



Rock, paper, scissors

In this project you will make Rock, Paper, Scissors in Scratch.

To have your move, you'll take a photo of your hand.

But first, you'll need to train the computer to look at your photos and recognise the different hand shapes of rock, paper, and scissors.

The image shows the Scratch 2.0 interface with a project titled "Rock, paper, scissors". The stage area on the right displays two images: "Your Move" (a photograph of a person's hand making a scissor shape) and "Computer's Move" (a black and white illustration of a hand making a thumbs-up gesture). Below the images, the text "You win!" is displayed in purple. The script area on the left contains the following Scratch script:

```
when green flag clicked
  set [rock v] to [rock]
  set [paper v] to [paper]
  set [scissors v] to [scissors]

when I receive [new-move v]
  set [you v] to [recognise image costume image]
  broadcast [score v]
  <<--- recogn

when I receive [score v]
  think [you]
  end
```

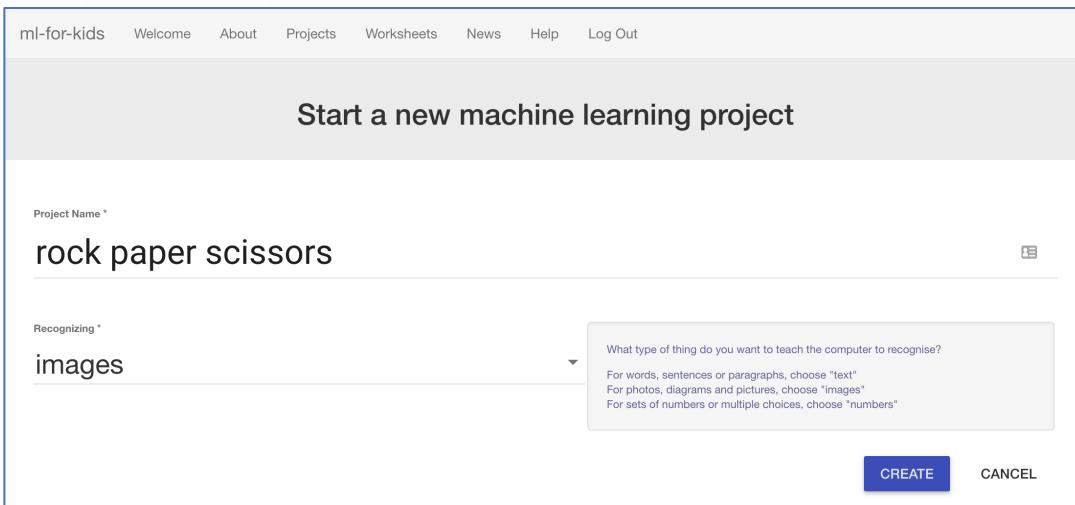
The script uses the "Control" blocks to handle events like the green flag being clicked and messages being received. It also uses the "Sensing" blocks to recognize hand images and the "Variables" blocks to store and compare the user's move against the computer's move. The "Video Sensing" block is used to capture video frames.



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This activity will include you taking pictures of your hand & uploading them.
If you're not happy with that, ask your teacher or group leader for a different activity.

- 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 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.
- 4.** Click on “**Projects**” on the top menu bar
- 5.** Click the “**+ Add a new project**” button.
- 6.** Name your project “rock paper scissors” and set it to learn how to recognise “**images**”.



The screenshot shows a web page titled "Start a new machine learning project". At the top, there is a navigation bar with links: ml-for-kids, Welcome, About, Projects, Worksheets, News, Help, and Log Out. Below the title, there is a "Project Name *" field containing "rock paper scissors". To the right of this field is a small "edit" icon. Below the project name, there is a "Recognizing *" field containing "images". To the right of this field is a dropdown arrow. A tooltip box is open over the "images" field, asking "What type of thing do you want to teach the computer to recognise?". It provides three options: "For words, sentences or paragraphs, choose 'text'", "For photos, diagrams and pictures, choose 'images'", and "For sets of numbers or multiple choices, choose 'numbers'". At the bottom right of the form are two buttons: a blue "CREATE" button and a white "CANCEL" button.

