scratch cat icon and a blue button labeled "Scratch 3". Below the button is a preview of the Scratch 3 interface showing a cat sprite on a stage.
- Python**: "Write Python code to use your machine learning model". It features the Python logo icon and a blue button labeled "Python". Below the button is a preview of a Python code editor with pre-installed ML libraries.
- App Inventor**: "Make a mobile app for your phone or tablet". It features the MIT App Inventor logo icon and a blue button labeled "App Inventor". Below the button is a preview of the MIT App Inventor interface showing a mobile app design.

A large red arrow points from the top of the page down to the "Scratch 3" button.

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.

[< Back to project](#)

You haven't trained a machine learning model yet.

You can [train one now](#) and then come back to open Scratch.
Or you can go now.

Your project will add these blocks to Scratch.

recognise image (label)

Put images in the input for this, and it will return the label that your machine learning model recognises it as.

recognise image (confidence)

This will return how confident your machine learning model is that it recognises the type of images. (As a number from 0 - 100).

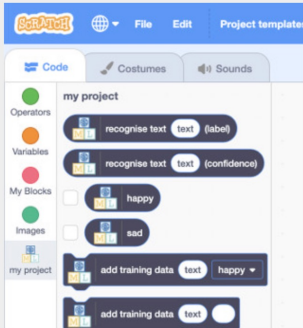
label

These blocks represent the labels you've created in your project, so you can use their names in your scripts.

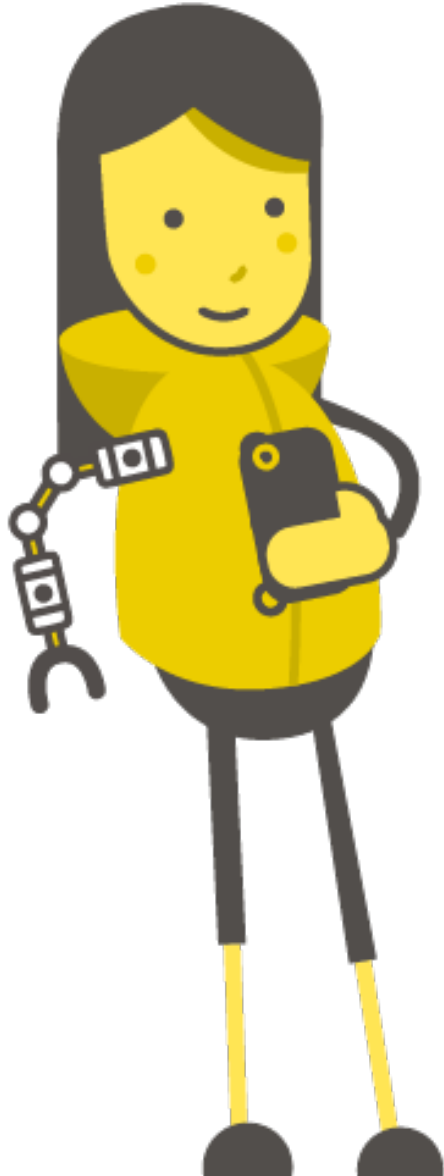
This means you can do something like this:

```
if (recognise image costume image (label) = label) then
  say "I think the costume looks like a "label"
```

It will look something like this - except with the name of your project.



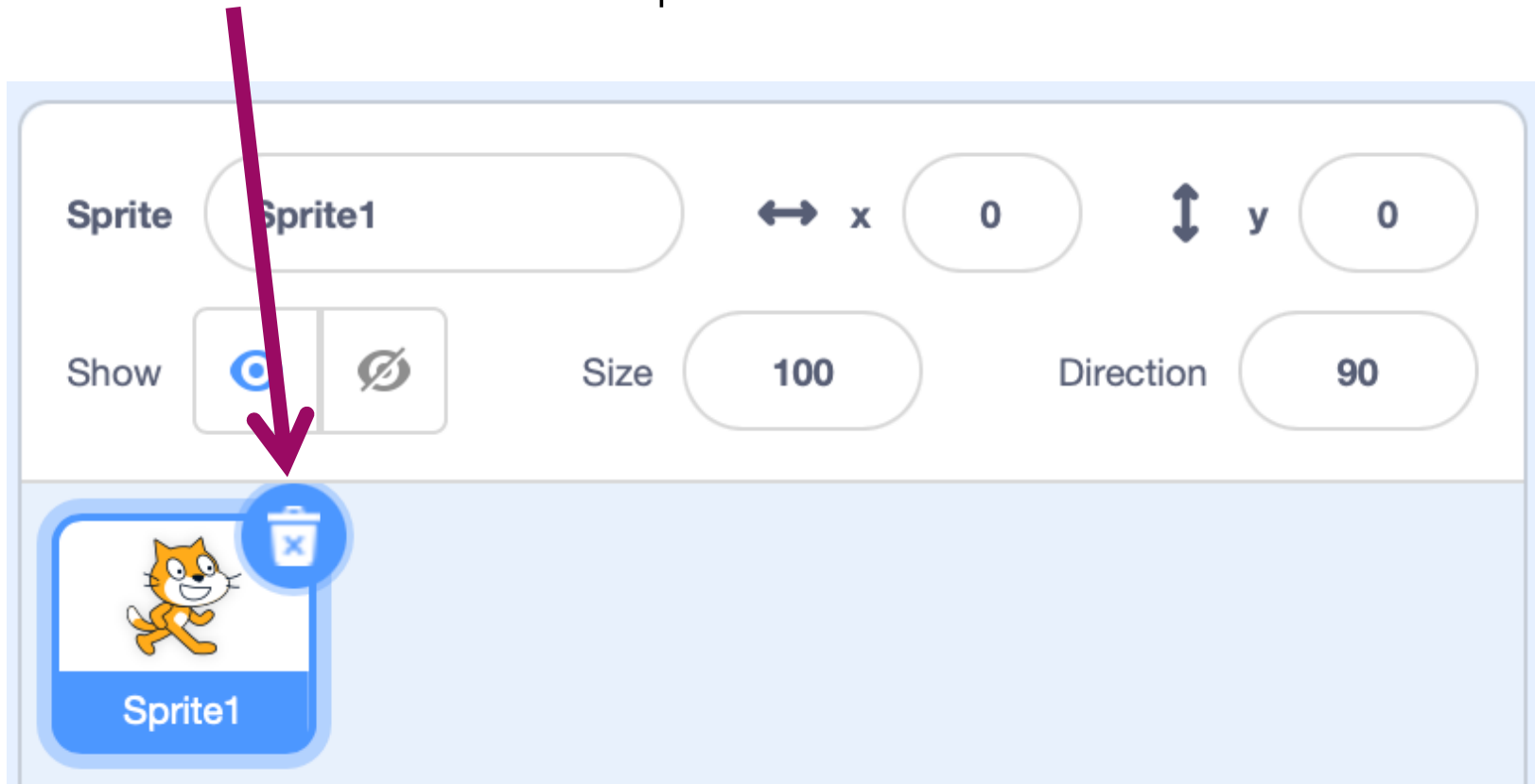
The screenshot shows the Scratch project editor interface. The project is named 'my project'. The 'Code' tab is selected. The project contains several blocks: a 'recognise text' block with 'text' as the input and '(label)' as the output; a 'recognise text' block with 'text' as the input and '(confidence)' as the output; a 'happy' block; a 'sad' block; and two 'add training data' blocks, one with 'text' and 'happy' as inputs, and another with 'text' and an empty input field.



