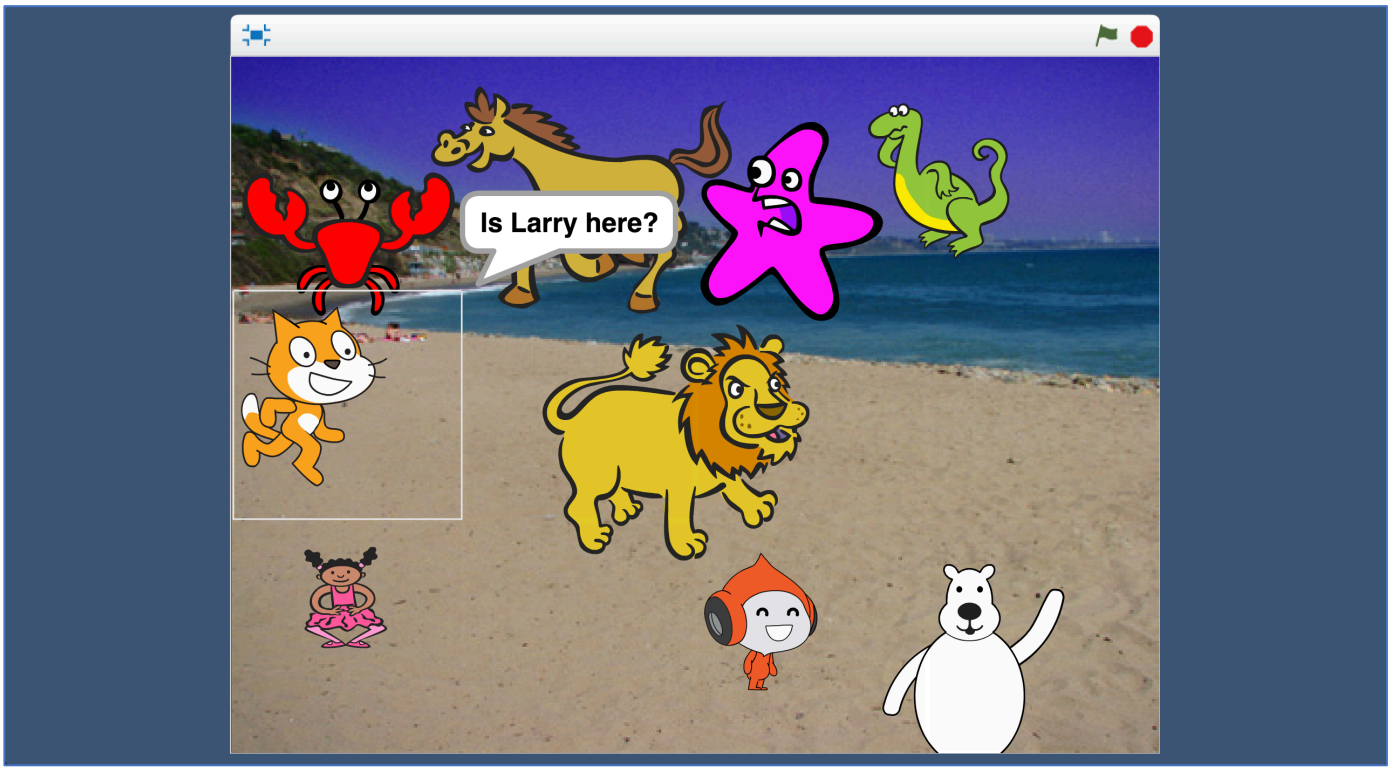
Locate Larry

In this project you will make a “Where’s Wally?” game (or “Where’s Waldo?” if you’re in the US).

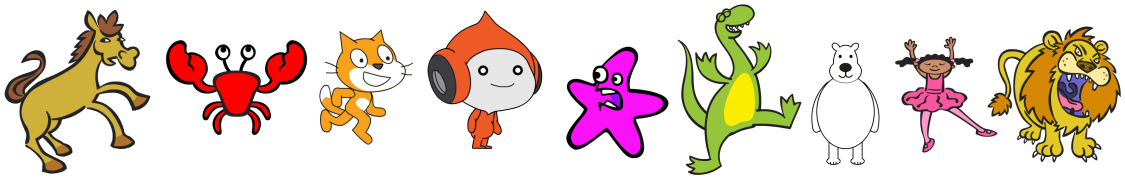
You’ll use a Scratch project that generates very simple “Where’s Wally?” style pictures – mixing up characters on a random background.

You’ll use the Scratch project to train the computer to be able to spot one of the characters in the scene.



1. Choose **one** of these characters

In this worksheet, I'll choose the Scratch Cat. But choose one that you like.



2. Think of a name for the character you chose

In this worksheet, I'll be using "Larry". But come up with your own name.

3. Go to https://machinelearningforkids.co.uk/ in a web browser

4. Click on "**Get started**"

5. Click on "**Log In**" and type in your username and password

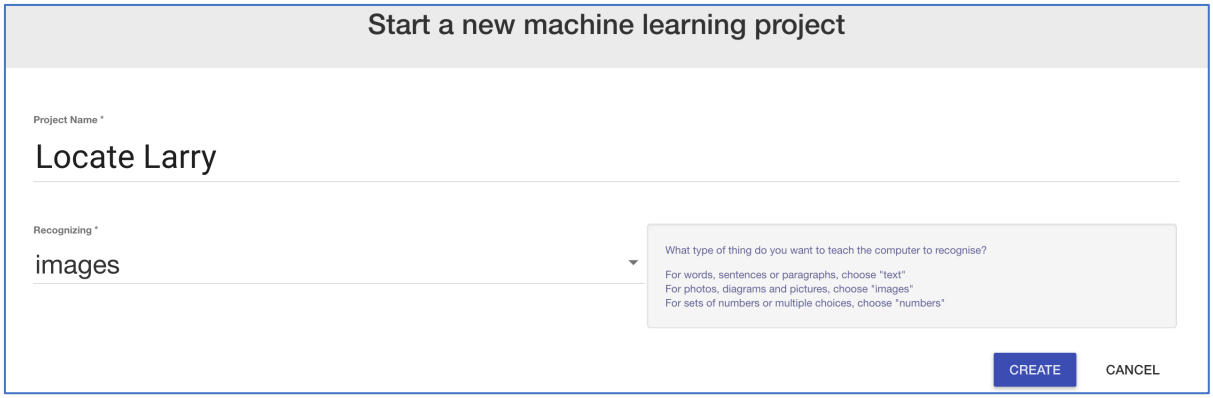
If you don't have a username, ask your teacher or group leader to create one for you.

If you can't remember your username or password, ask your teacher or group leader to reset it for you.