- 7.** Click the “**Create**” button

8. You should see “rock paper scissors” in the projects list. Click on it.

ml-for-kids Welcome About Projects Worksheets News Help Log Out

Your machine learning projects

rock paper scissors
Recognising **images**

+ Add a new project

9. Click on “Train”

About Projects Worksheets News Help Log Out Language

"rock paper scissors"

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 or in Python.
Make

10. Click “+ Add new label” and create a bucket called “rock”.

ml-for-kids Welcome About Projects Worksheets News Help Log Out

Recognising **images** as **rock**

< Back to project

+ Add new label

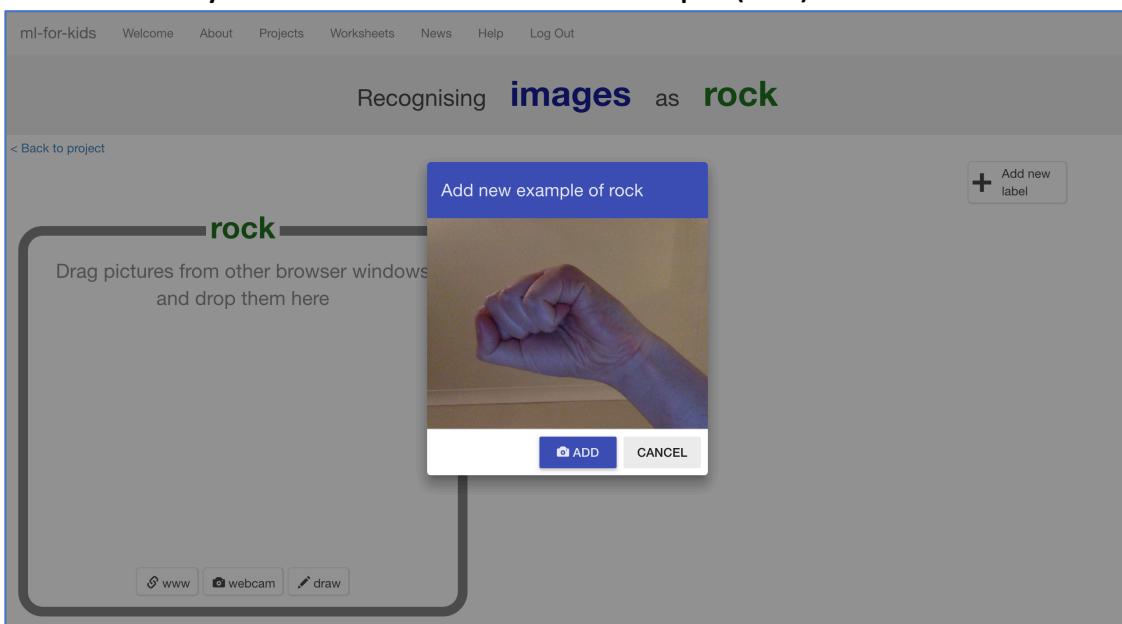
rock
Drag pictures from other browser windows and drop them here

⌚ www 📸 webcam ⌚ draw

11. Click “webcam”

A Preview window shows the current view from your webcam.
You will need to click “Approve” or “Allow” if your web browser asks permission to use your webcam.

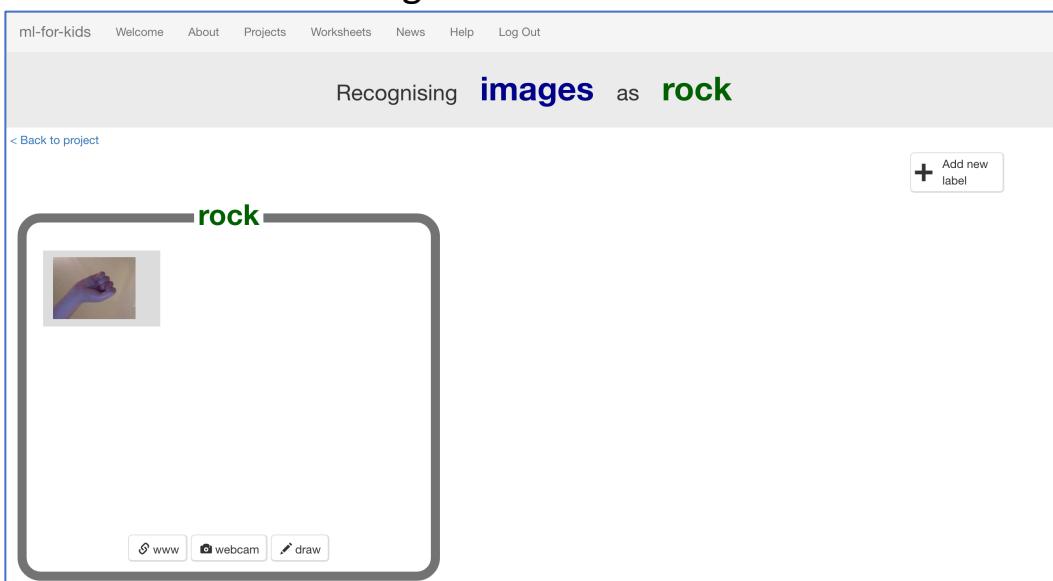
12. Make your hand into a “rock” shape (fist) in front of the webcam