Machine Learning in Scratch

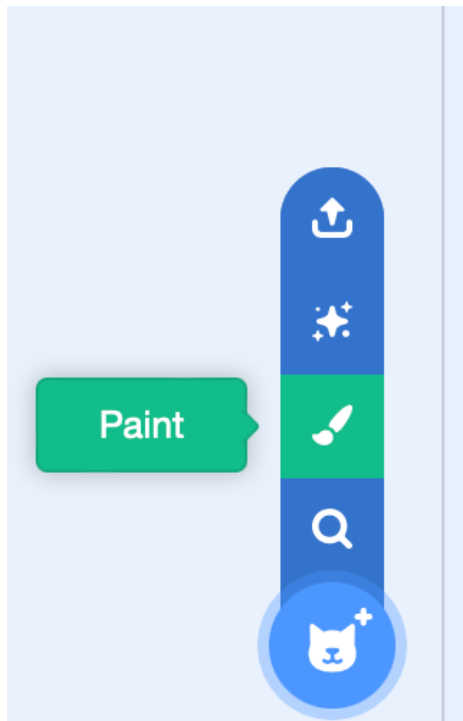
Deleting Sprites

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



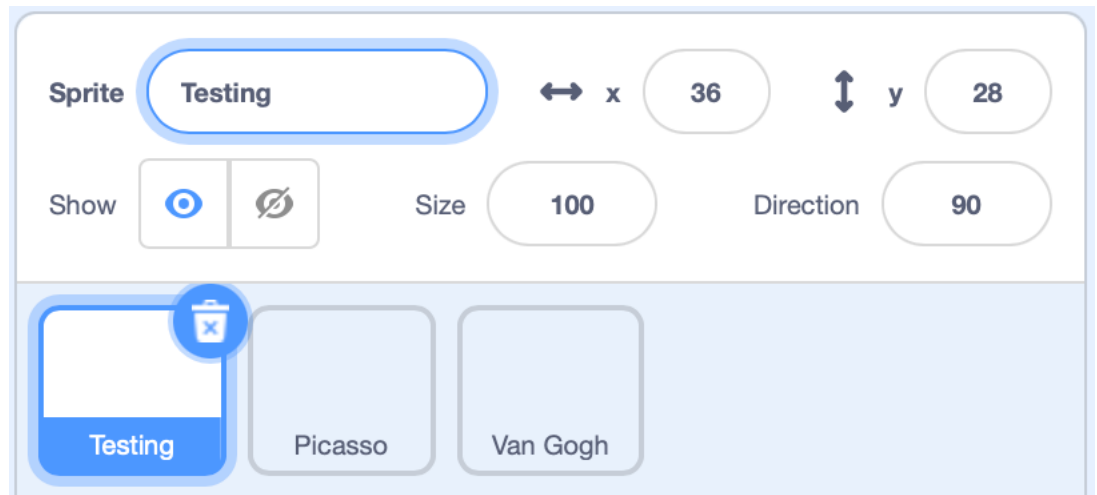
Creating Sprites

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



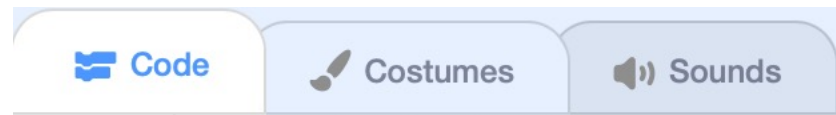
We will not paint a Sprite, just repeat this three times and name the sprites:

Testing, Picasso and Van Gogh.

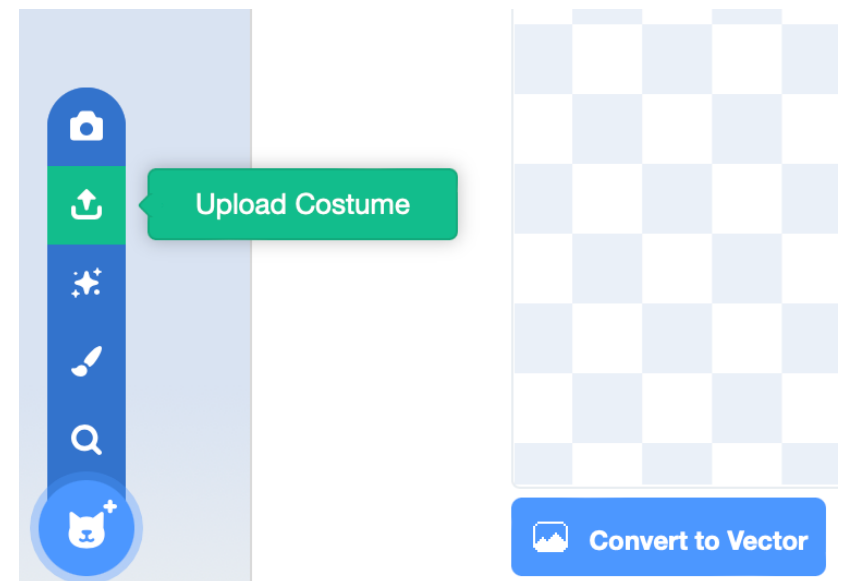


Uploading Images

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



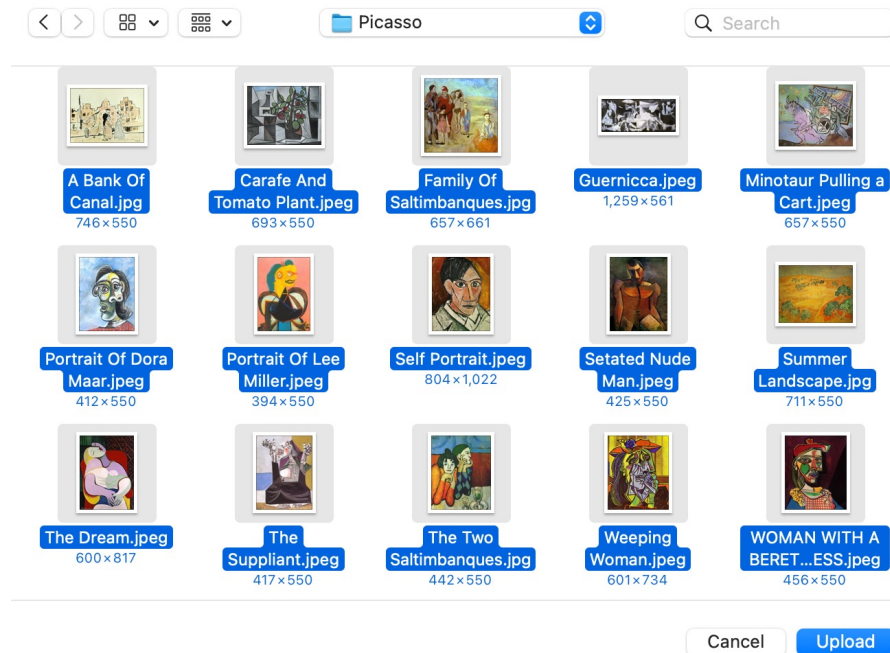
In the bottom left corner hover over the “Choose a Costume” button and select “Upload Costume”.



Uploading Images

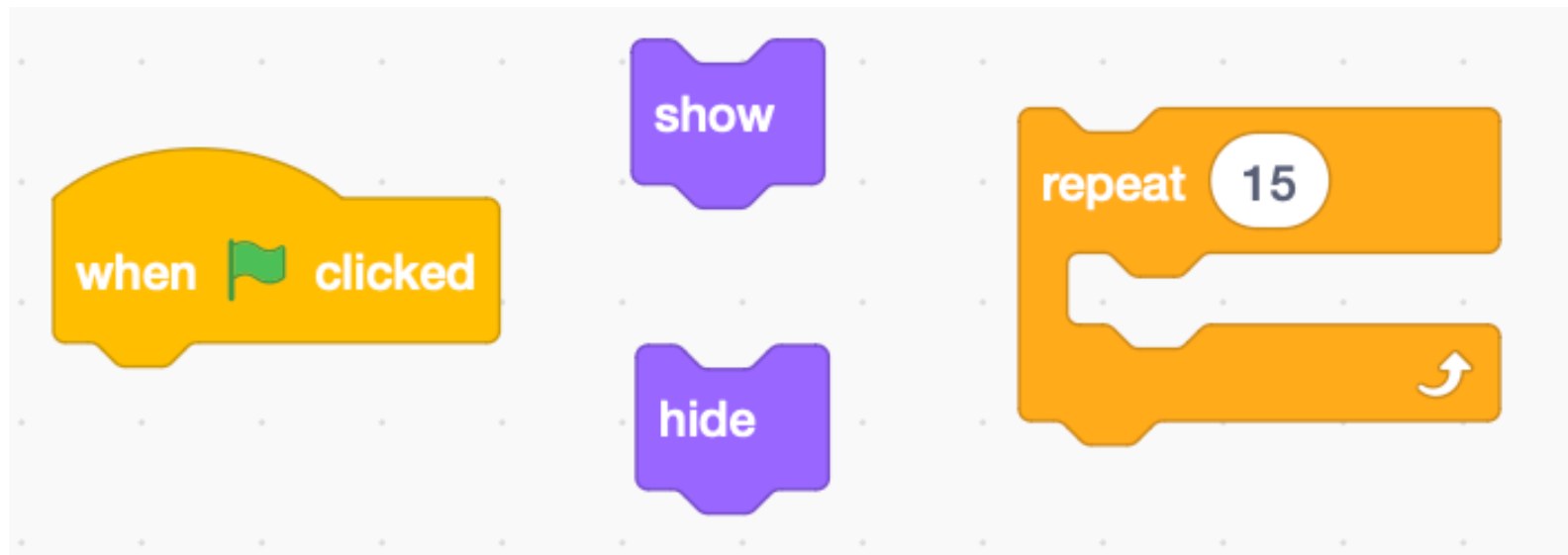
Select all images within the testing folder downloaded and click upload.

