



Virtual Pet

In this project you will make a virtual pet.

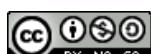
You'll need to feed it to stop it getting too hungry, give it drinks to stop it getting too thirsty, and show it love to stop it getting too sad.

You'll do that by showing it actions through your webcam. But first, you'll need to train your virtual pet to recognise those actions, using machine learning.

The virtual pet artwork in this project was drawn by Grace Lane.

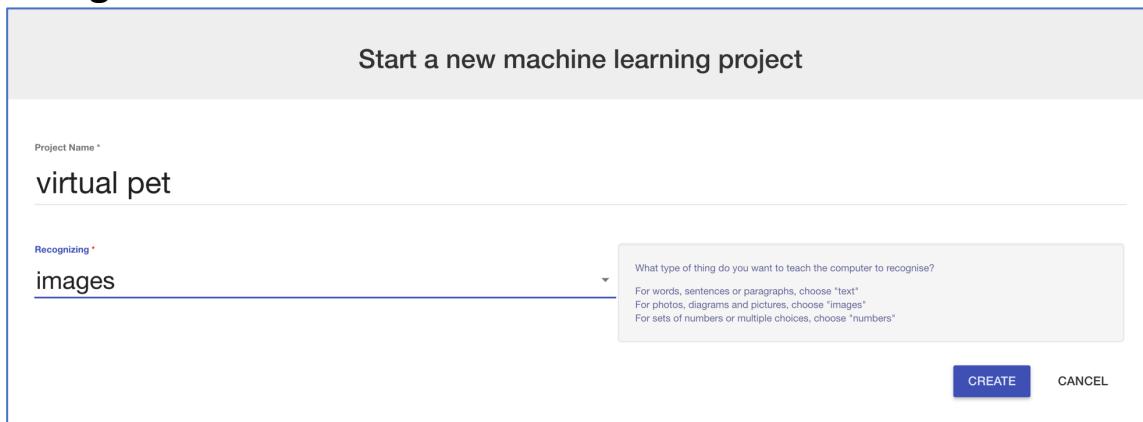
The screenshot shows the Scratch workspace with the following details:

- Stage:** A pink, spiky cat-like sprite named "flobzy" is holding a red apple. It has large black eyes and a smiling mouth. To its right are three status bars: "sadness" (4), "thirst" (19), and "hunger" (16).
- Script Area:** The script for "flobzy" contains several procedures:
 - recognise photo:** This procedure uses the "recognise image" block to identify three categories: "PICTURE-eat" (when costume image is PICTURE-eat), "PICTURE-drink" (when costume image is PICTURE-drink), and "PICTURE-love" (when costume image is PICTURE-love). It then performs the corresponding action (eat, drink, or love) if the confidence level is above 75%.
 - key pressed:** This event triggers when a key is pressed. It checks if the state is not STATE-DEAD and if the action is ACTION-WAITING. If so, it calls the "recognise photo" procedure.
- Scratch Editor:** The left sidebar shows the Scratch editor with categories like Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks, and Images. The "Code" category is selected.
- Backpack:** The bottom left corner shows the backpack containing the "flobzy" sprite and a "webcam" backdrop.



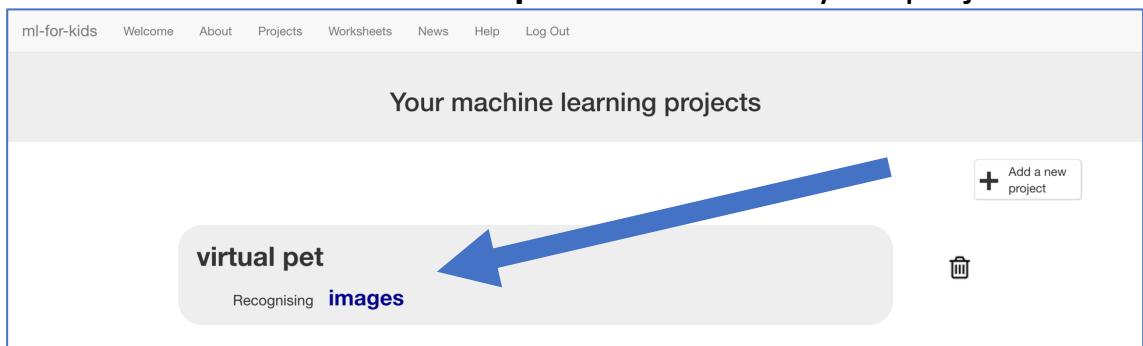
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- 1.** Go to <https://machinelearningforkids.co.uk/> in a web browser
- 2.** Click on “**Get started**”
- 3.** Click on “**Log In**” and type in your username and password
If you can't remember your password, ask your teacher to reset it for you.
- 4.** Click on “**Projects**” on the top menu bar
- 5.** Click the “**+ Add a new project**” button.
- 6.** Name your project “virtual pet” and set it to learn how to recognise “**images**”. Click the “**Create**” button



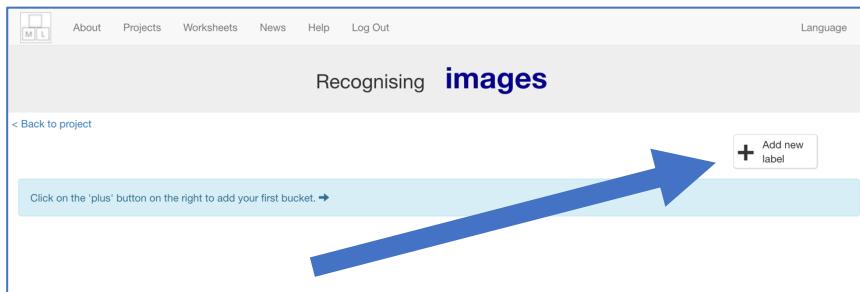
The screenshot shows a dialog box titled "Start a new machine learning project". It has two main sections: "Project Name *" and "Recognizing *". In the "Project Name" field, "virtual pet" is typed. In the "Recognizing" dropdown, "images" is selected. To the right of these fields is a help text box asking "What type of thing do you want to teach the computer to recognise?". Below the help text are three options: "For words, sentences or paragraphs, choose "text"" (which is not selected), "For photos, diagrams and pictures, choose "images"" (which is selected), and "For sets of numbers or multiple choices, choose "numbers"" (which is not selected). At the bottom right of the dialog are "CREATE" and "CANCEL" buttons.

- 7.** You should see “**virtual pet**” in the list of your projects. Click on it.



