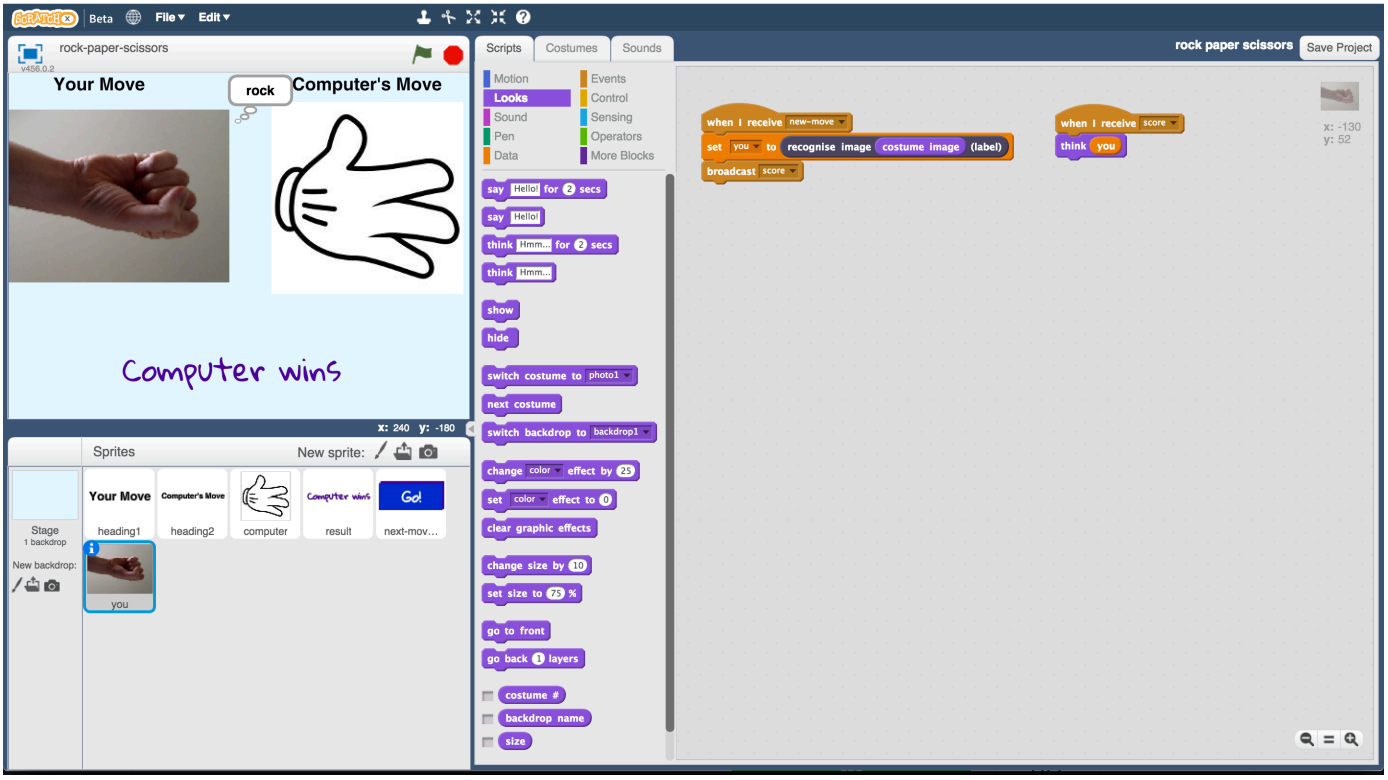
Rock, paper, scissors

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.



This activity will include you taking pictures of your hand and uploading them to the Internet. Photos of your hand will be accessible to anyone online.
If you're not happy with that, ask your teacher or group leader for a different activity.

☐ You'll need a digital camera for this project. A computer webcam is easiest, but anything you can use to take photos of your hand is okay.

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1. You'll need the **rock-paper-scissors.sbx** starter file for this project.
If you haven't got this, ask your teacher or group leader.