6. Click on "**Projects**" on the top menu bar

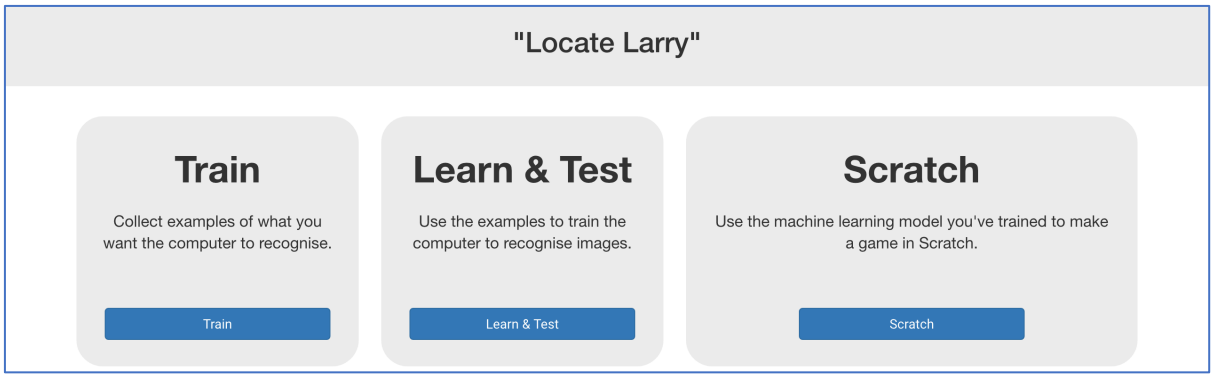
7. Click the **"+ Add a new project**" button.

8. Name your project "Locate Larry" and set it to learn how to recognise "**images**". Click the "**Create**" button



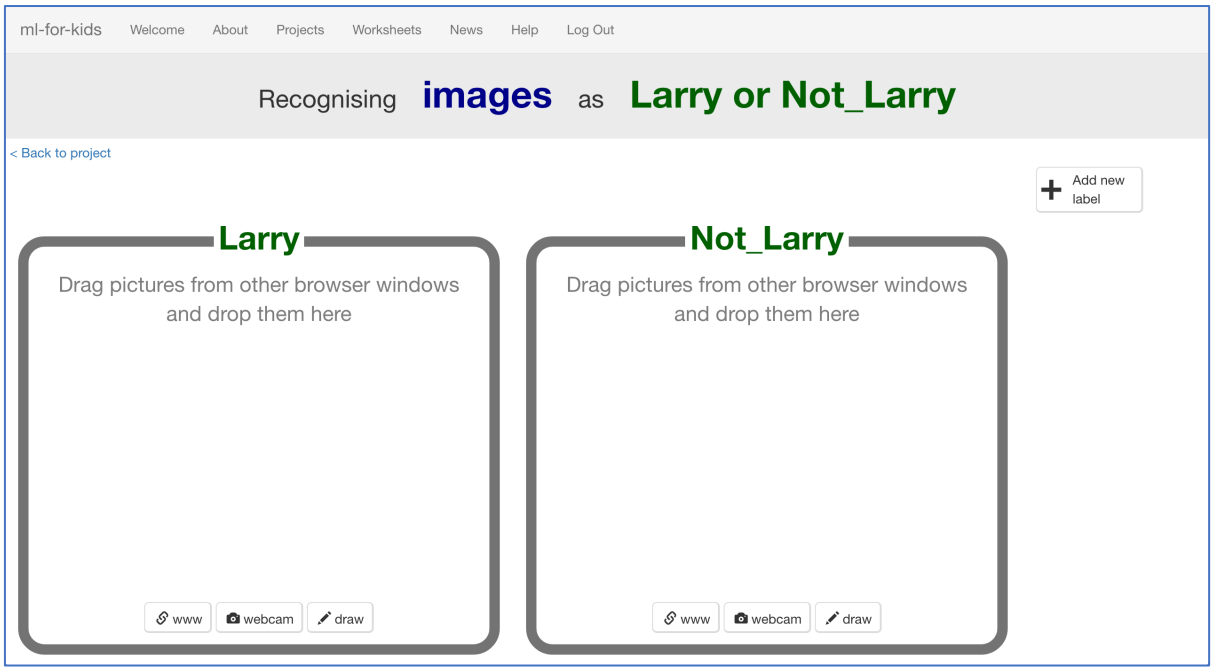
9. You should see "**Locate Larry**" in the list of your projects. Click on it.

10. Click the "**Train**" button



11. Click the "**+ Add new label**" button. Create a label with the name you chose for your character. (e.g. "Larry")

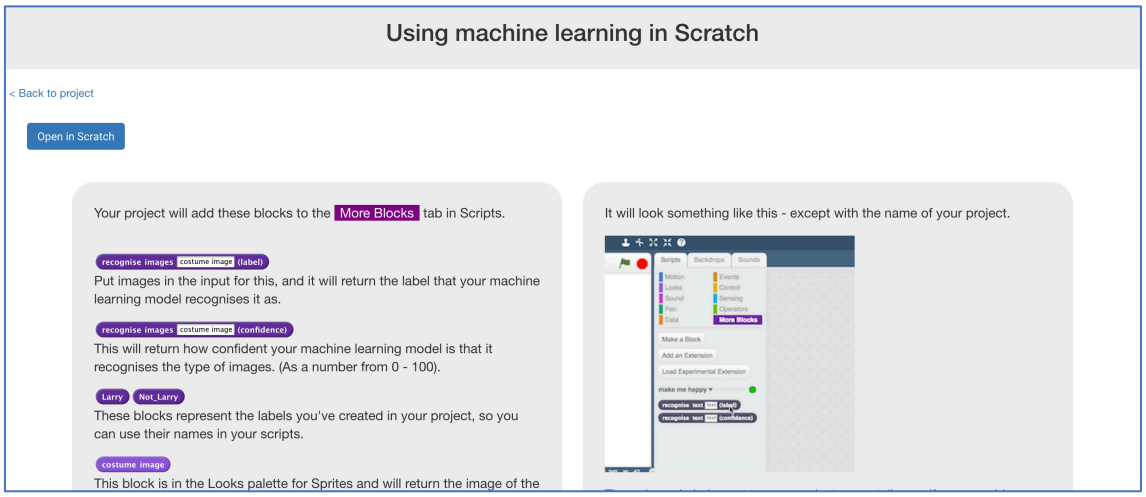
12. Click "**+ Add new label**" again. Create a label with the name "Not <Character Name>" (e.g. "Not Larry")