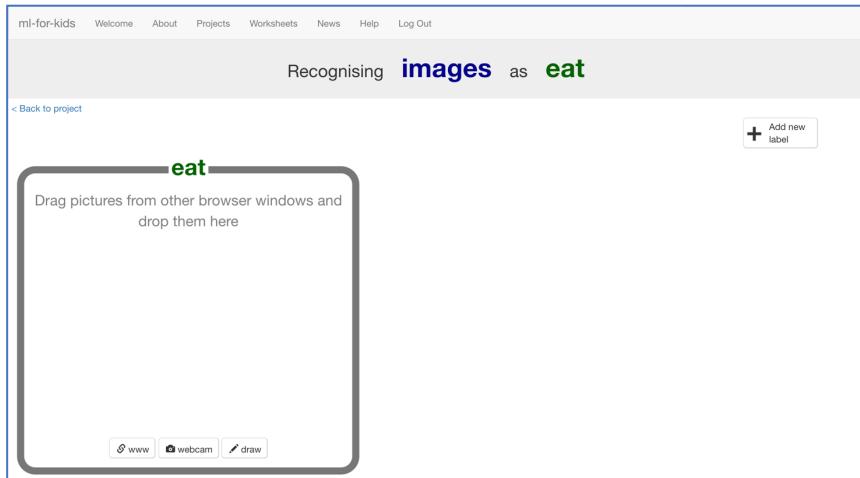
- 8.** Click the “**Train**” button

9. Click “+ Add new label”



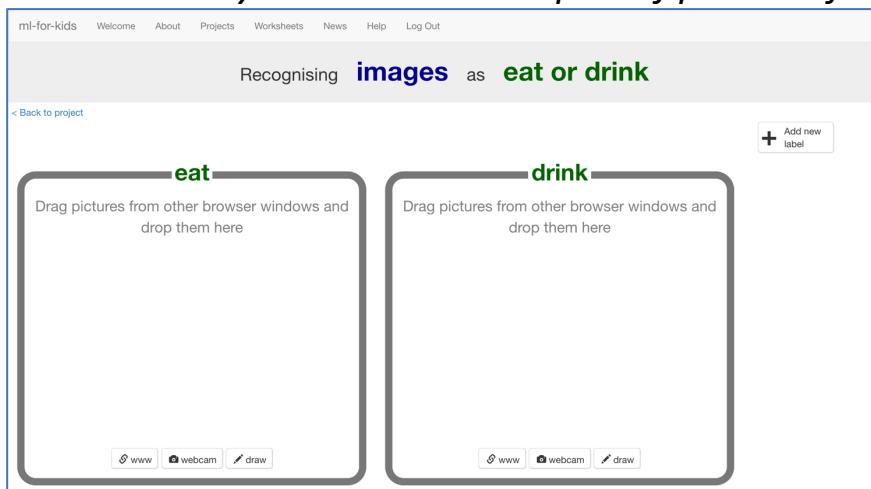
10. Type in “eat”, and press “Add”

This is where you'll collect examples of pictures of food for your virtual pet



11. Click “+ Add new label” again, type in “drink”, and press “Add”

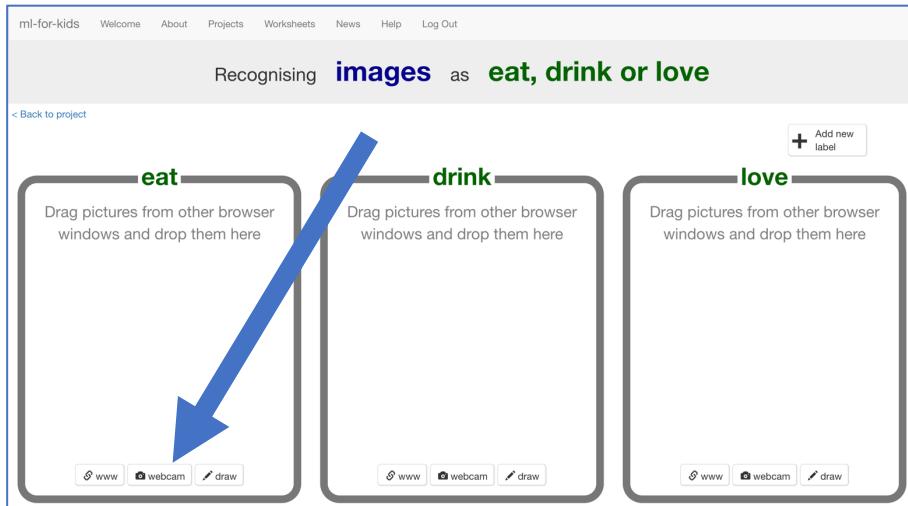
This is where you'll collect examples of photos of drink for your virtual pet



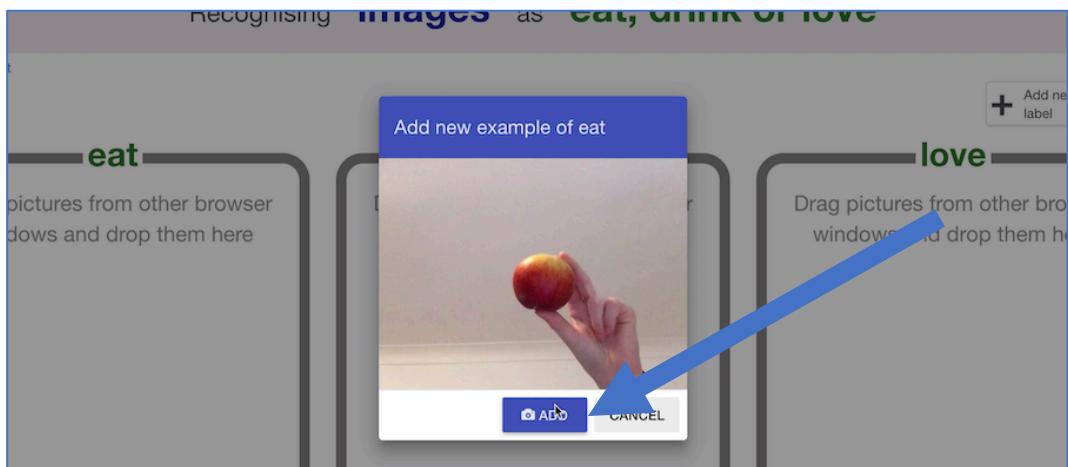
12. Click “+ Add new label” again, type in “love”, and press “Add”

This is where you'll collect examples of pictures of showing love to your virtual pet.