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

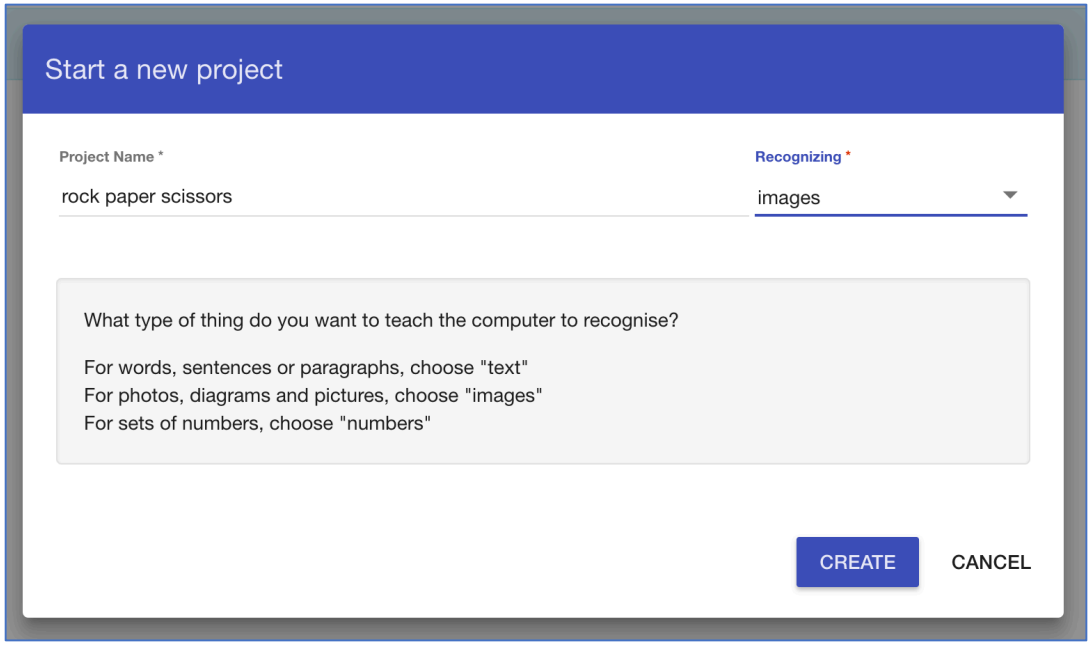
3. Click on "**Get started**"

4. 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.

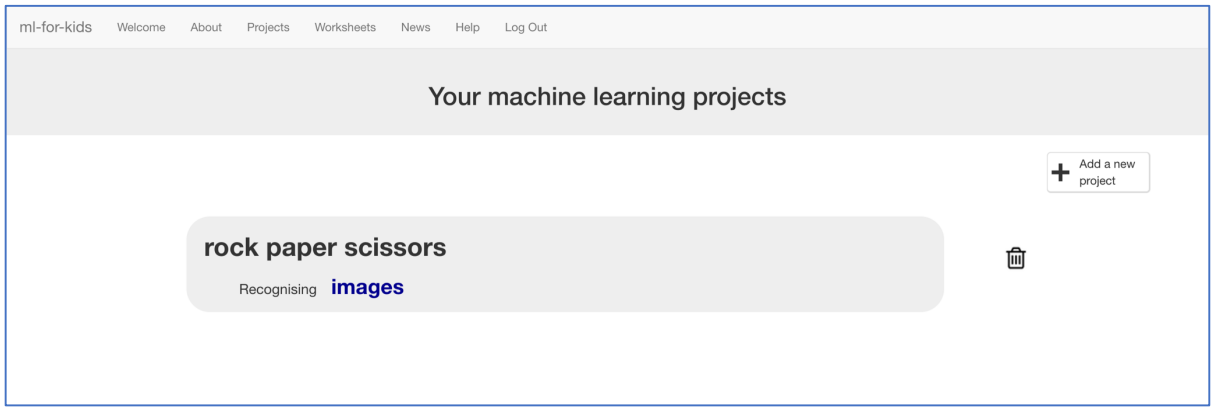
5. Click on "**Projects**" on the top menu bar

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

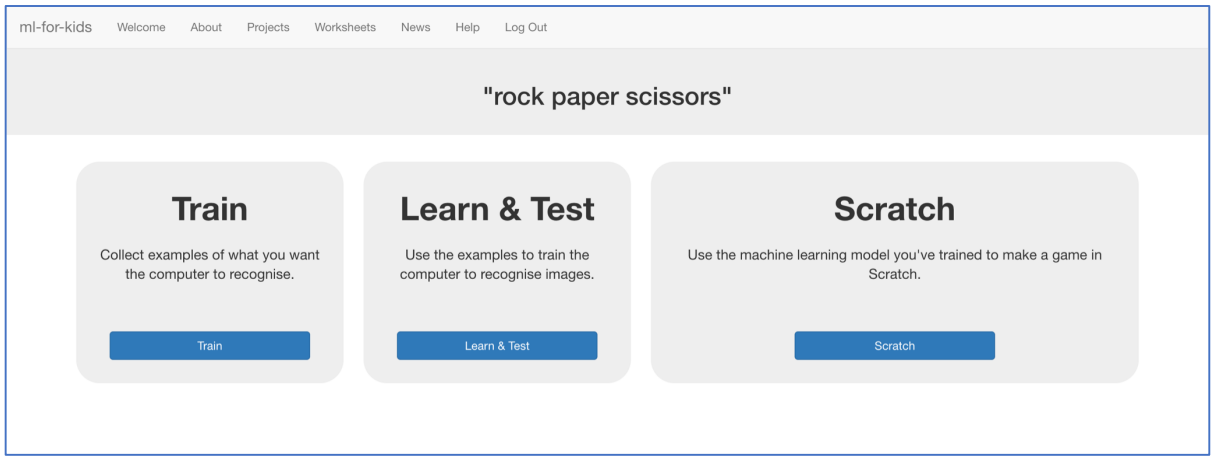
7. Name your project “rock paper scissors” and set it to learn how to recognise “**images**”