13. Click the "**< Back to project**" link

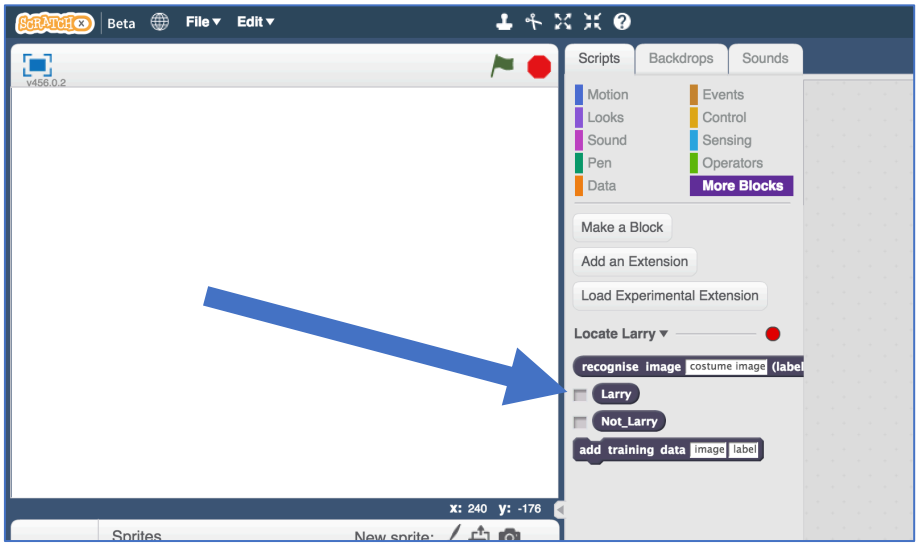
14. Click the "**Scratch**" button

15. Click the "**Open in Scratch**" button



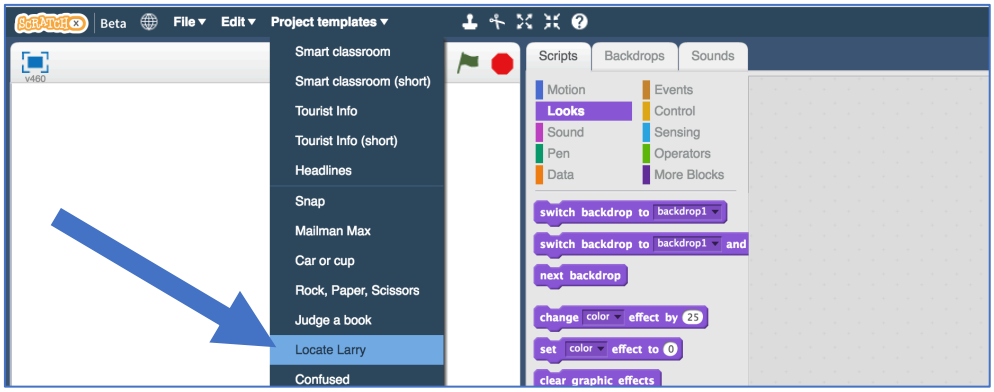
16. The page will warn you that you haven't done any machine learning yet. Click "**straight into Scratch**" to open Scratch anyway.

You should see four new blocks in the "More blocks" section.