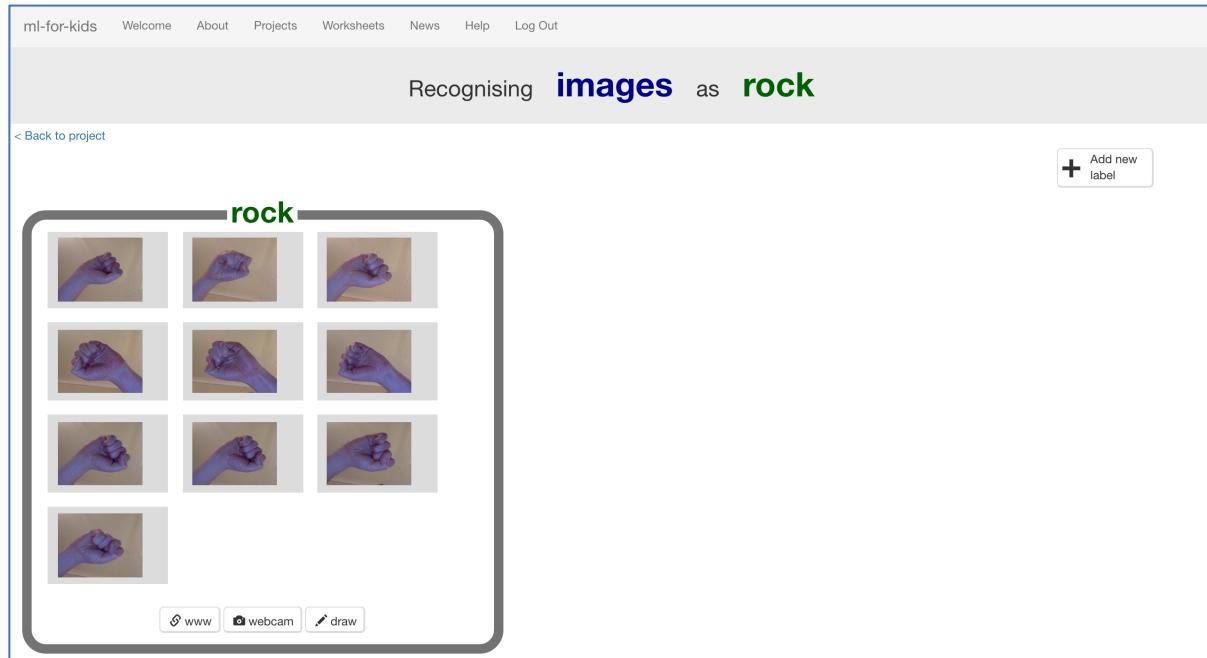
13. When you’re ready, click “ADD” to take a picture

If you’re doing this with a partner, it might be easier for one of you to click on “ADD” while the other makes hand-shapes.