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



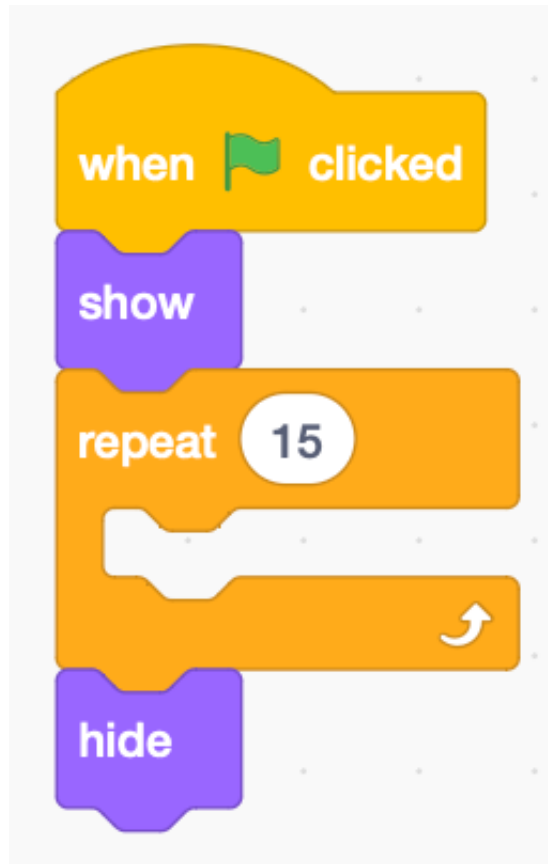
Picasso Sprite

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



Picasso Sprite

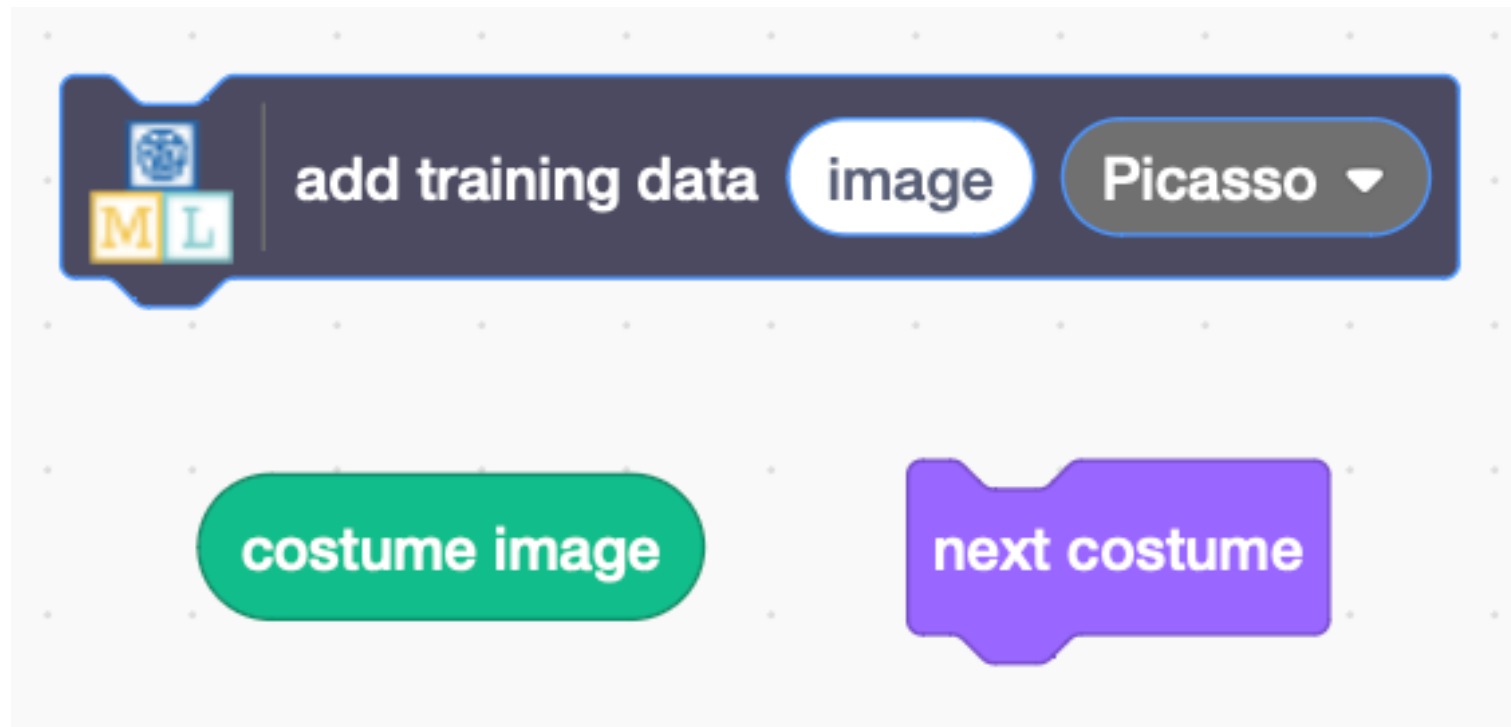
Assemble the blocks as shown.



Picasso Sprite

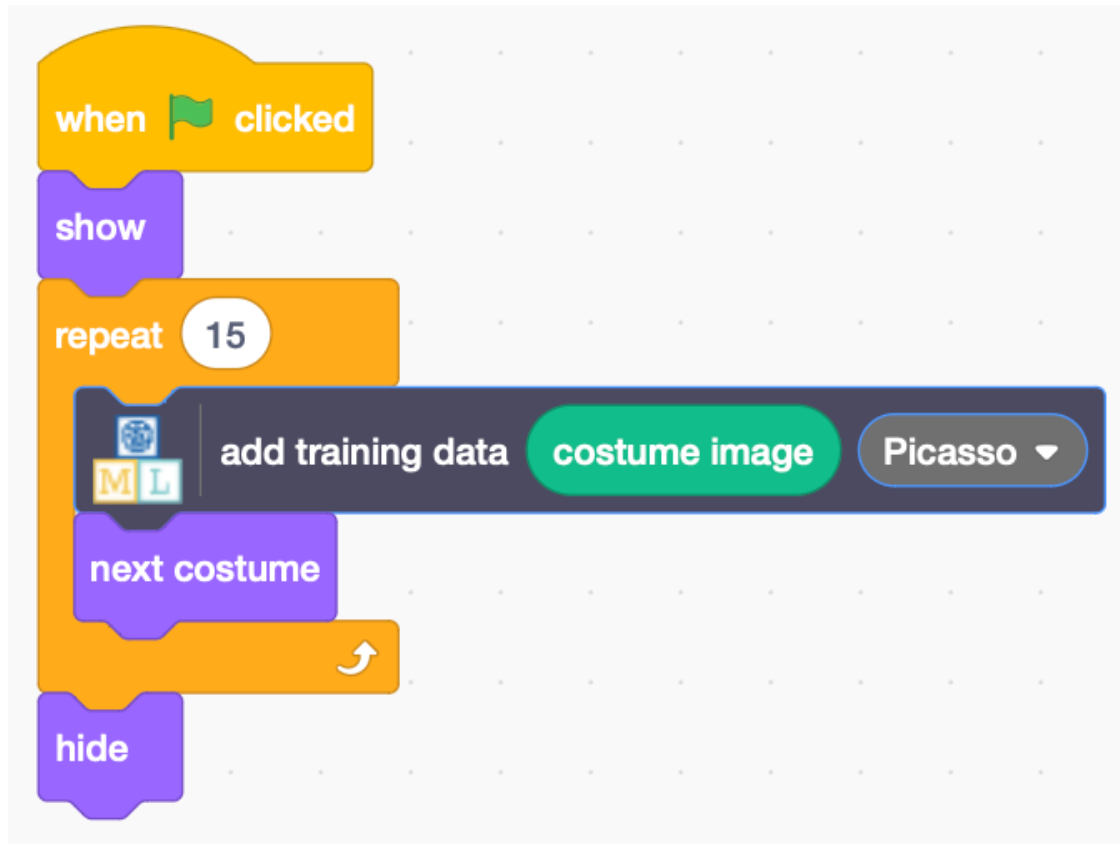
Find these blocks in the palette.