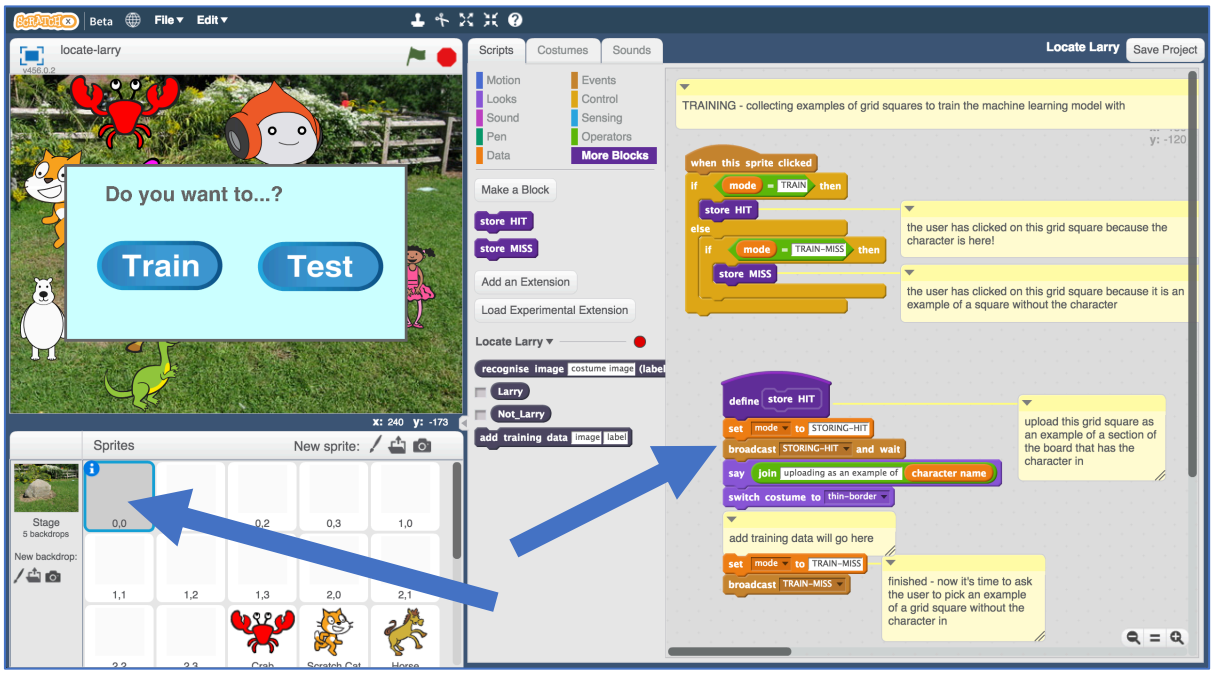


17. Open the Locate Larry project template

*Click "**Project templates**" -> "**Locate Larry**"*



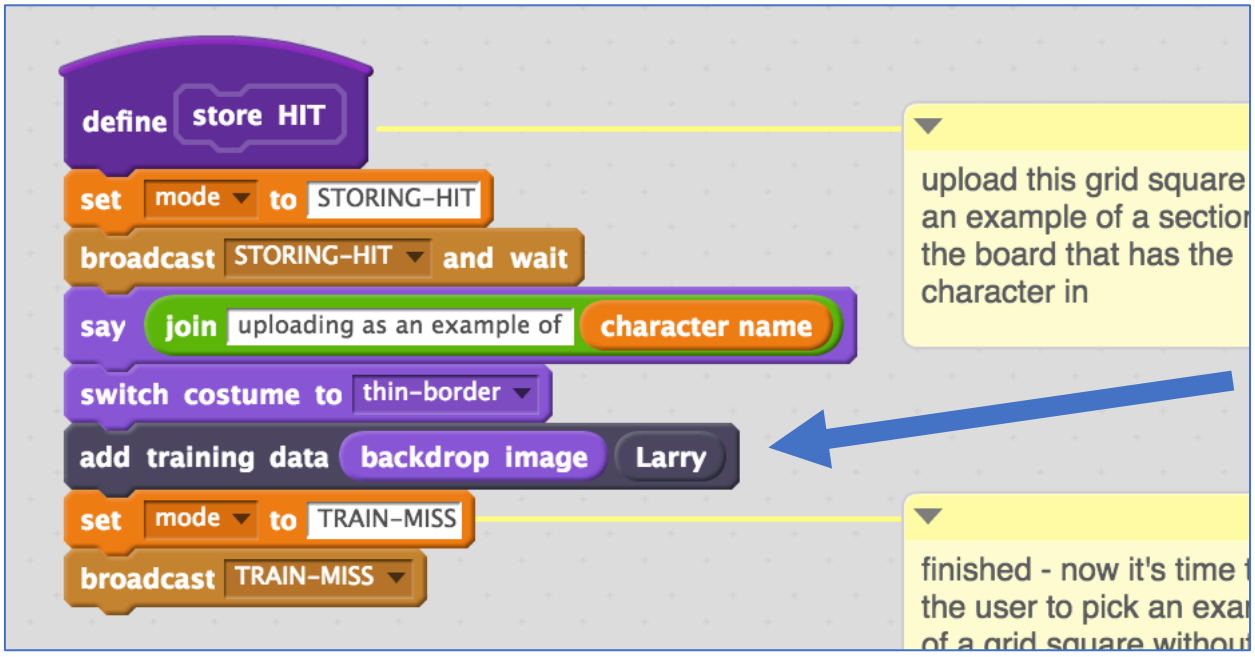
18. Click on the "**0,0**" sprite, and find the "**store HIT**" block



19. The "add training data will go here" comment is there to show you where you need to add a new block.

*Add the "**add training data**" block, and put "**backdrop image**" (from the "Looks" tab) and the name for your character in there.*

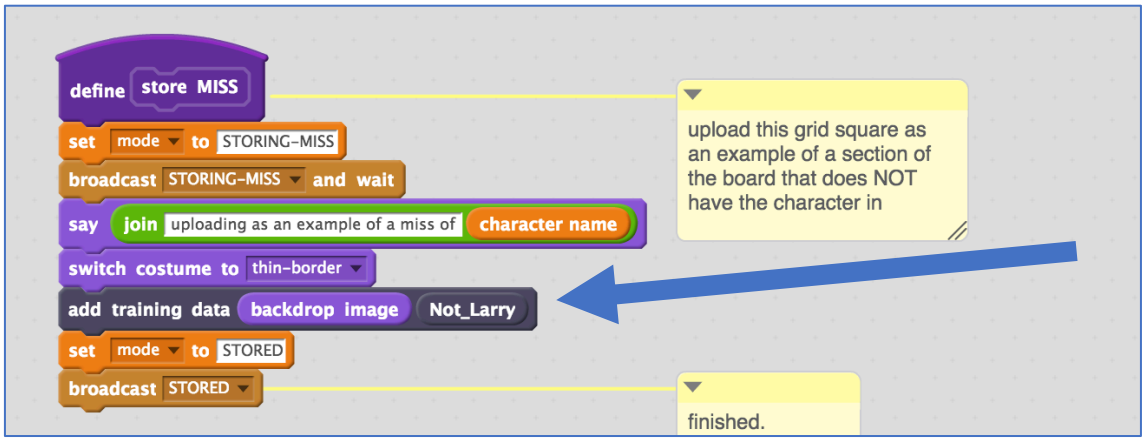
Make sure you join it all up!



20. Find the "store MISS" block script.

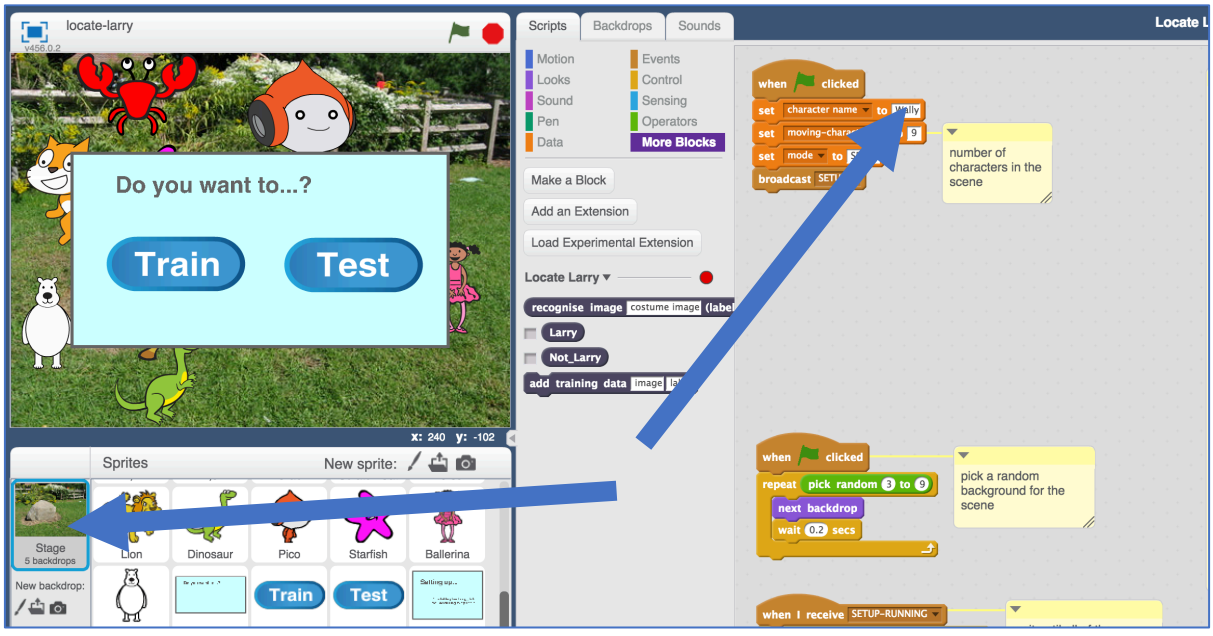
It should be just to the right of "store HIT" – you might need to scroll to it.

21. Put another "**add training data**" block where the comment is, like before. This time, you should use "Not Larry" instead of "Larry"
This will be the name you've chosen, not "Larry".
Make sure you join the script up again.