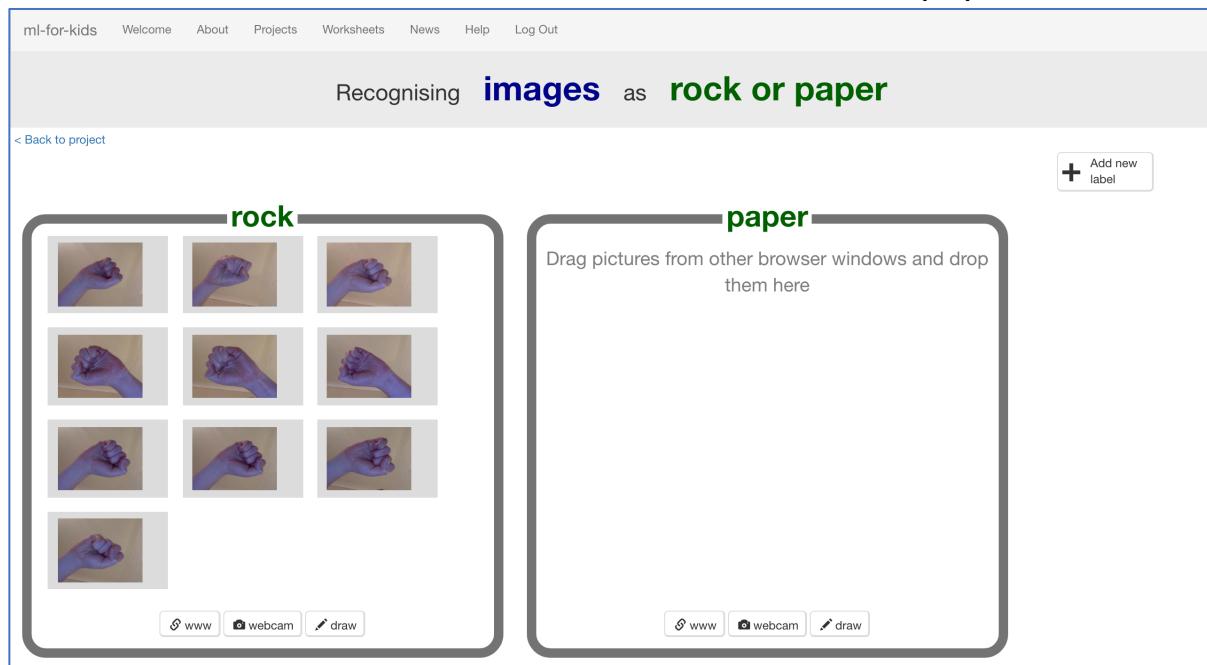
14. Click “webcam” again



- 15.** Repeat until you've got **10** examples of a “rock” shape (fist).
*Try to get a variety of positions, angles and sizes.
The more variation the computer has to learn from, the better.*

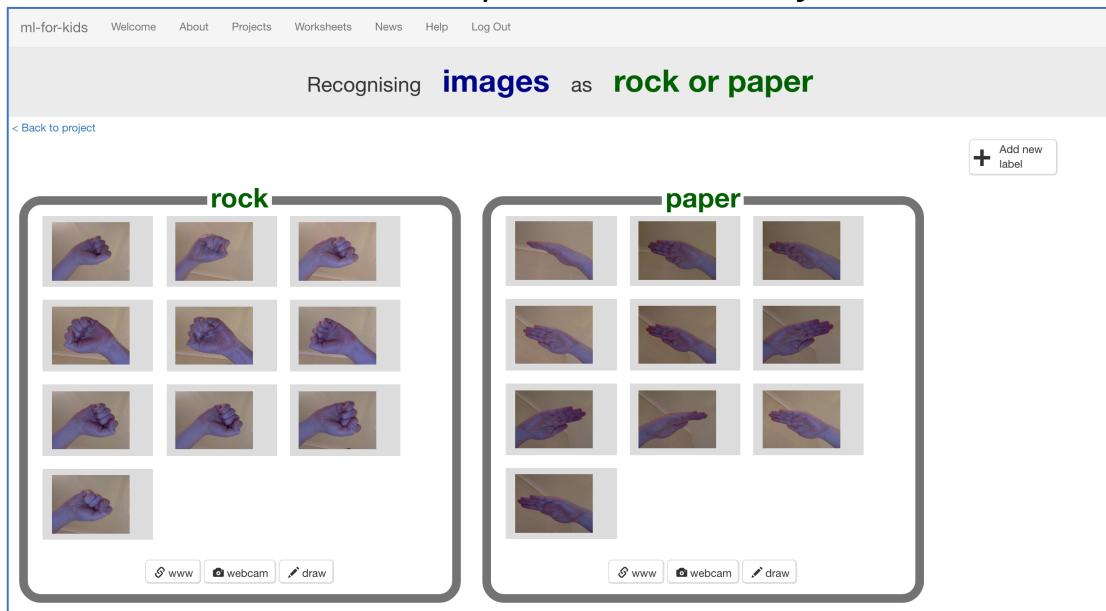


- 16.** Click “+ Add new label” and create one called “paper”