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



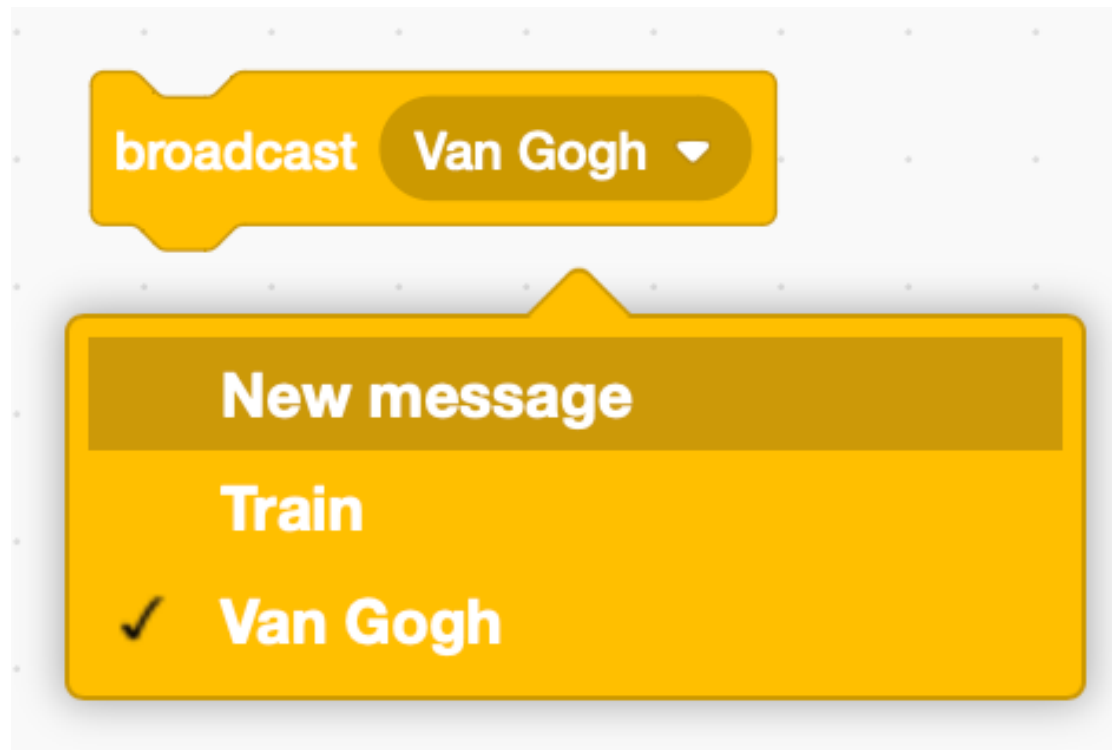
Picasso Sprite

Add these blocks into the repeat block.



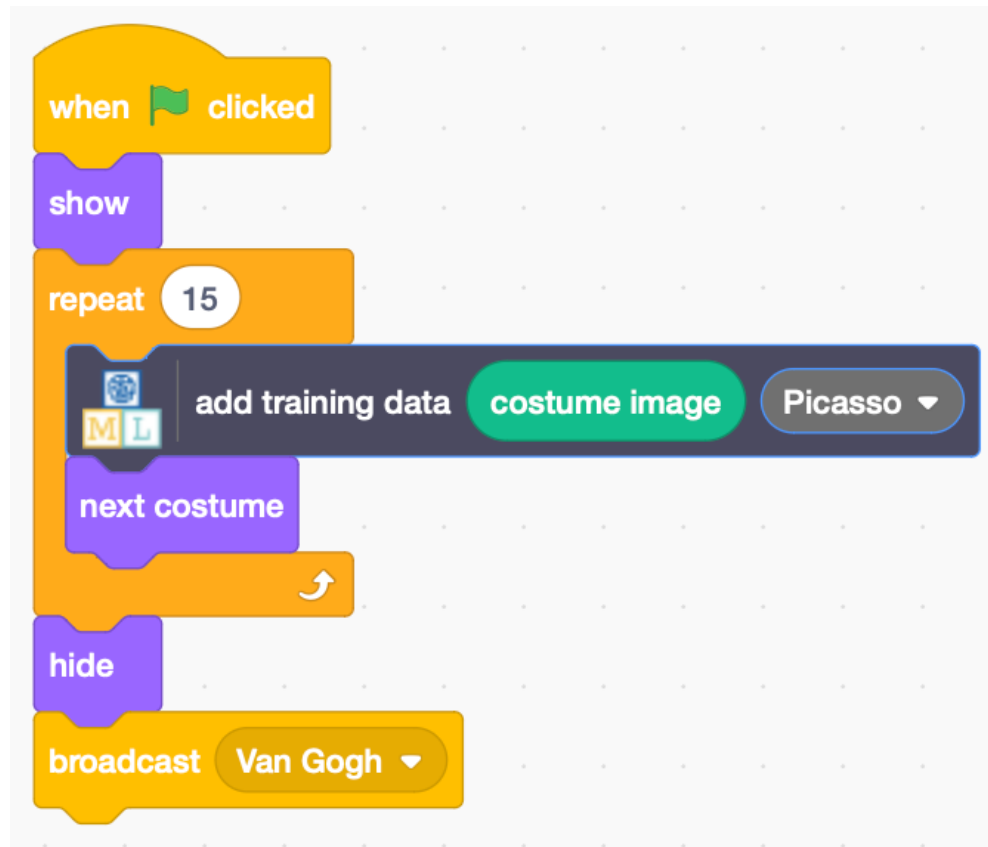
Picasso Sprite

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



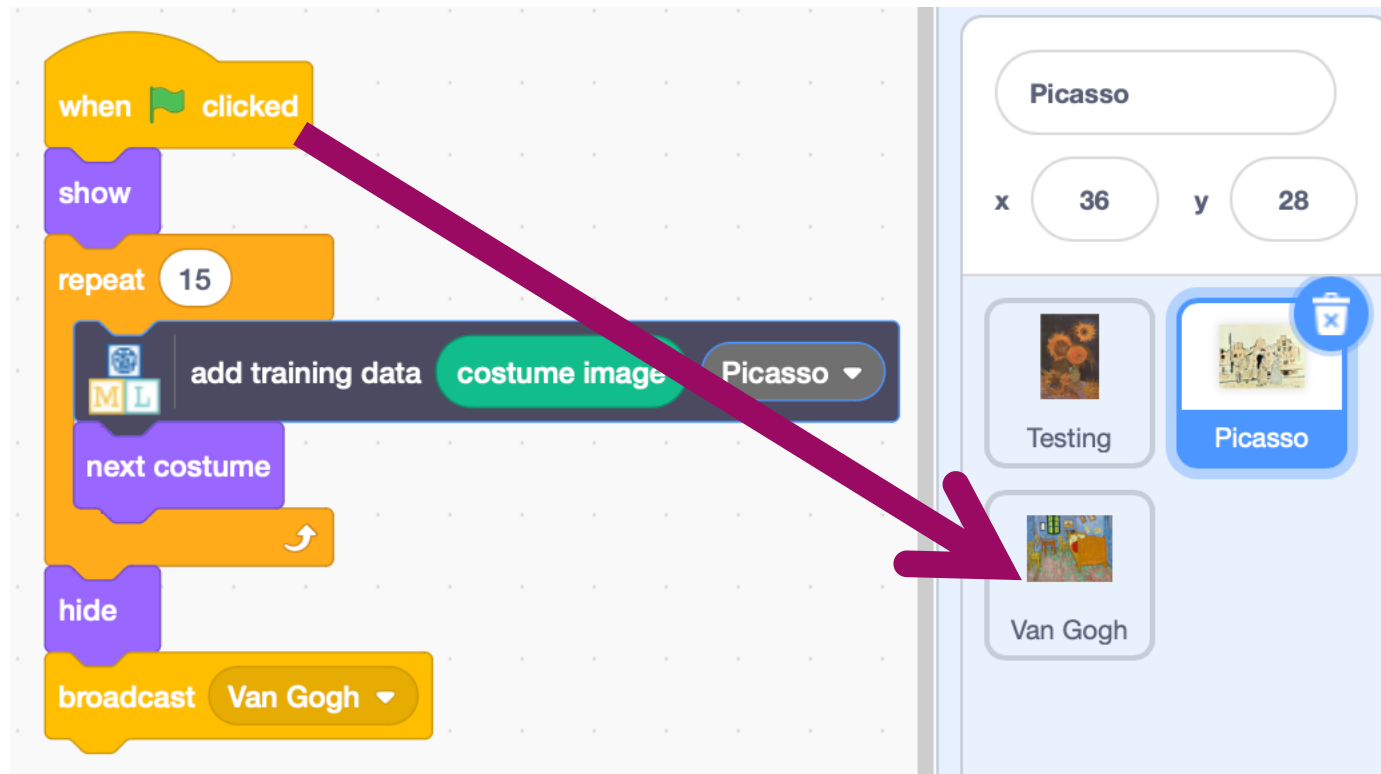
Picasso Sprite

Add the broadcast block to the end of the code.