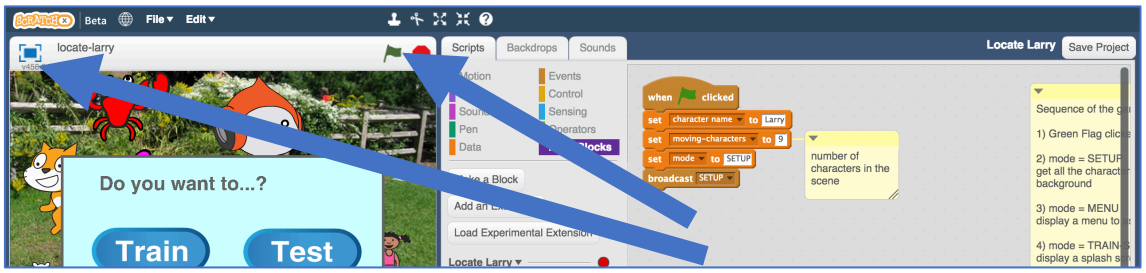


22. Do that again for all the other grid square sprites:
0,1 0,2 0,3 1,0 1,1 1,2 1,3 2,0 2,1 2,2 2,3
Make sure you do all twelve sprites!
Deleting comments first to get them out of the way might help.
*Remember: put the "**Name**" of your character in "store **HIT**" and put the "**Not** Name" one in "store **MISS**"*

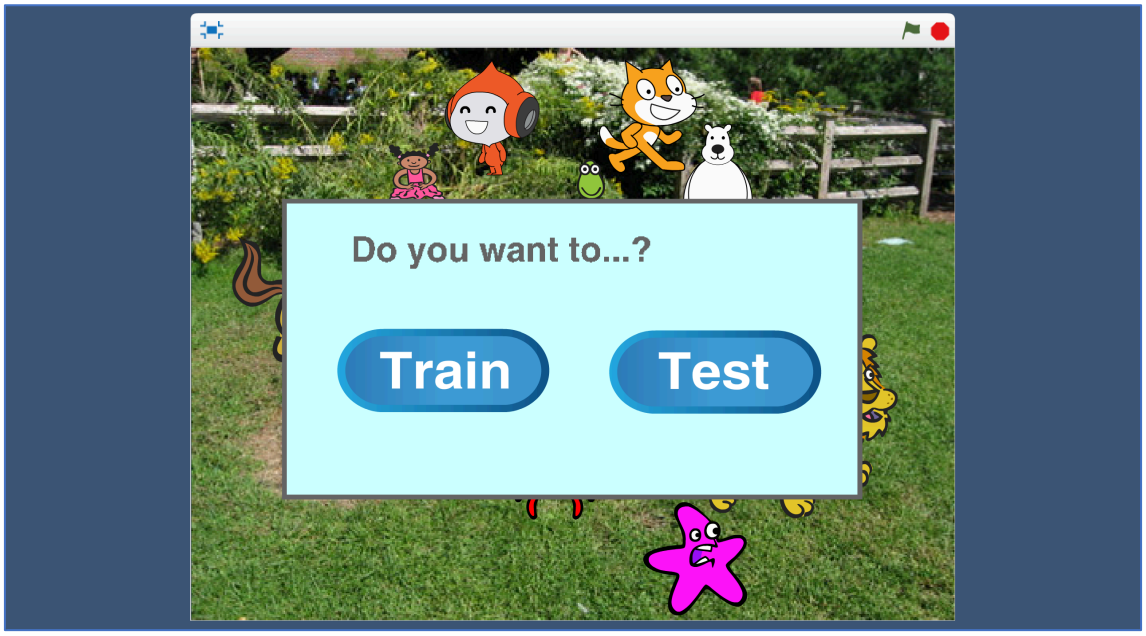
23. Click on "**Stage**" and type your character name in the script



24. Click on “full screen” and then click the Green Flag



25. The script will pick a random background, and shuffle the characters (choosing a random size, position and costume for them).
Click “**Train**”



Click “**OK**”

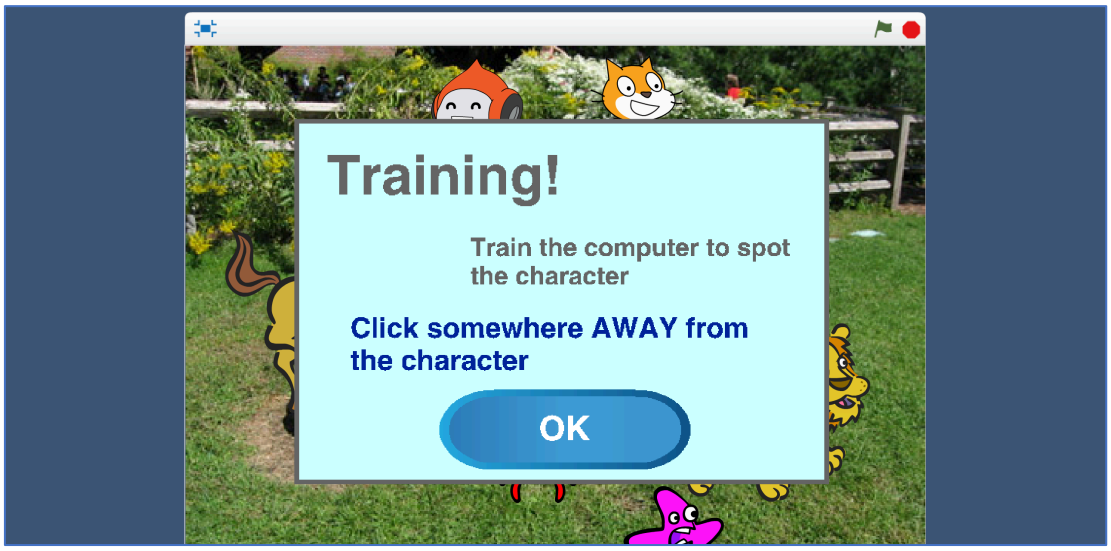
26. Click on the character that you chose before

We're training the computer how to find the character you chose – so clicking on it will collect an example of what they look like.