13. Click the “webcam” button in the “eat” bucket

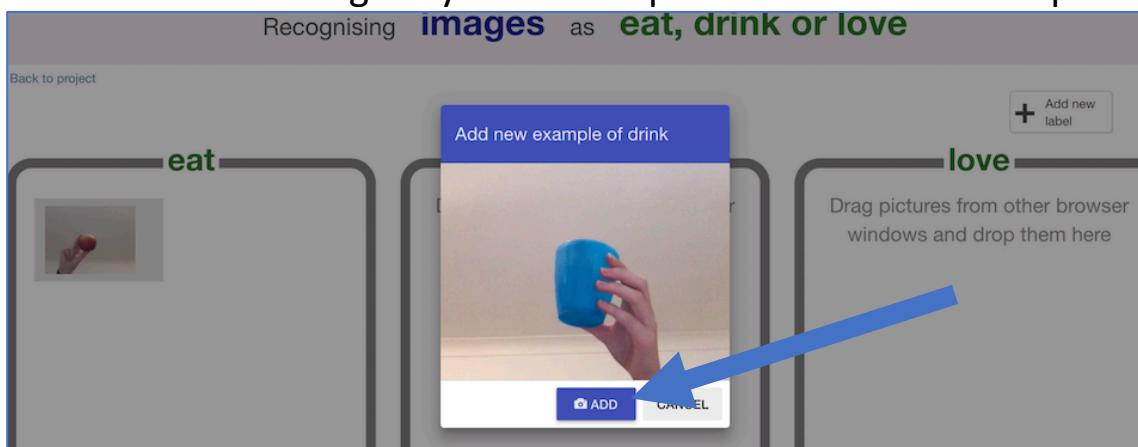


14. Find something for your virtual pet to eat and hold it to the webcam Click “Add”



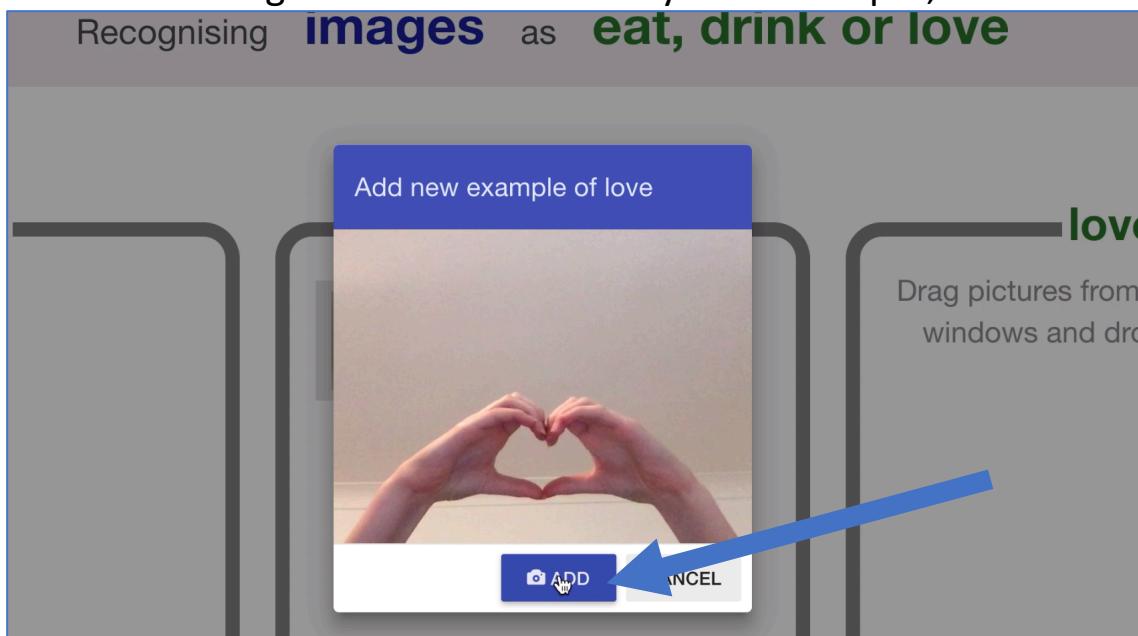
15. Click the “webcam” button in the “drink” bucket

16. Find something for your virtual pet to drink and take a photo of it.



17. Click on the “**webcam**” button in the “**love**” bucket

18. Make a sign that shows love for your virtual pet, and take a photo
Recognising **images** as **eat, drink or love**

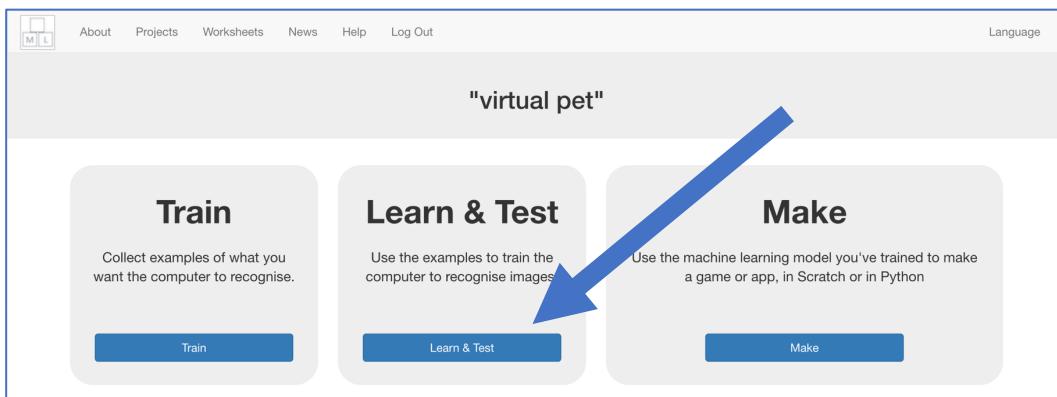


19. Repeat until you have **ten examples** of each action

A screenshot of a web-based application interface titled 'Recognising **images** as **eat, drink or love**'. The interface features three main sections: 'eat', 'drink', and 'love', each containing a grid of 10 small images. Below each section is a green circle with the number '10'. At the bottom of each section are buttons for 'www', 'webcam', and 'draw'. A 'Back to project' link is located above the 'eat' section. A 'Language' dropdown is in the top right. A 'Add new label' button is in the top right corner of the main area.

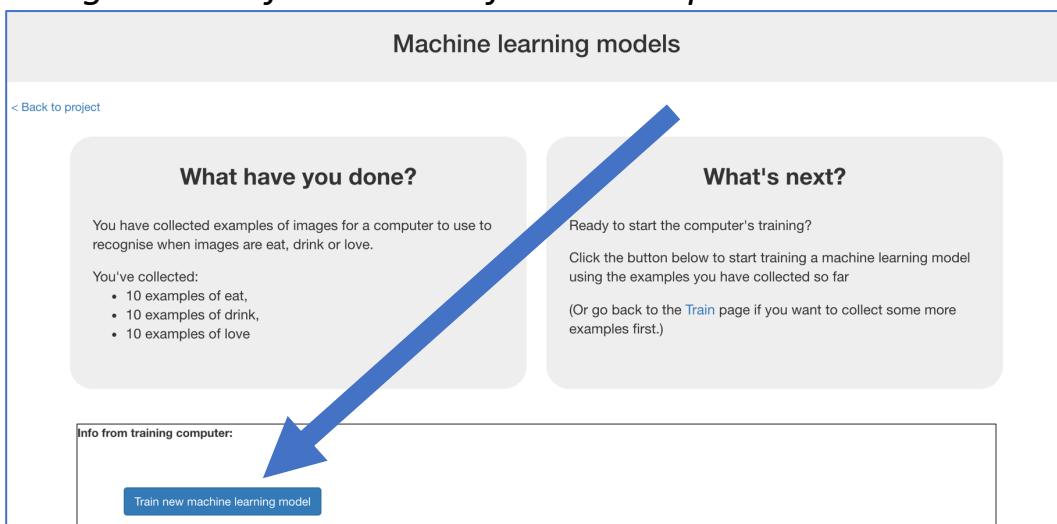
20. Click the “< Back to project” link

21. Click the “Learn & Test” button



22. Click the “Train new machine learning model” button

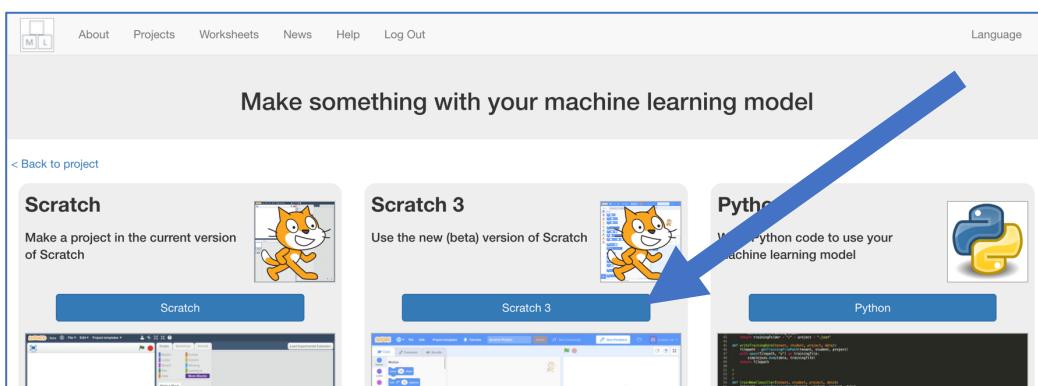
It might take a few minutes for the computer to train