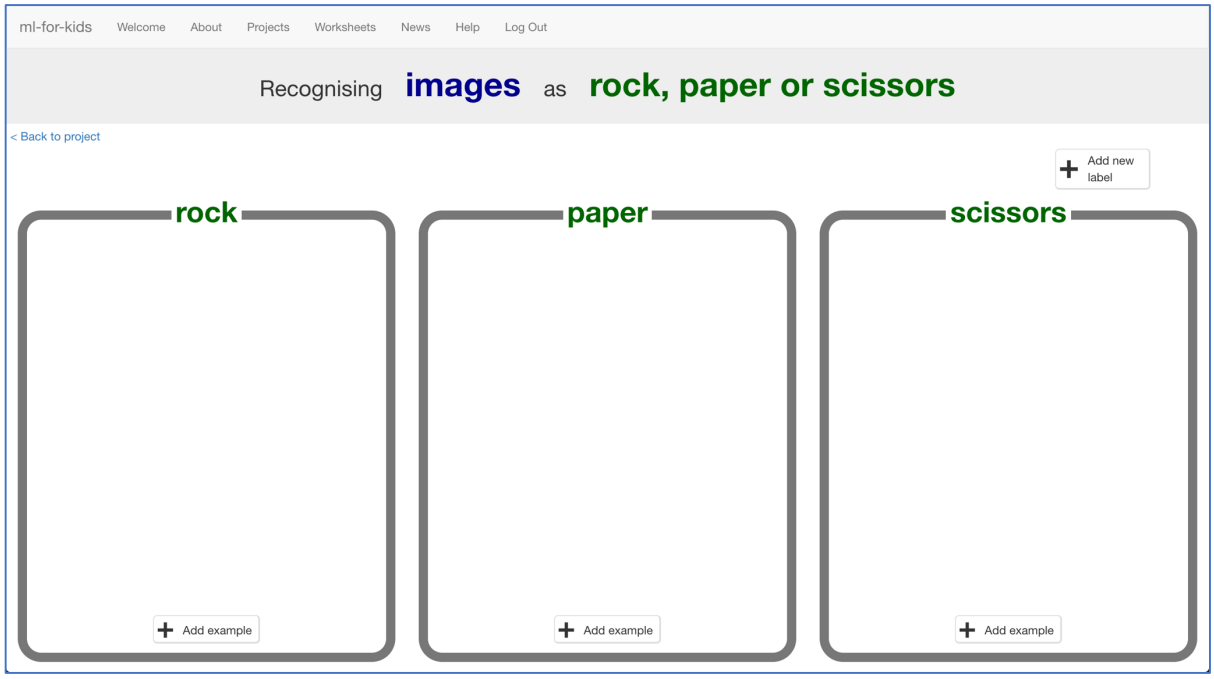
8. You should see “rock paper scissors” in the projects list. Click on it.



9. Click on “**Train**”



10. Click the "**+ Add new label**" button and create a bucket called "rock".
Do this again to create buckets for "paper" and "scissors".



We need to collect example of photos of your hand in "rock", "paper" and "scissors" shapes.

This means taking photos of your hand, and uploading them to a photo sharing site on the Internet.

The next few steps will explain how to do this using **your computer webcam** and the website **imgur**.com. But any digital camera and any photo sharing website would work just as well.

Skip to step 16 if you use a different site to upload your photos to.