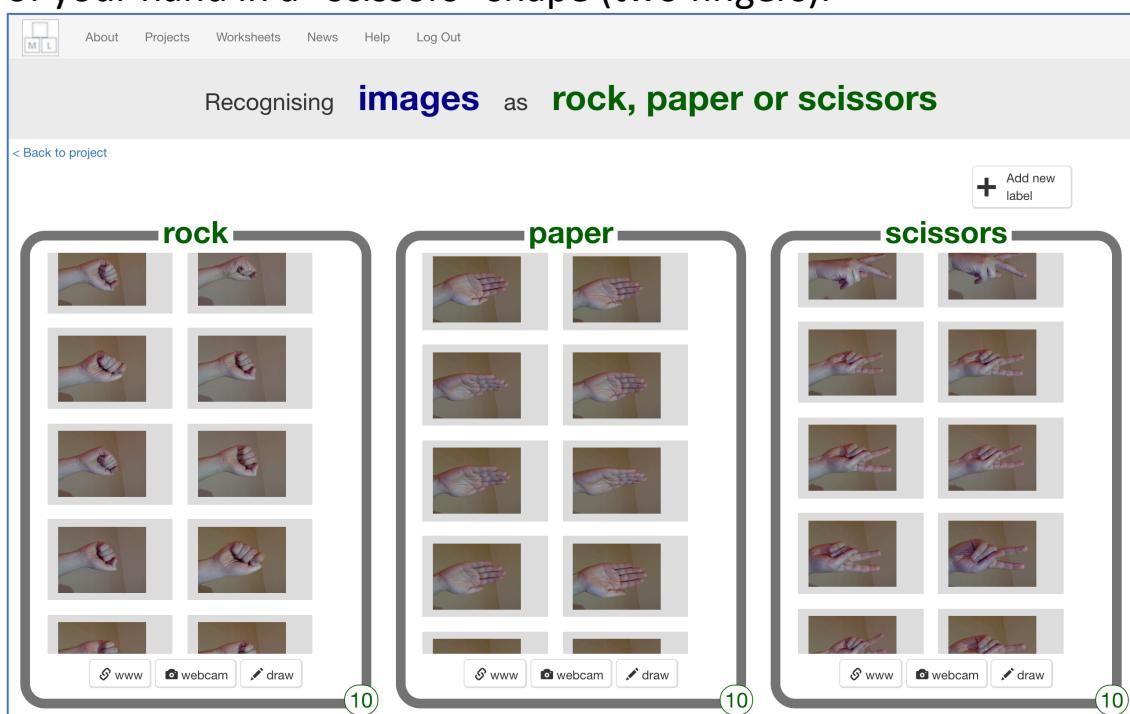


- 17.** Click the “webcam” button in the “paper” bucket
- 18.** Click “ADD” for a photo of your hand in a “paper” shape (flat hand)

- 19.** Repeat until you have **10** photos of your hand in a “paper” shape
*Try to get a variety of positions, angles and sizes.
The more variation the computer has to learn from, the better.*



- 20.** Click “+ Add new label” and create one called “scissors”
- 21.** Use the “webcam” button in the “scissors” bucket to take **10** photos of your hand in a “scissors” shape (two fingers).



- 22.** Click the “< Back to project” link.

23. Click the “**Learn & Test**” button.

24. Click the “**Train new machine learning model**” button.

The screenshot shows a web page titled "Machine learning models". At the top left is a link "[< Back to project](#)". Below it are two main sections: "What have you done?" and "What's next?". The "What have you done?" section contains text about collecting images of rock, paper, or scissors, and a list of collected items: 10 examples of rock, 10 examples of paper, and 10 examples of scissors. The "What's next?" section asks if the user is ready to start training the computer. It includes a button labeled "Train new machine learning model". A large blue arrow points from the text in the "What's next?" section down towards the "Train new machine learning model" button.

25. Wait for the training to complete. This might take a few minutes.
While waiting, try the multi-choice quiz at the bottom of the page.

26. Click “< Back to project”

What have you done so far?

You've started to train a computer to recognise pictures as being rock, paper or scissors. You are doing it by collecting 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 colours and shapes from each of the photos you’ve given it. These will be used to be able to recognise new photos.

Tips

More examples!

The more examples you give it, the better the computer should get at recognising whether a photo of your hand is rock, paper or scissors.

Try and be even

Try and come up with roughly the same number of examples for each shape.

If you have a lot of examples for one type, and not the other, the computer might learn that type is more likely, so you'll affect the way that it learns to recognise photos.