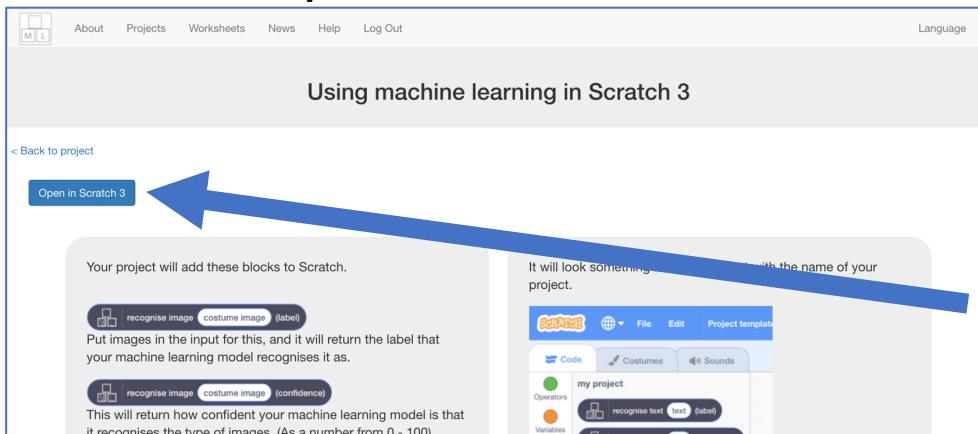
23. Click the “< Back to project” link

24. Click the “Make” button

25. Click the “Scratch 3” button



26. Click the “Open in Scratch 3” button



27. Click the “Train new machine learning model” button

It might take a few minutes for the model to train.

What have you done so far?

You've started to train a computer to recognise whether photos of a face and photos of a covered face. You are doing it by taking example photos. These examples are being used to train a machine learning “model”.

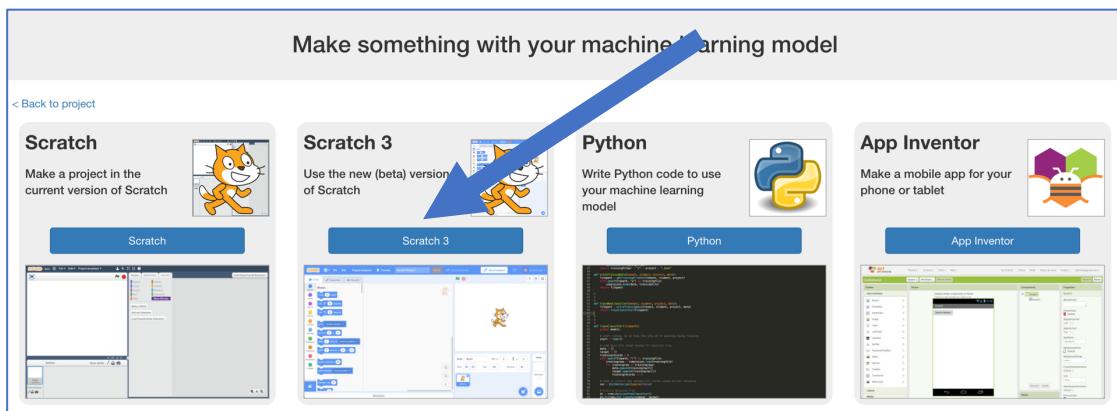
This is called “supervised learning” because of the way you are supervising the computer’s training.

The computer will learn from patterns in the shapes and colours in each of the photos you’ve given it. These will be used to recognise new photos.

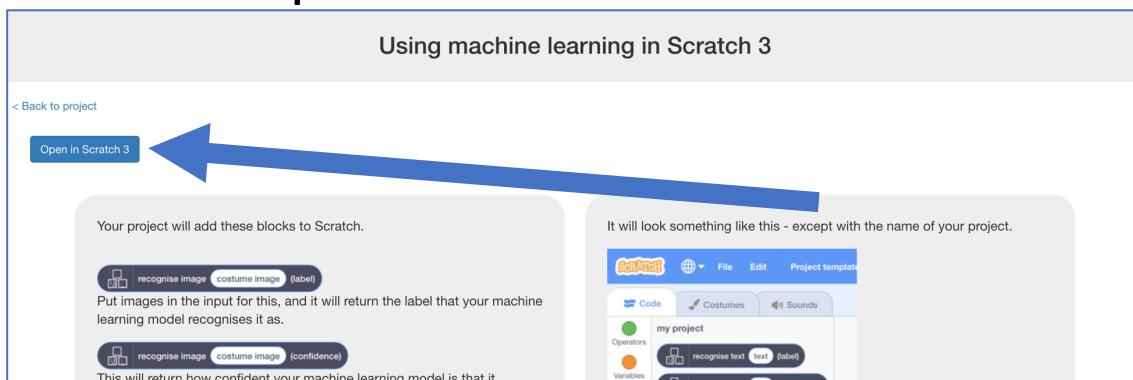
28. Click “< Back to project”

29. Click the “Make” button

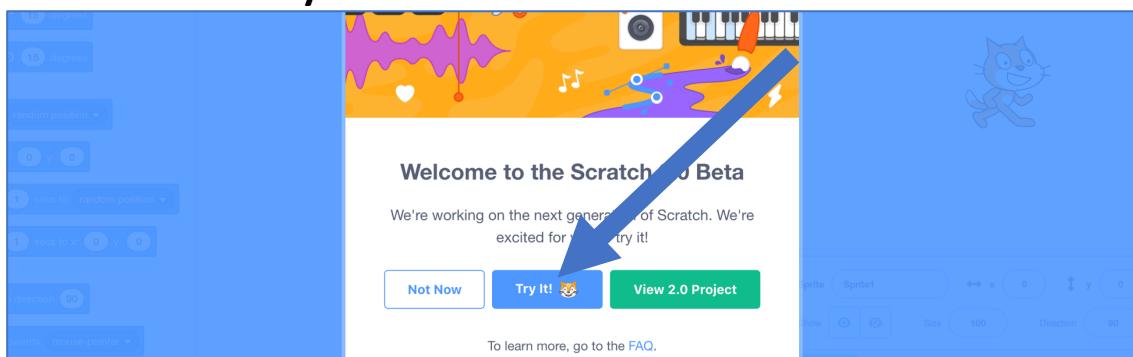
30. Click “Scratch 3”