Van Gogh Sprite

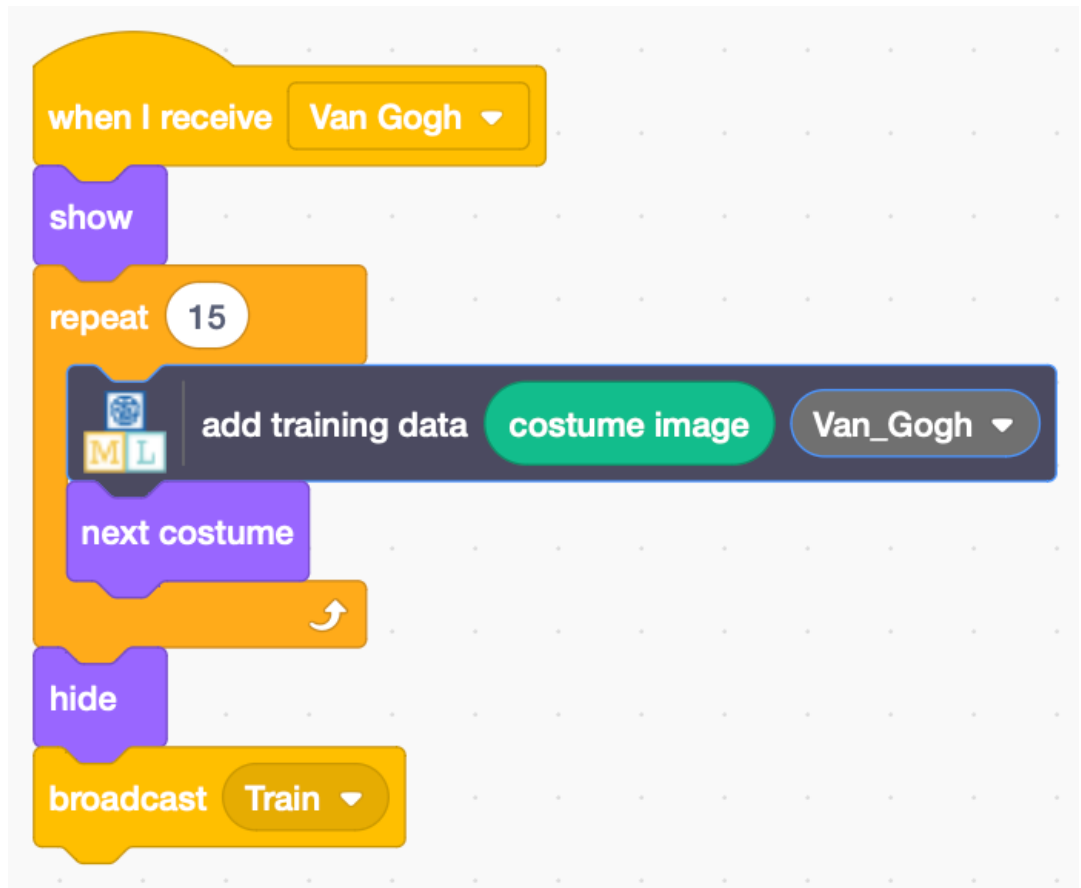
Drag the code of the Picasso sprite into the Van Gogh sprite. This will duplicate the code within the sprite.



Van Gogh Sprite

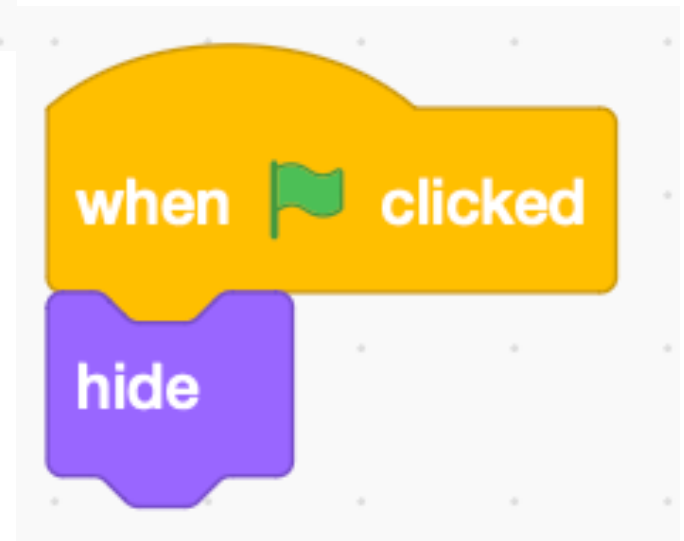
In the Van Gogh sprite, change:

- 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”



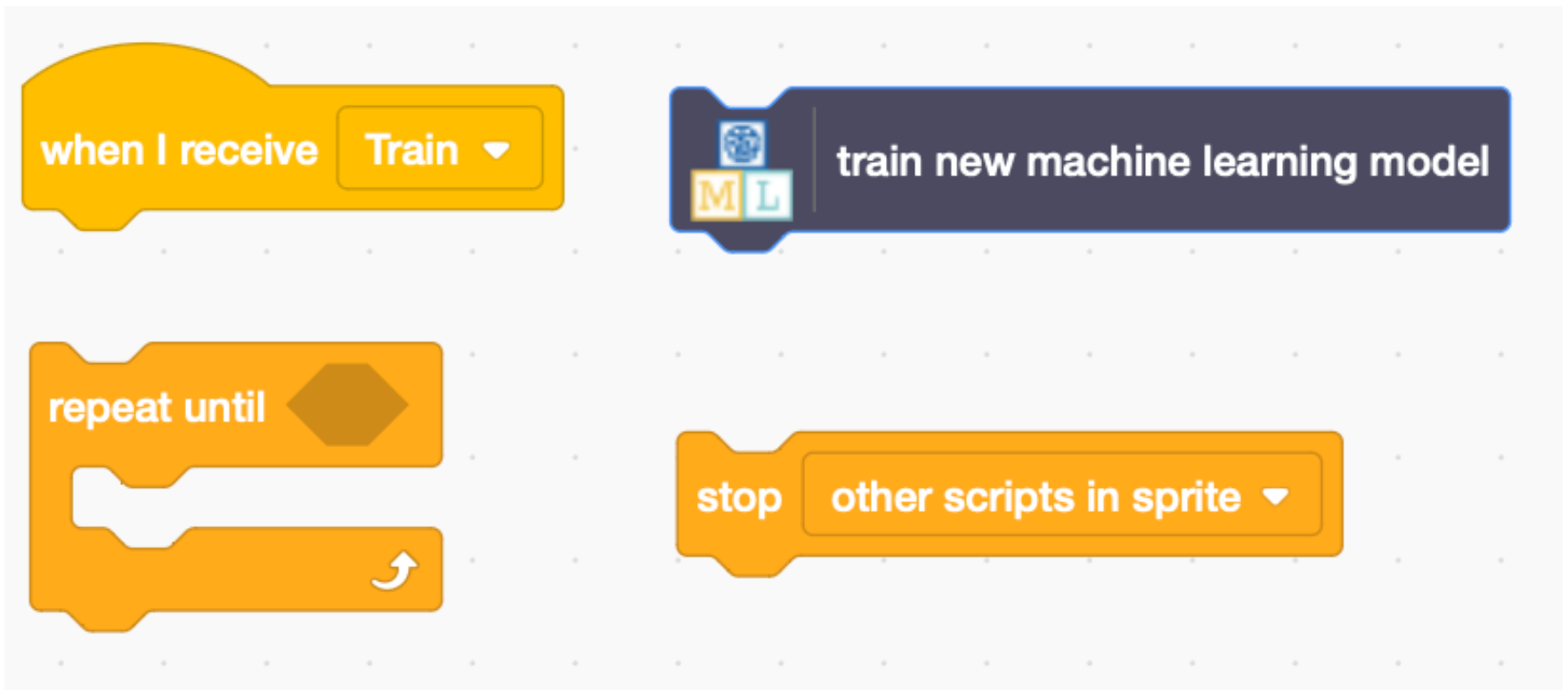
Testing Sprite (Start)