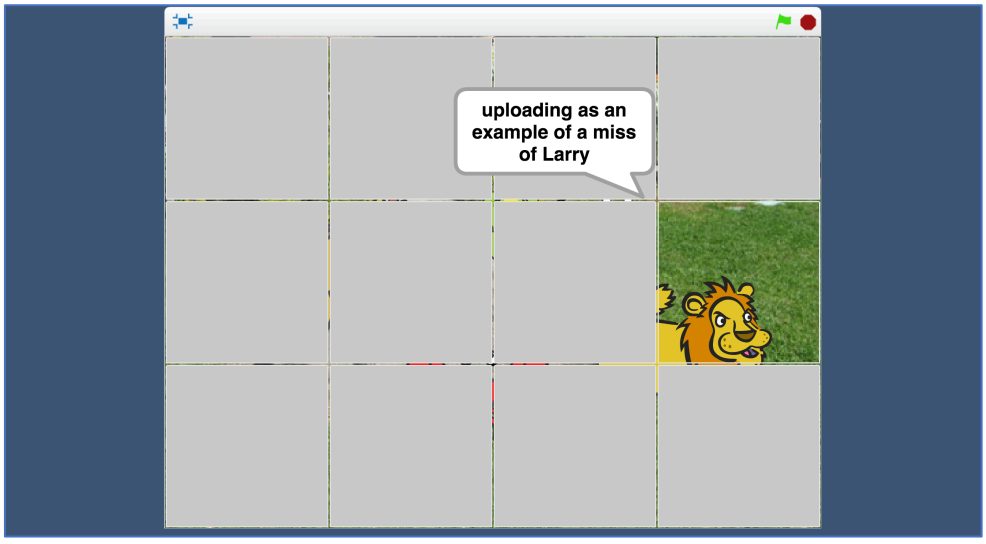
e.g. click here

27. Next, you need to collect an example of an area of the stage that **doesn't** have the character you chose.

Click "OK"

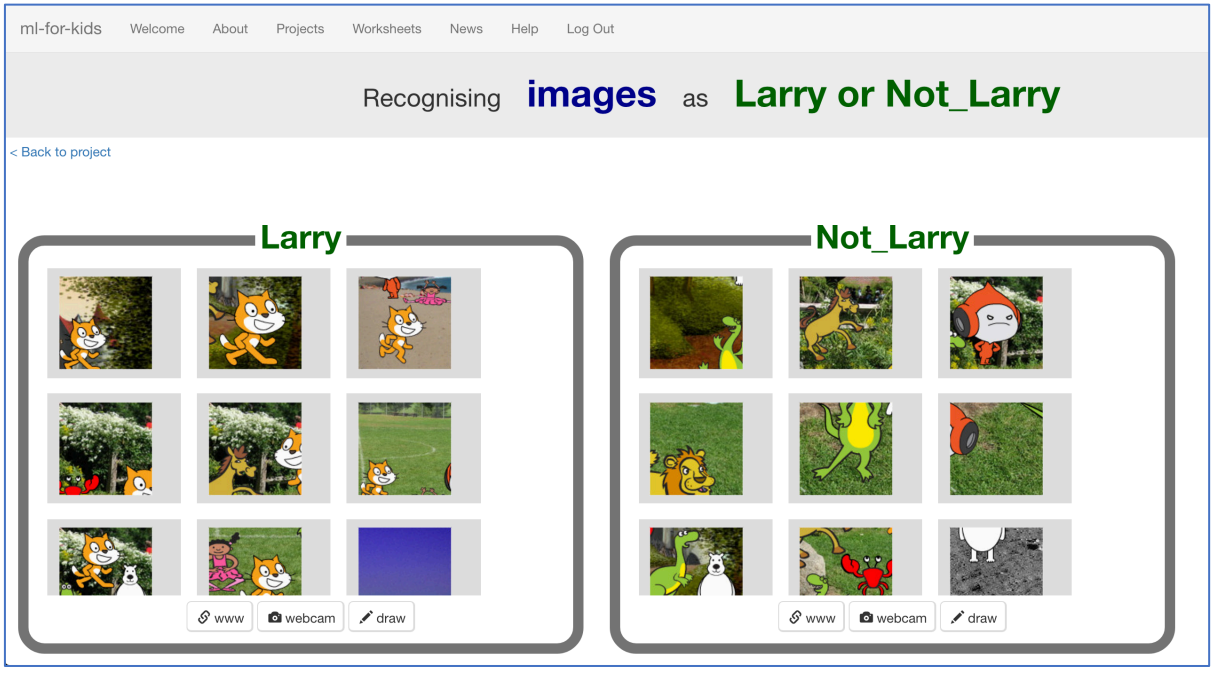


28. Click any area that your character definitely isn't in



29. Go back to the main training tool window. *(Leave Scratch open!)*
Click "**< Back to project**" and then click the "**Train**" button.
You should see the two training images you just uploaded from Scratch

30. Go back your Scratch window.
Click the Green Flag to collect another two training examples.
*Collect **ten (pairs of)** examples.*

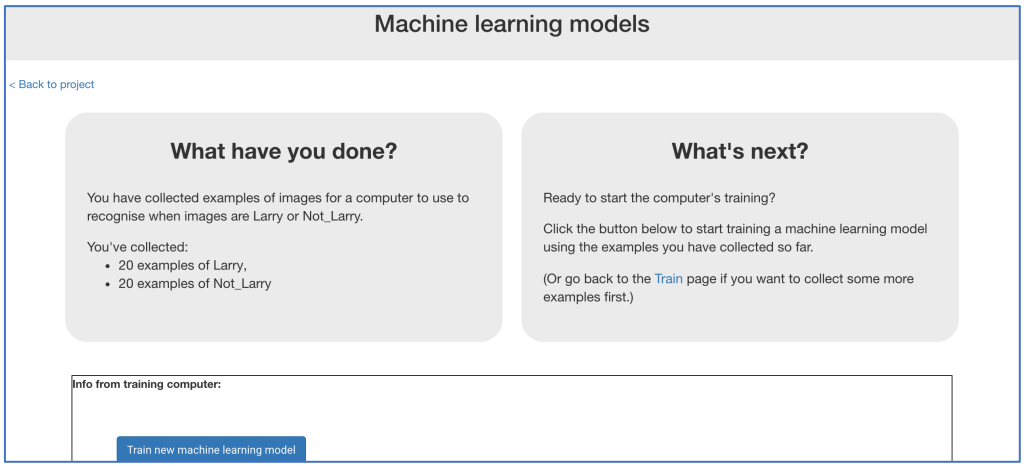


31. Save your Scratch project, and then close the Scratch window
*Click "**File**" -> "**Save project**"*

32. Click "**< Back to project**" and then click the "**Learn & Test**" button

33. Click the "**Train new machine learning model**" button

As long as you've collected enough examples, the computer should start to learn how to recognise your character from the examples.