Mix things up with your examples

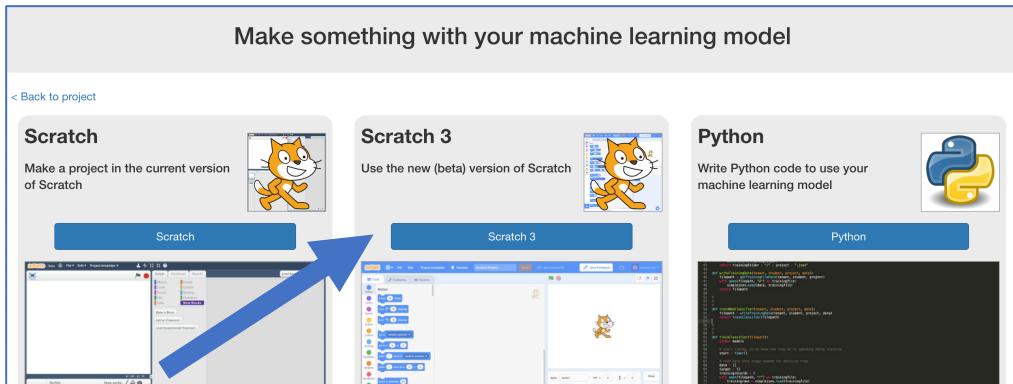
Try to come up with lots of different types of examples.

For example, you could include examples of your hand coming from the left side of the photo as well as examples of your hand coming from the right side.

Some could look small (with your hand further away) and some could be larger (with your hand very close).

27. Click the “Make” button

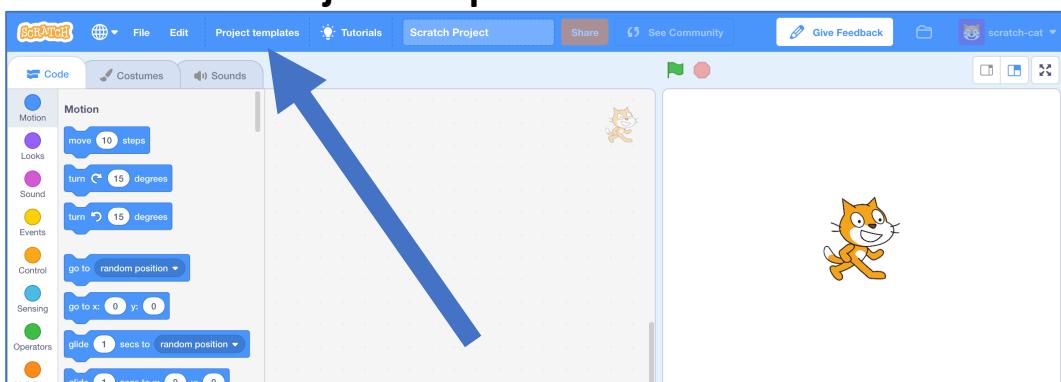
28. Click “Scratch 3”



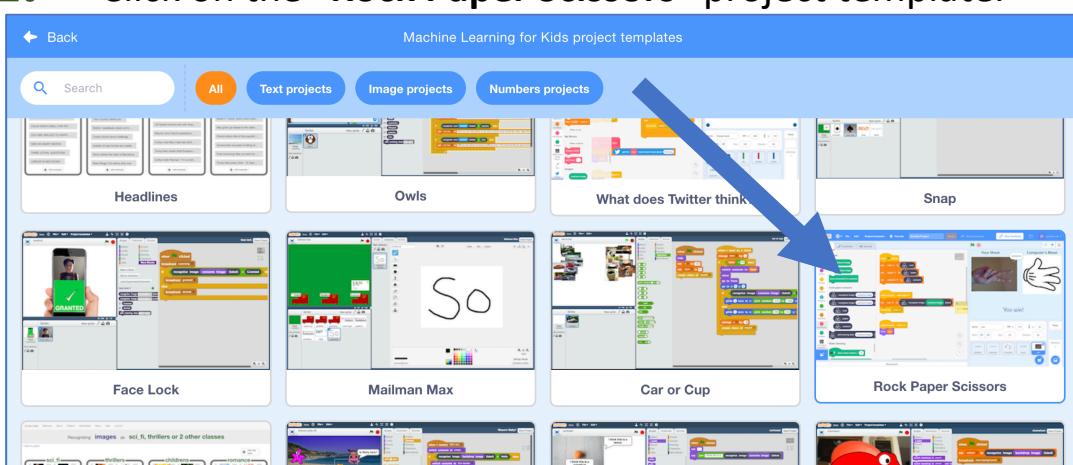
29. Click “Open in Scratch”