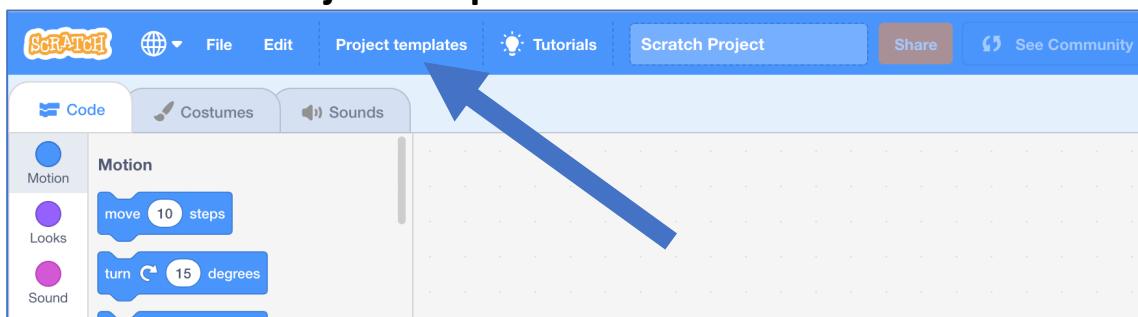
31. Click on “Open in Scratch 3”



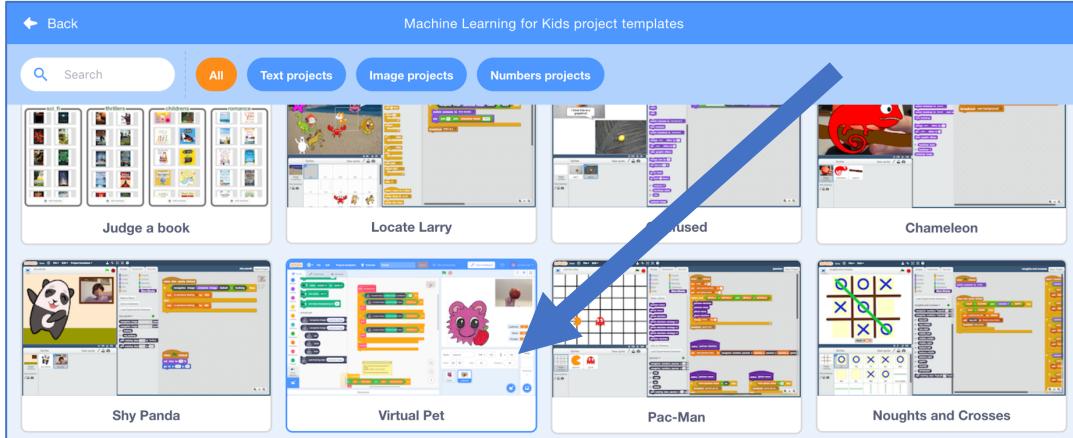
32. Click on “Try it!”



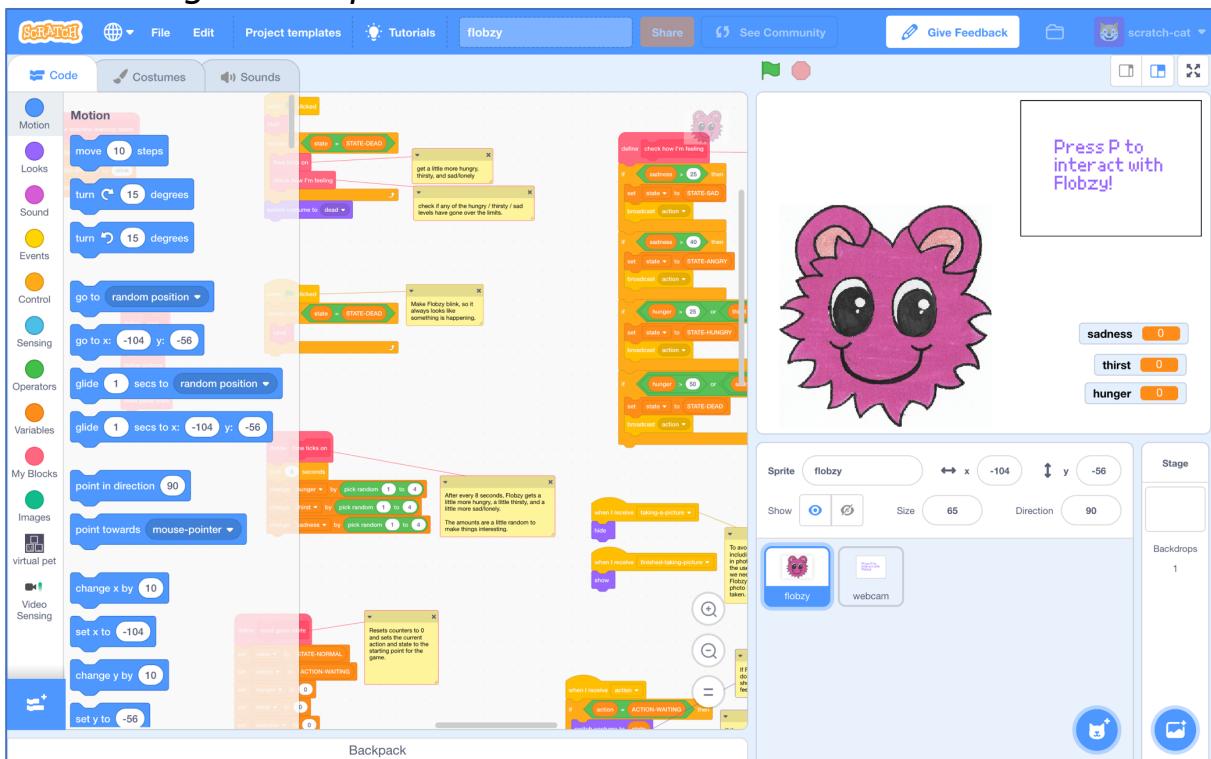
33. Click on “Project templates”



34. Click on the “Virtual Pet” template
You might need to scroll down to it
If your browser asks for permission to use the web-cam, click Allow