34. Click "**< Back to project**" and then click the "**Scratch**" button

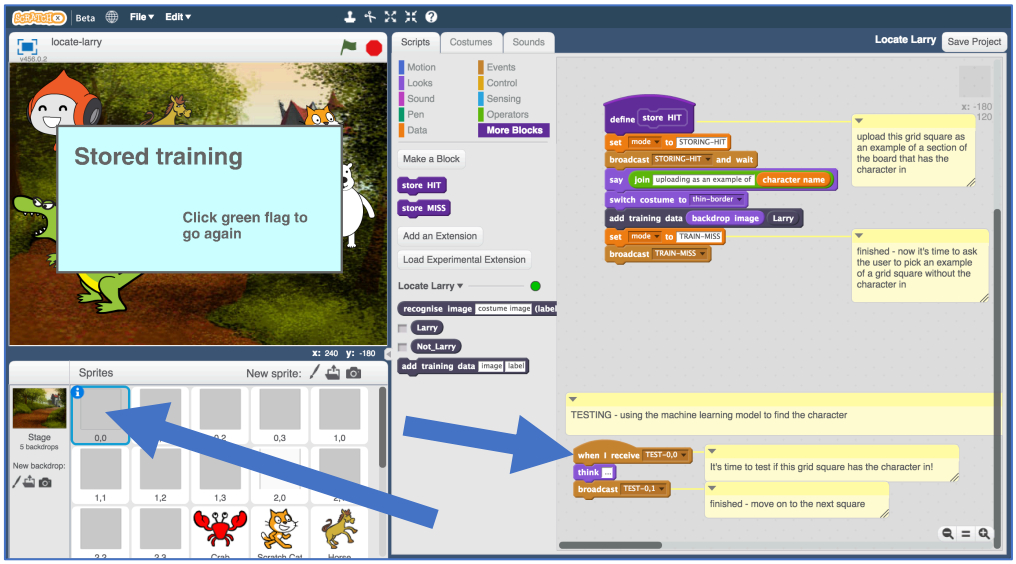
35. Click "**Open in Scratch**"

36. Open the Scratch project you saved earlier

*Click "**File**" -> "**Load Project**"*

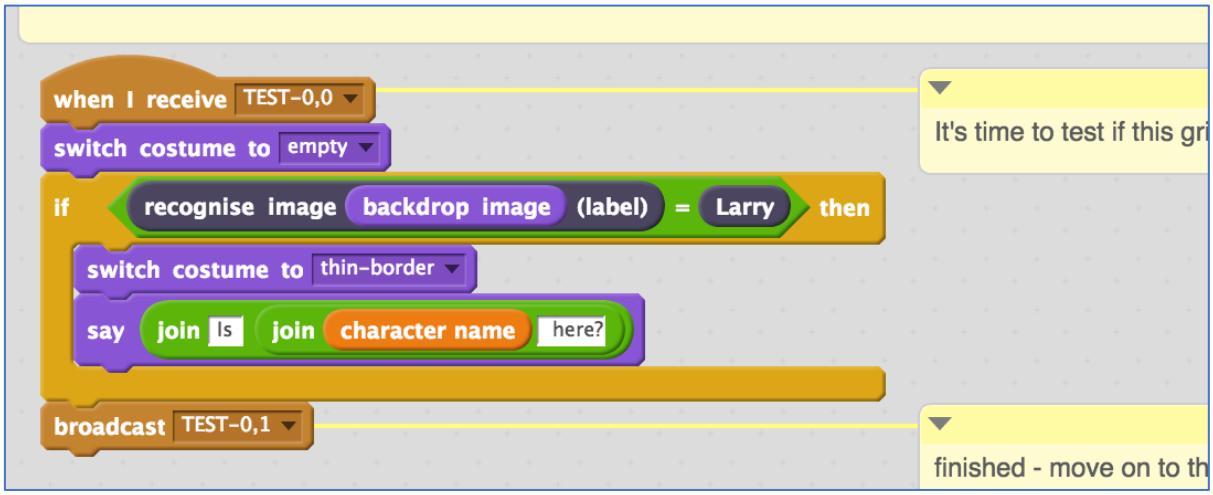
37. Click the "**0,0**" sprite, and find the "**when I receive TEST-0,0**" script

It will be at the very bottom. You might need to scroll down to it.



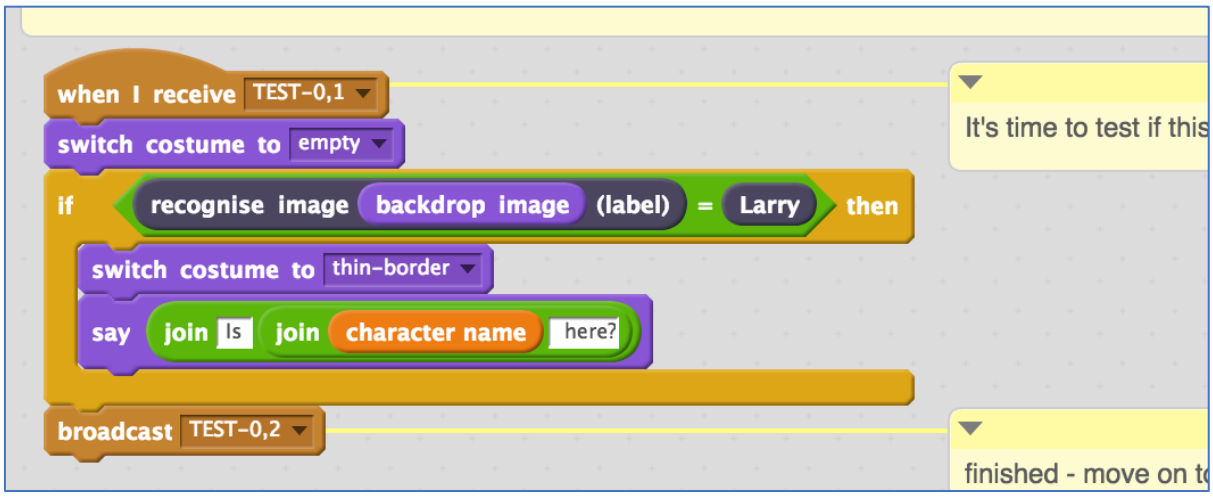
38. Update the script to look like this

Keep "when I receive" and "broadcast" at the top and bottom.
Fill in the new script in the middle



39. Click on the "0,1" sprite, and do the same again

The "when I receive" and "broadcast" values are different to before, but the script in between the top and bottom is the same!