30. Scratch 3 is still quite new, so you might need to click “Try It!”

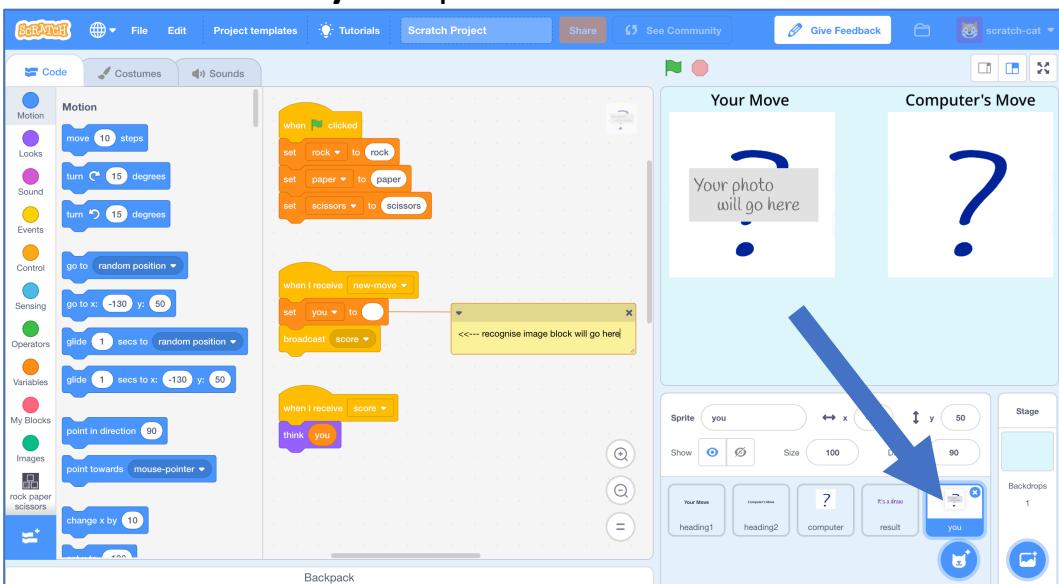
31. Click on “Project templates”



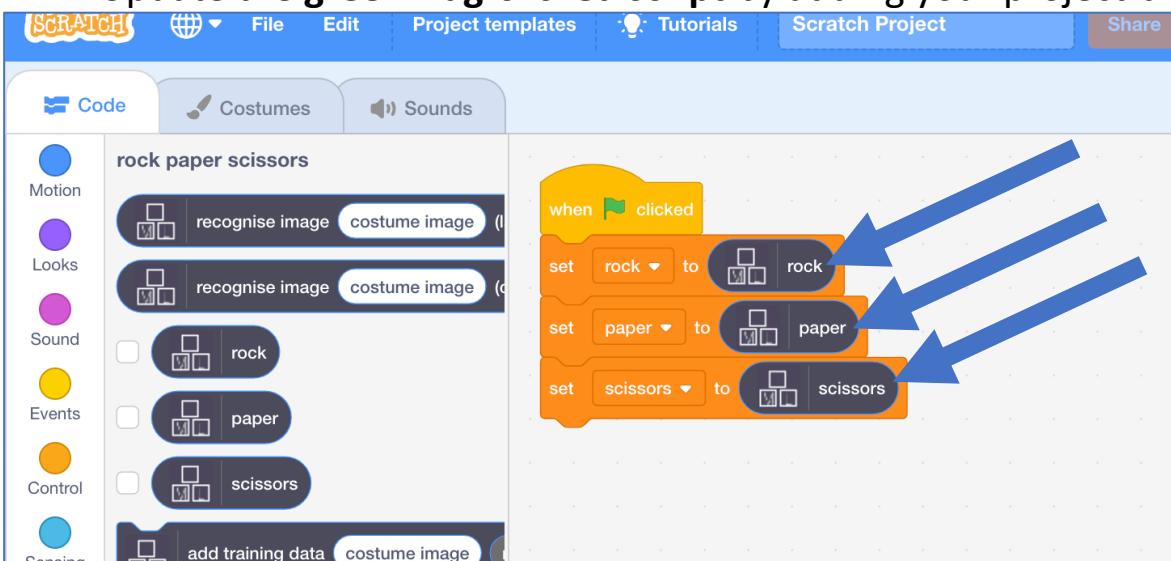
32. Click on the “Rock Paper Scissors” project template.