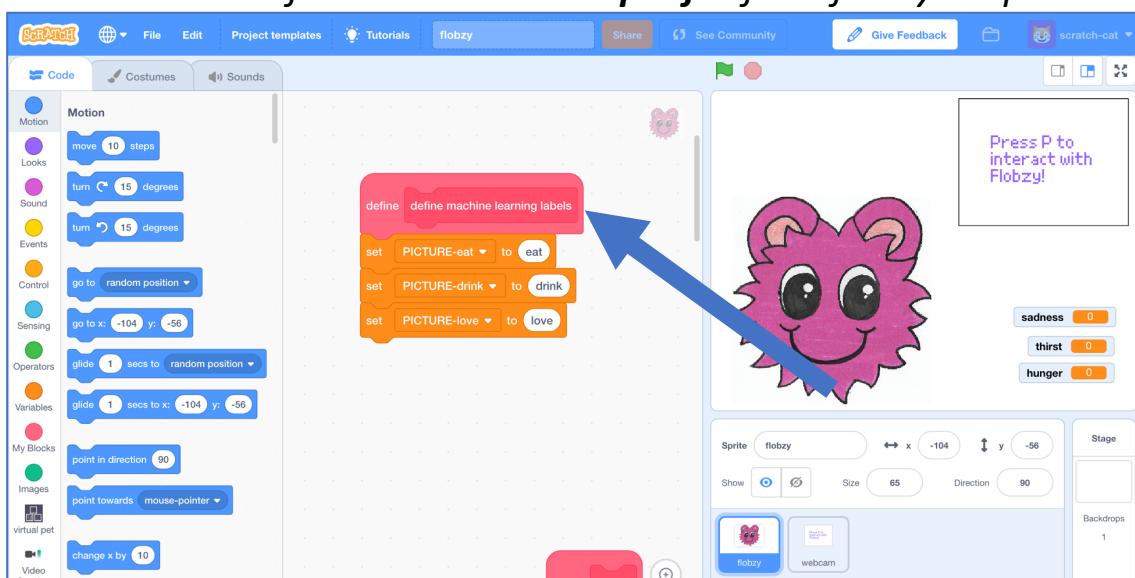


35. The project template has a virtual pet called “Flobzy”.
It has three variables shown on the stage. They will keep increasing over time, and if they get too high, it'll be game over.
“hunger” will go down if you give it food
“thirst” will go down if you give it a drink
“sadness” will go down if you show it love
You'll do that by taking photos with the webcam.
But first, you'll need to add your machine learning model to the project so it can recognise the photos.

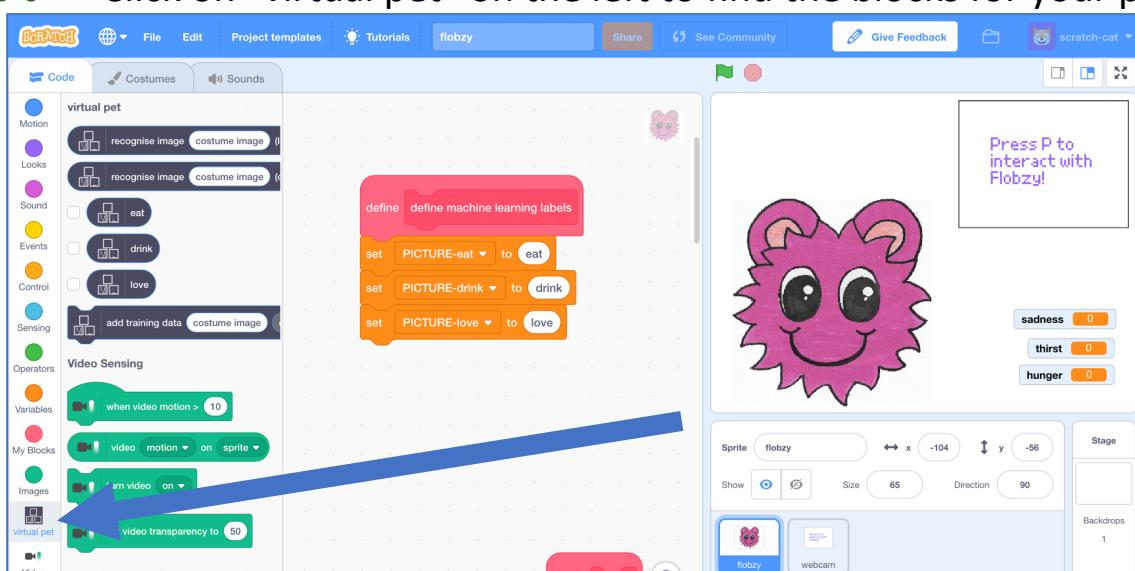


36. Find the “define machine learning labels” script

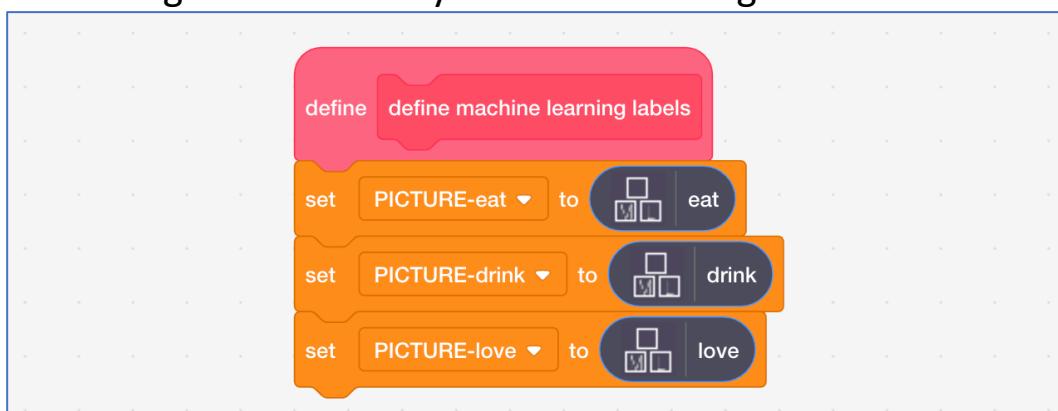
Scroll around to find it. It’s at the top left of the flobzy scripts.



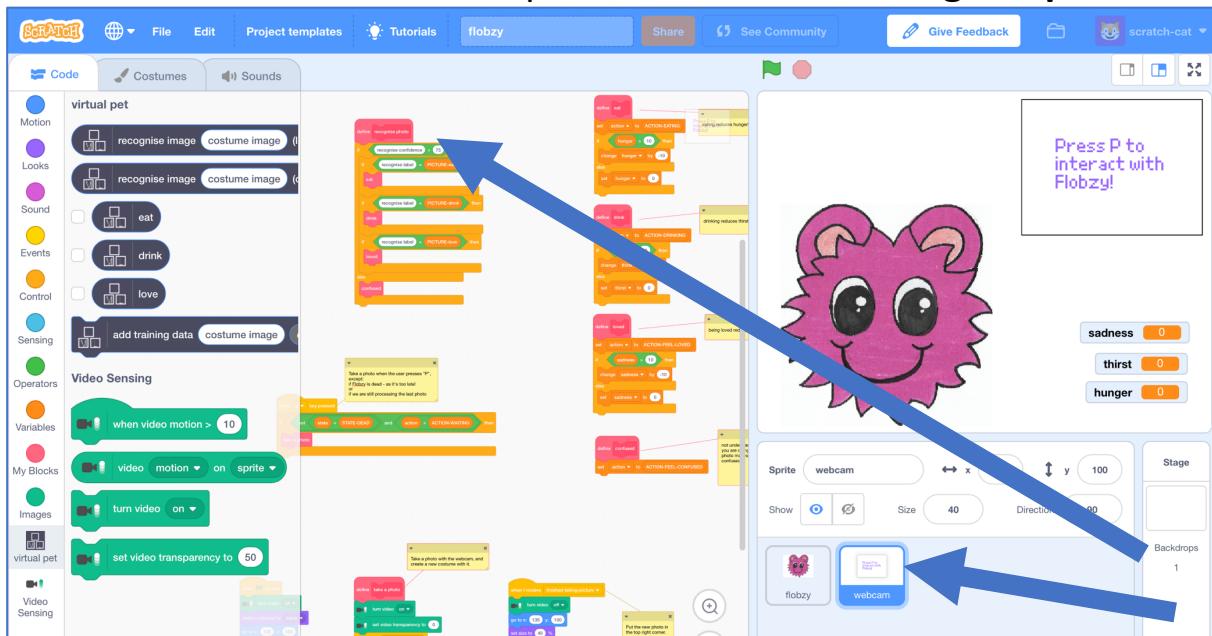
37. Click on “virtual pet” on the left to find the blocks for your project.