Find these blocks in the palette and assemble as shown:



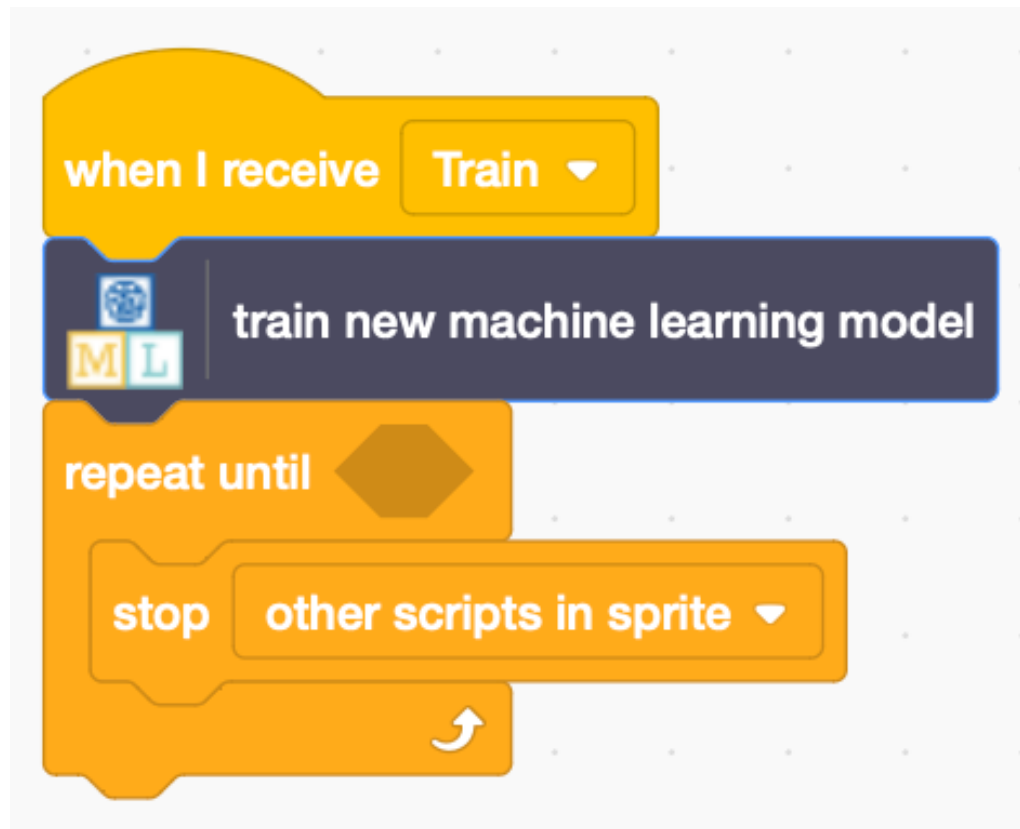
Testing Sprite (Train)

Find these blocks in the palette:



Testing Sprite (Train)

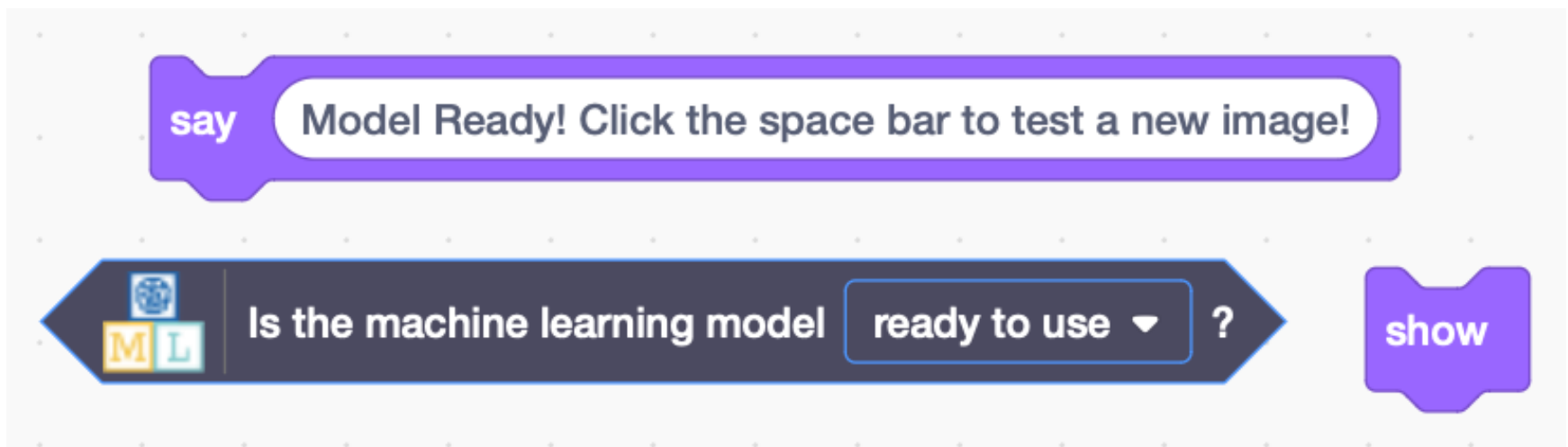
Assemble the blocks as shown:



Testing Sprite (Train)

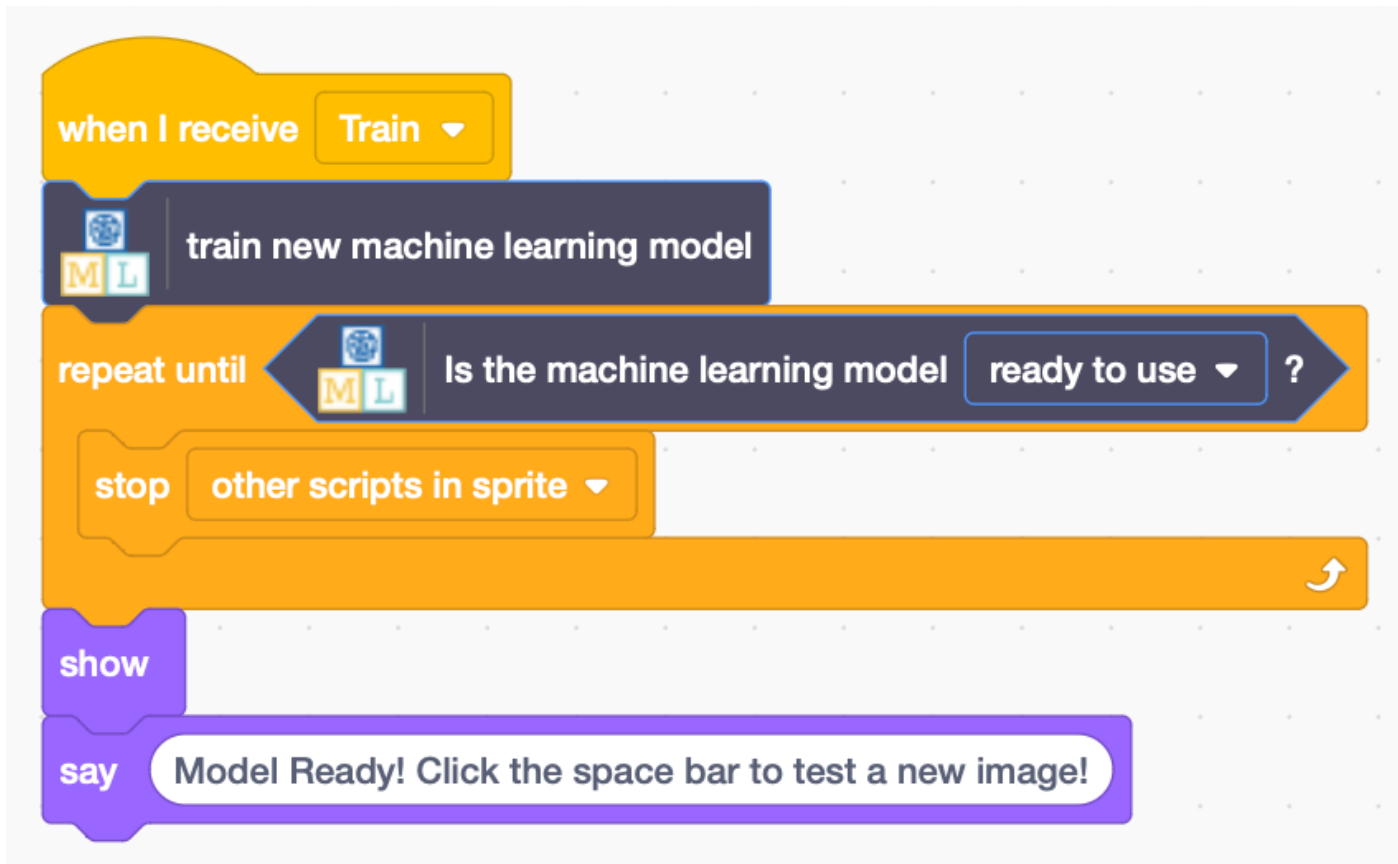
Find these blocks in the palette:

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



Testing Sprite (Train)

Add these blocks into the code as shown:



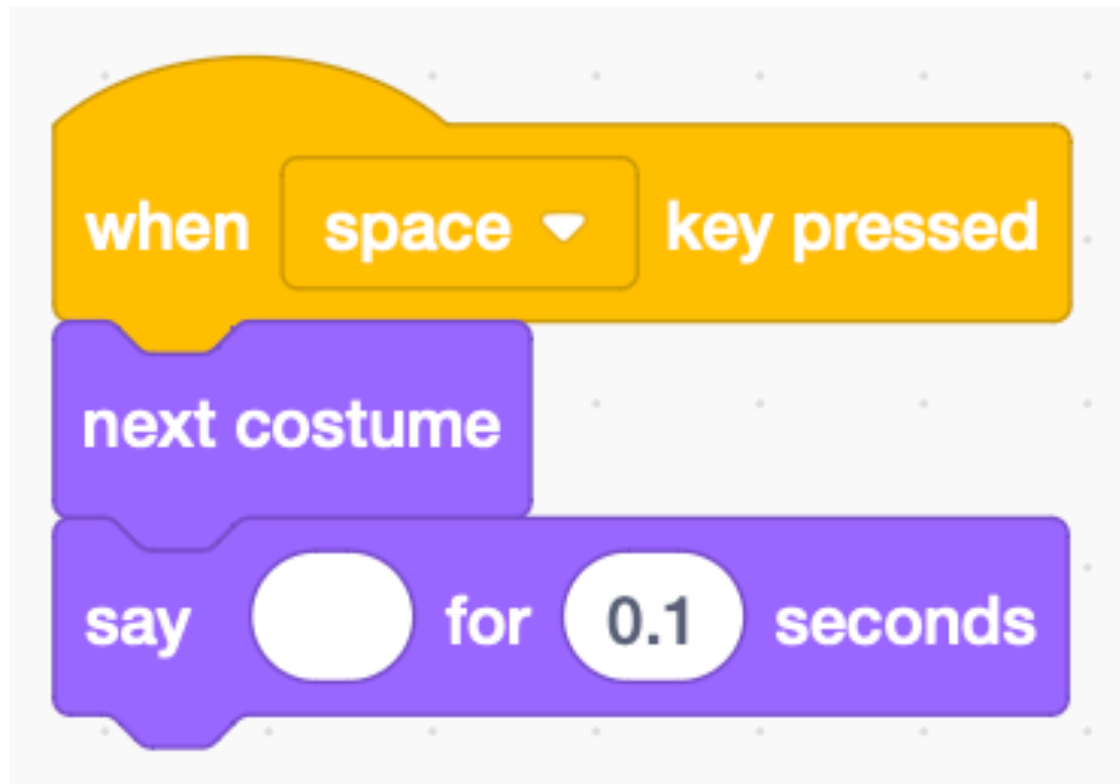
Testing Sprite (New Image)

Find these blocks in the palette:



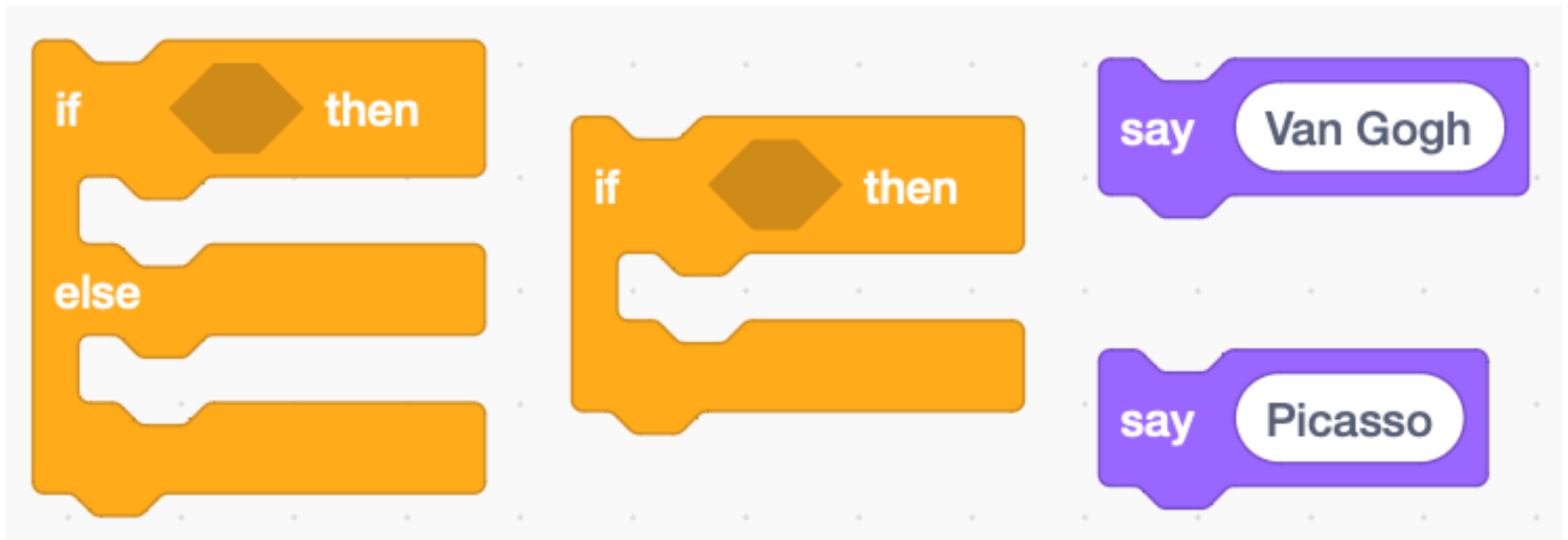
Testing Sprite (New Image)

Assemble the blocks as shown:



Testing Sprite (New Image)

Find these blocks in the palette:



Testing Sprite (New Image)

Assemble the blocks as shown:



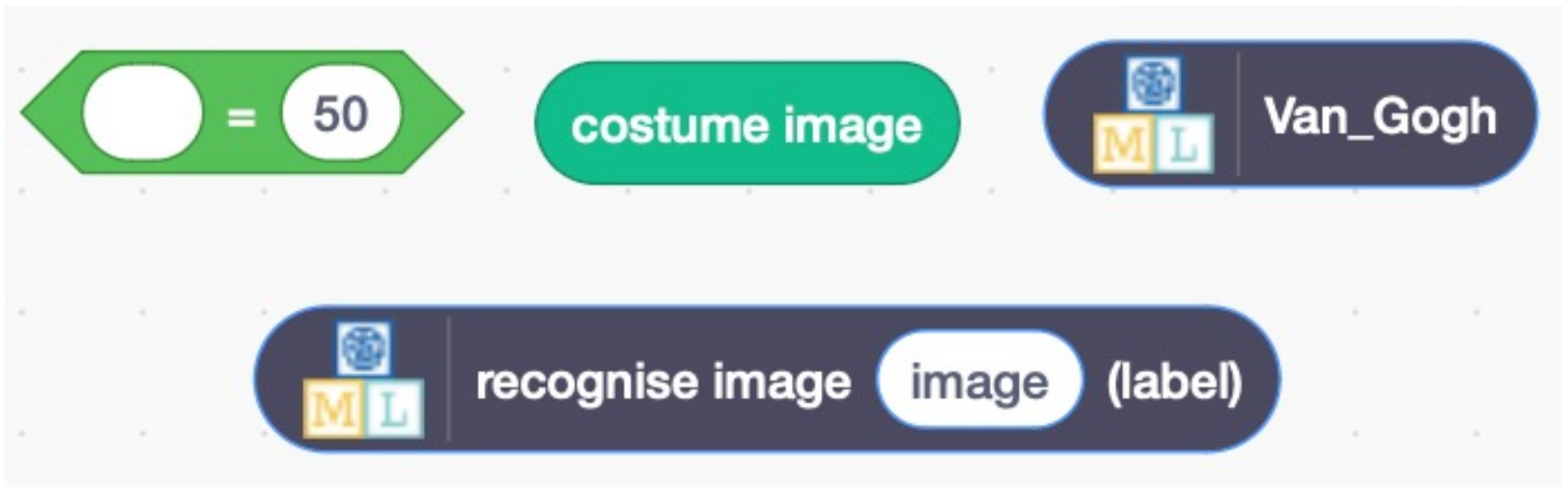
Testing Sprite (New Image)