33. Click on the “you” sprite.

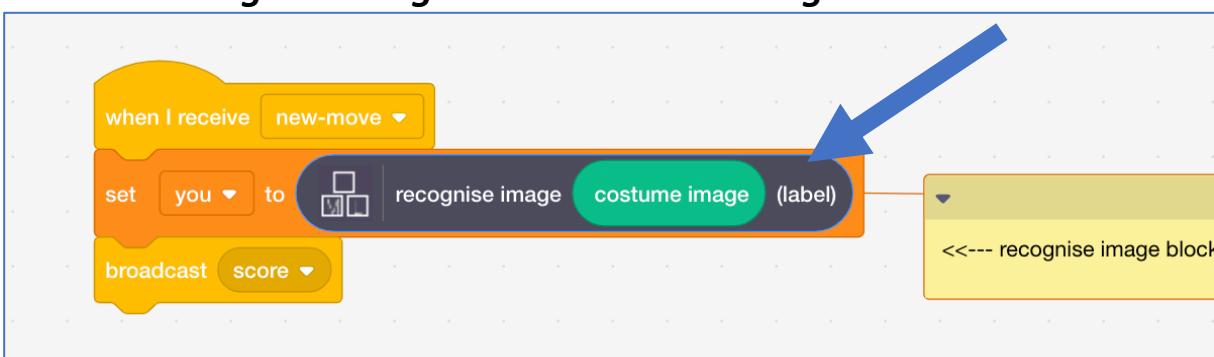


34. Update the green-flag-clicked script by adding your project blocks



35. Update the new-move script

Add the “recognise image” and “costume image” blocks

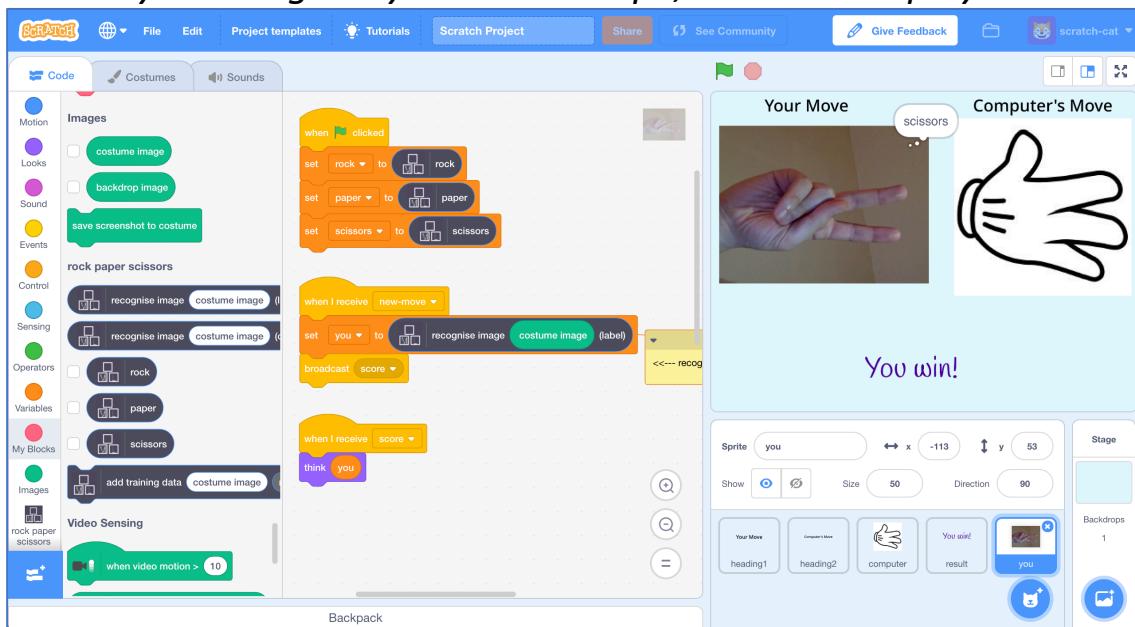


36. Test your project

Click the **Green Flag**, then click press the “P” button to take a photo.

The computer will choose a random picture.

It will try to recognise your hand shape, and then display who won.



37. If the computer is not very good at recognising your hand shapes, go back to step 21, and add more examples for the computer to learn from. You'll need to repeat step 24 and train a new machine learning model after you've added more examples.

What have you done?

You've made a simple rock-paper-scissors game in Scratch.

The game uses a webcam to take pictures of your hand, and uses machine learning to understand the meaning of the photo.

This is “image recognition” – teaching a computer to recognise images.