38. Drag the names of your three training buckets into the script

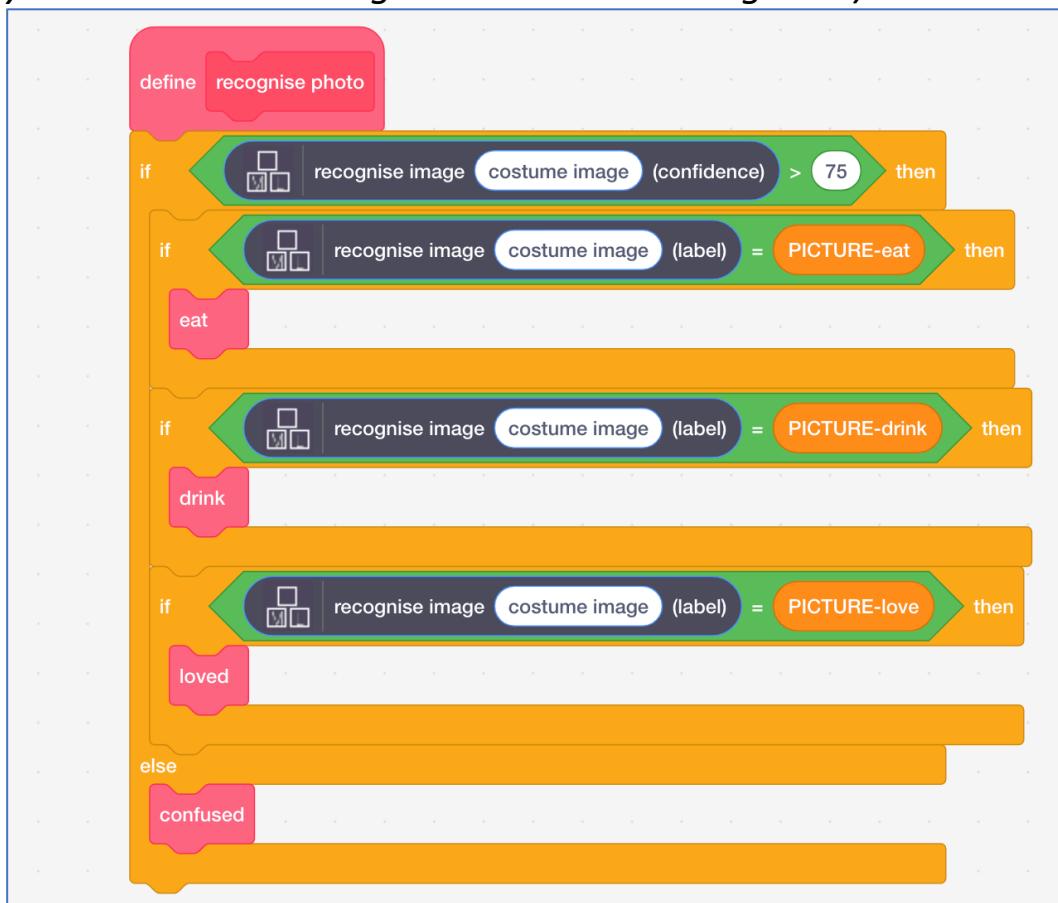


39. Click on the “webcam” sprite, and find the “recognise photo” script

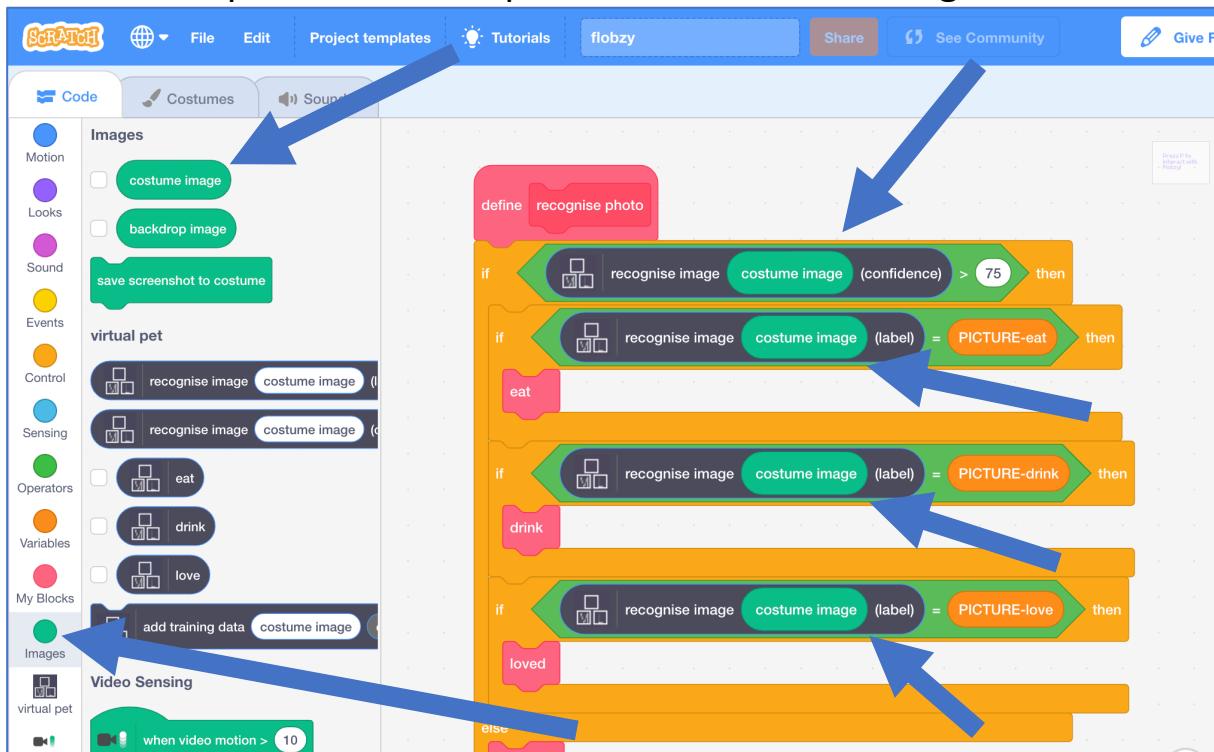


40. Modify the “recognise photo” script using blocks from your project

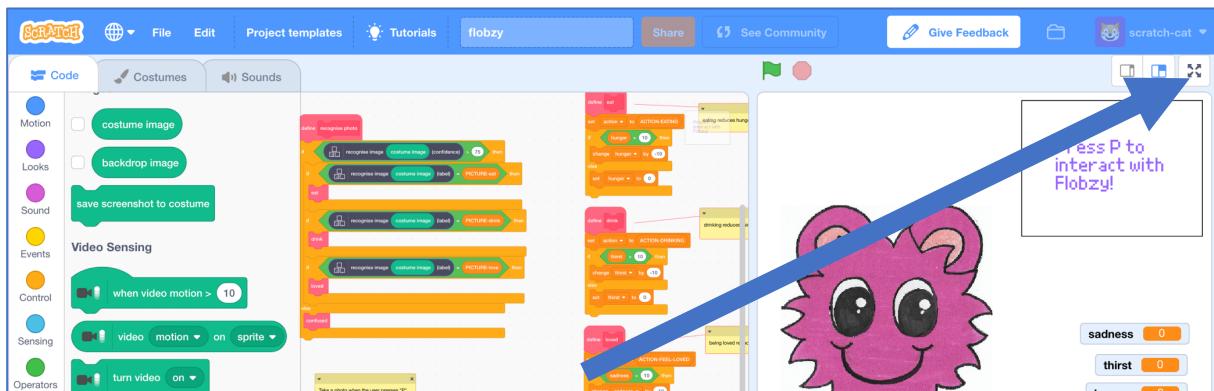
Notice that the first one is using the confidence score (how sure your machine learning model is), and the next three are using the label (what your machine learning model thinks it recognised).



- 41.** Click on “images” to find the “costume image” block. Drag it into each of the spaces in the script labelled “costume image”.



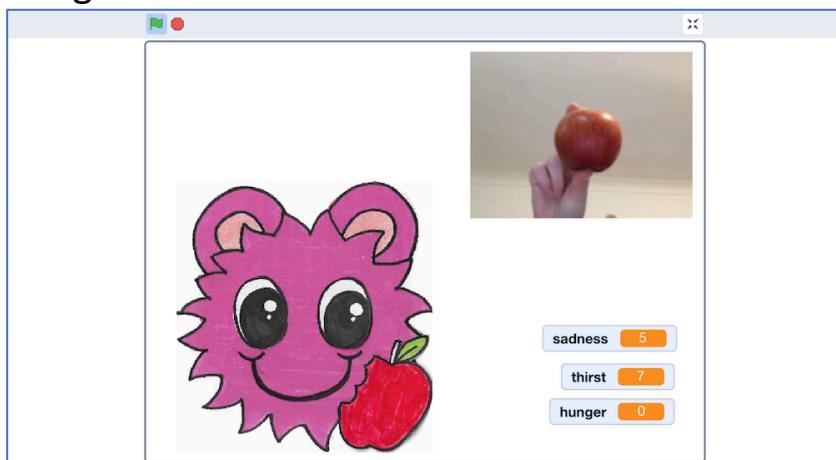
- 42.** Click the full-screen button



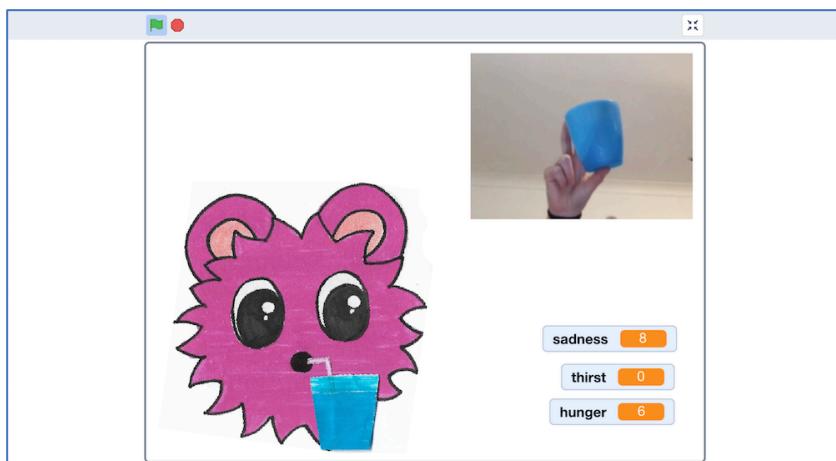
- 43.** Click on the Green Flag to start the game
*The sadness, thirst, and hunger values will start to increase.
 You need to look after your virtual pet to keep it happy and fed.*

*You'll do that by **pressing the P button on the keyboard** to take a photo.
 Your virtual pet will use the machine learning model you trained to
 recognise what you're doing.*

- 44.** If it recognises a photo of food, you'll see your virtual pet eat and its hunger value will decrease

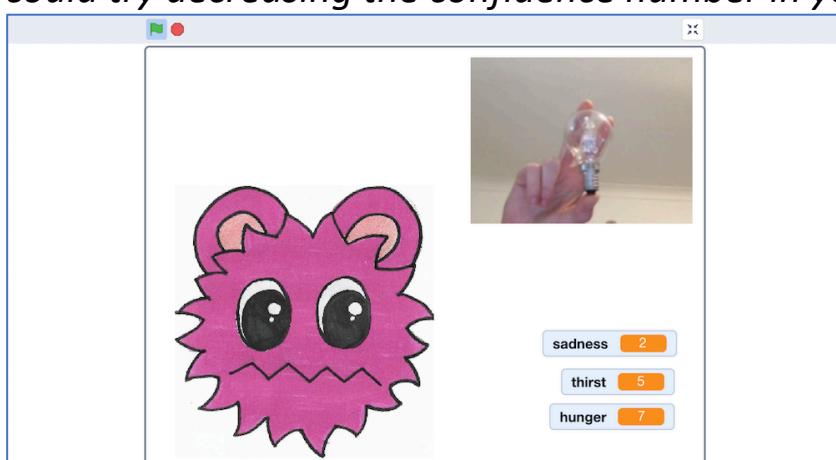


- 45.** If it recognises a photo of drink, you'll see your virtual pet drink and its thirst will decrease



- 46.** If it doesn't recognise your photo, it'll look confused

If this happens when you're showing it photos of food, drink or love, you could try decreasing the confidence number in your script a little.



47. If the values get too high, it'll be game over



48. Save your project

*Click the **full-screen** button again*

Click “File” -> “Download to your computer”

What have you done?

You've created a virtual pet in Scratch that uses machine learning to recognise the actions that you take to look after it.

The machine learning model that you've trained is an image classifier, that is able to classify photos based on the training examples you took.

The more examples you give it, the better it should get at recognising your actions.

Ideas and Extensions

Now that you've finished, why not give one of these ideas a try?

Or come up with one of your own?

Draw your own pet

You don't have to use the pet in the project template. Why not draw your own character? You'll need costumes for each of the states that the virtual pet can be in.

Improving your training

Try testing it with your classmates. Does your pet understand their photos as well?

How can you improve the training so that your pet does the right thing for these sorts of cases?

Change your pet's behaviour

The Scratch script for your pet is complicated, but there are a lot of comments in there to explain how it works.

Think of something that you'd like to change about how your pet behaves, and try changing the script to make it happen.

Try starting with something small, like changing the reward you get for giving your pet something to eat.