Add these blocks into the code as shown:



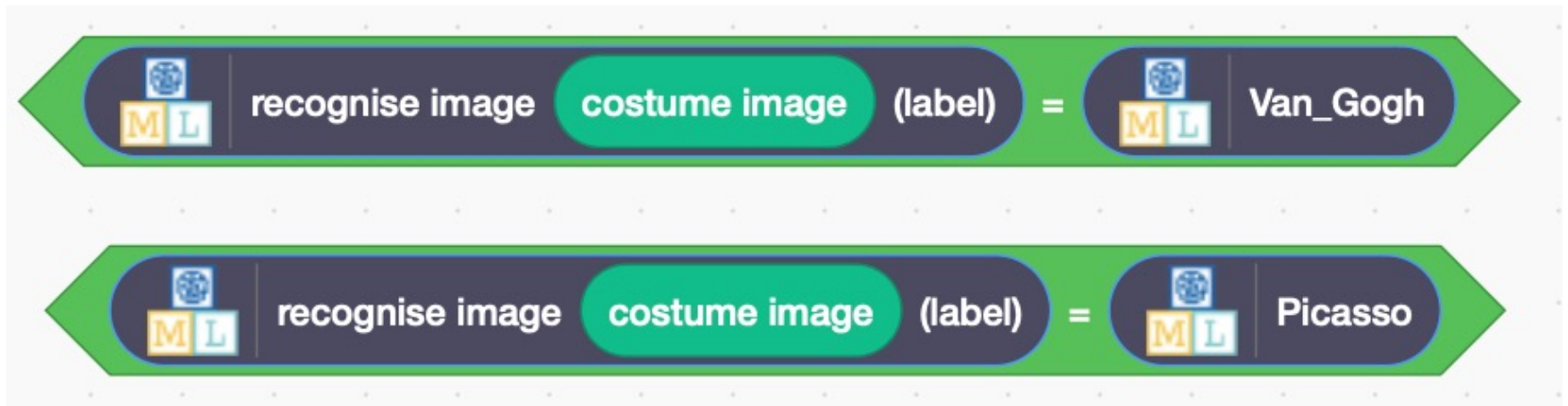
Testing Sprite (New Image)

Find these blocks in the palette:



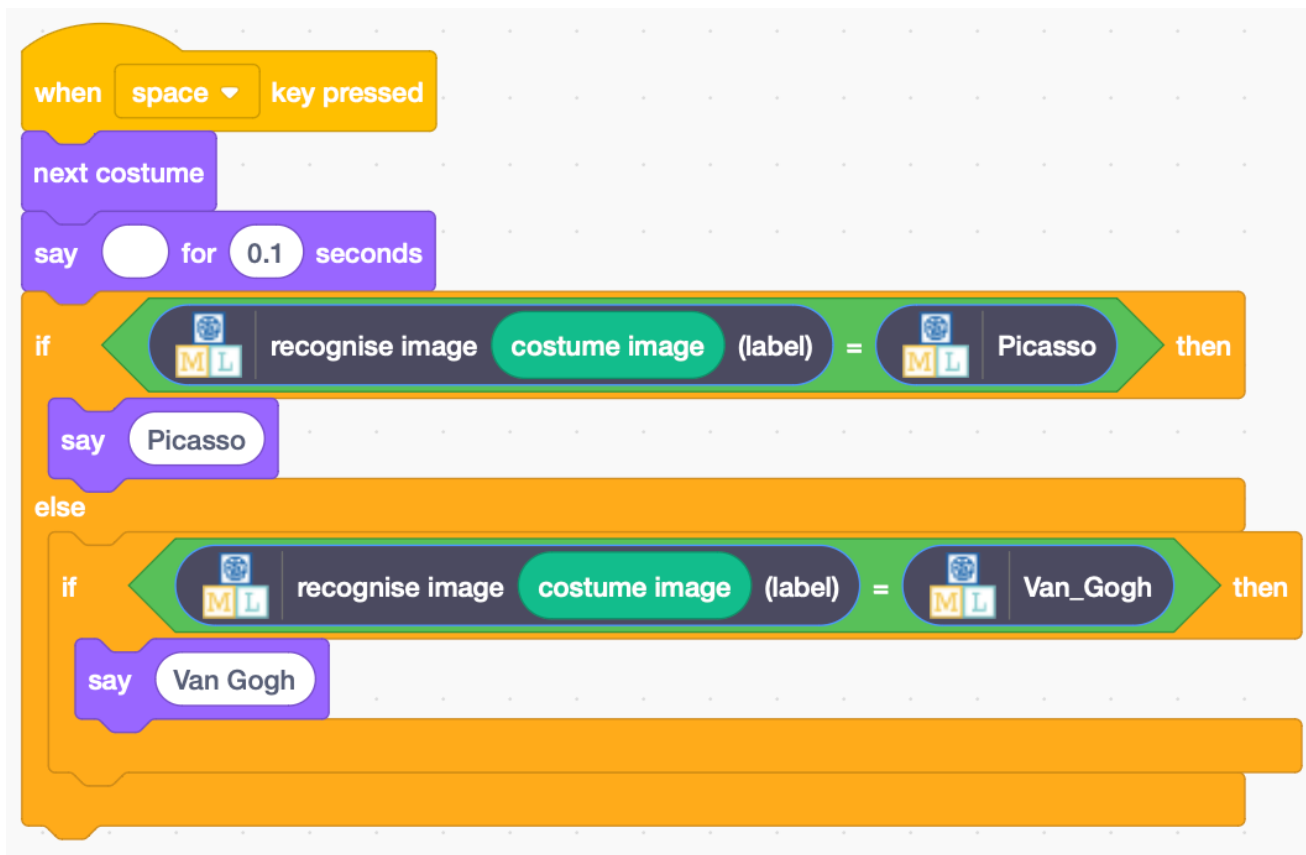
Testing Sprite (New Image)

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:

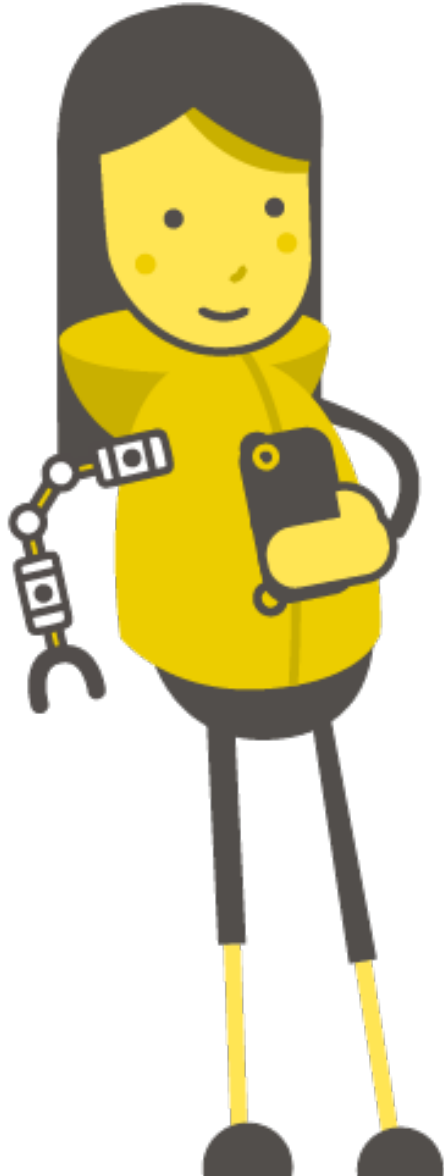


Extensions

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.



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!