40. Do that again for all the other grid square sprites:

0,2 0,3 1,0 1,1 1,2 1,3 2,0 2,1 2,2 2,3

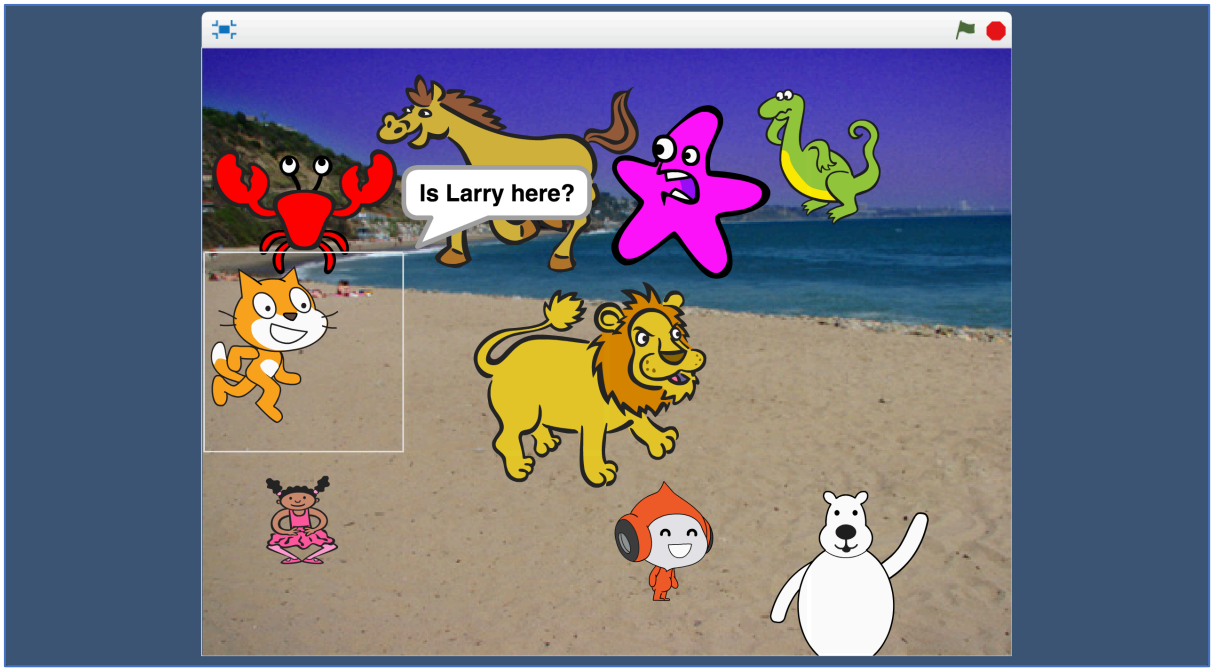
Make sure you do all twelve sprites!

Make sure you don't change the "when I receive" and "broadcast" values, as they need to be different for every grid square.

41. It's time to test!

Click the "full-screen" button, and then click the Green Flag.

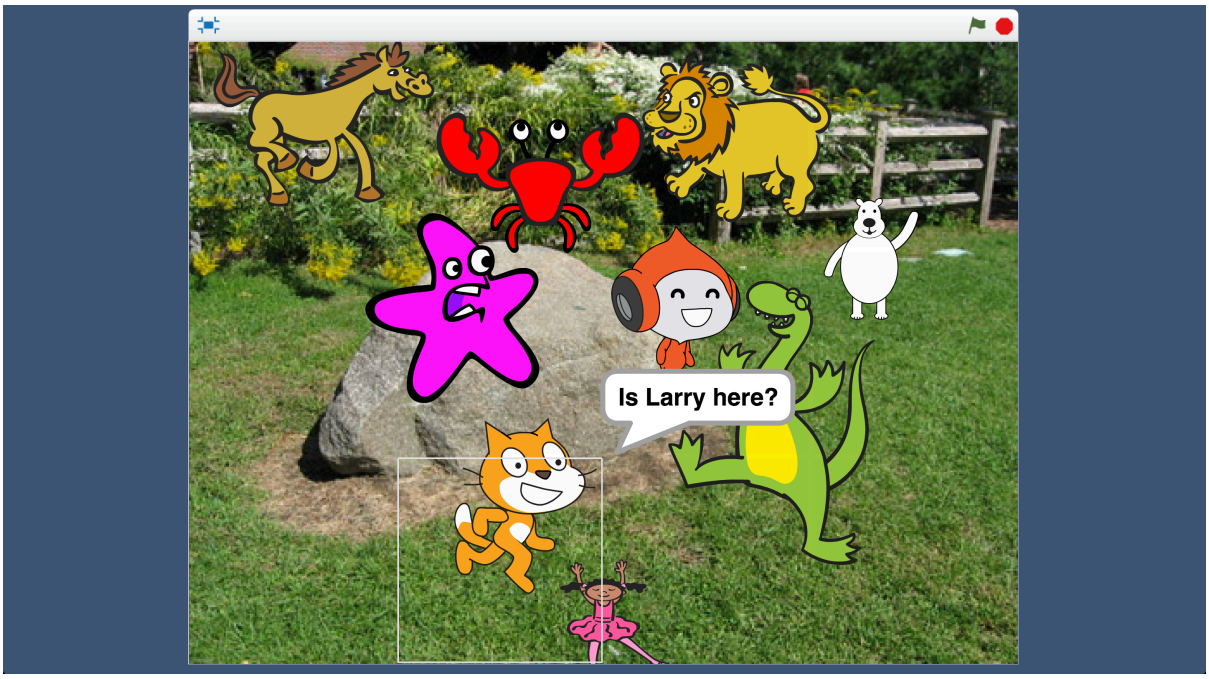
42. Click "**Test**"



43. Did it work?

Try it a couple of times, and see how good it is at finding your character.

44. If it's not getting it right, click the Green Flag and then click Train a few times to collect more examples.
*You **need to train a new machine learning model again** to use the new examples.*



What have you done?

You've trained a machine learning model to be able to recognise a character in a picture.

You don't just want to know if the character is in the picture, but where in the picture they are. To do this, the picture was cut up into twelve squares, and you used the machine learning model to check each of the twelve squares individually.

Did you know?

What you've made in Scratch is a common approach for finding things in pictures.

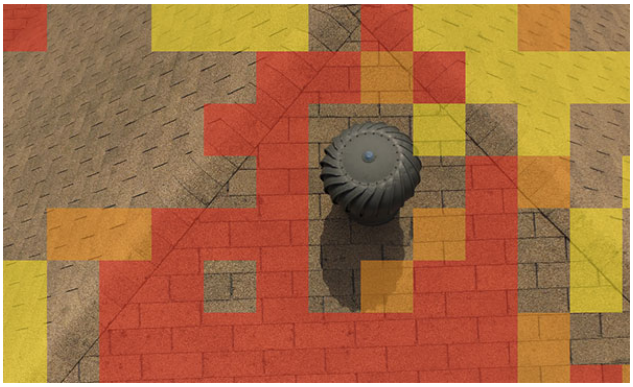
Quickly understanding water usage in times of drought

In 2015, during a state of emergency caused by a drought in California, a machine learning model was used to find lawns, swimming pools, & other features that affect water usage.

By cutting the satellite images for the whole state into small squares, each one could be individually classified. Combining this with a map meant they could quickly understand the impact on water usage across the state.

Identifying building and maintenance issues

Examples include using a drone to take photos of a roof and quickly identifying damaged roof tiles.



And taking a high-resolution photo of a bridge and identifying areas of rust.