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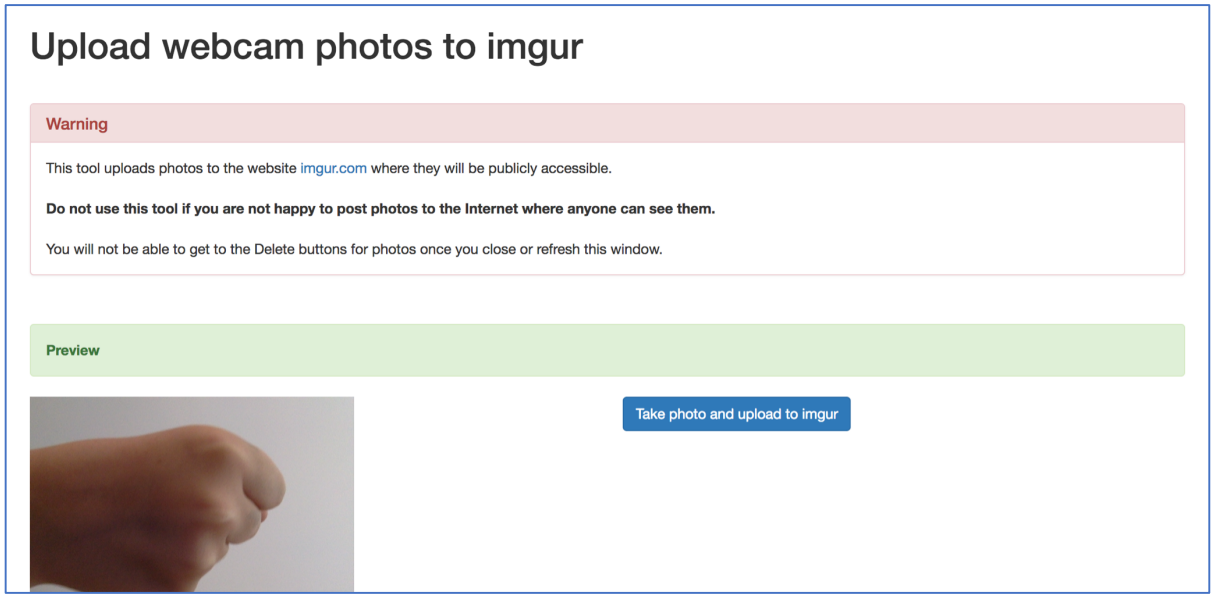
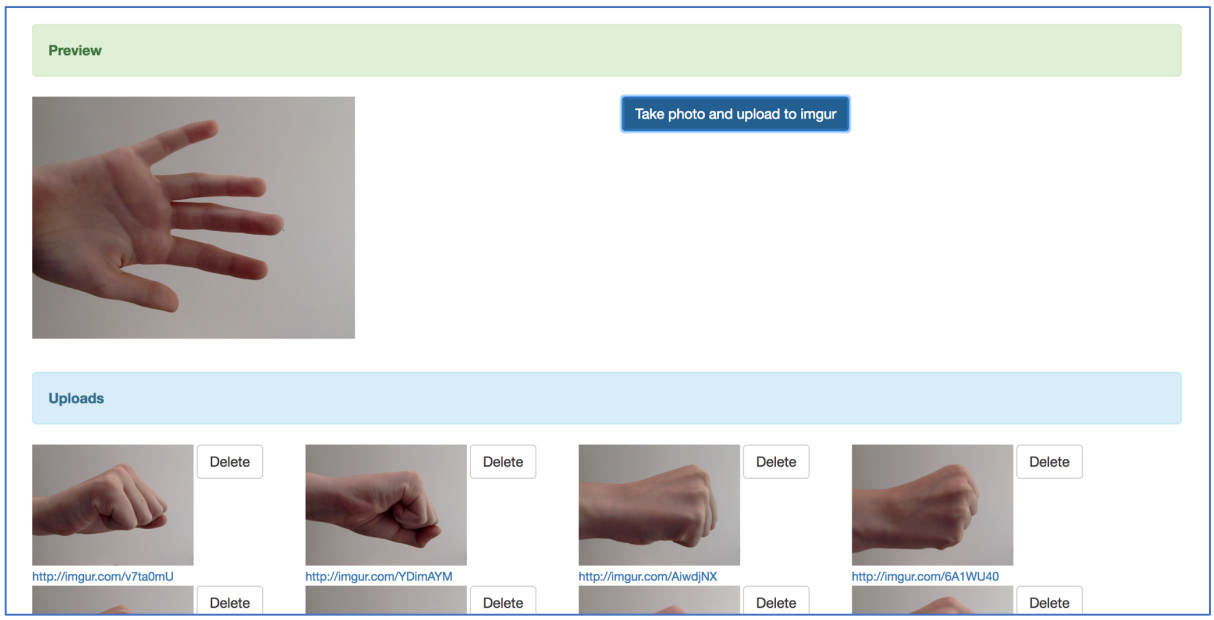
11. Open a new browser window or tab, and go to **https://dalelane.github.io/webcam-to-imgur/**

12. The 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.

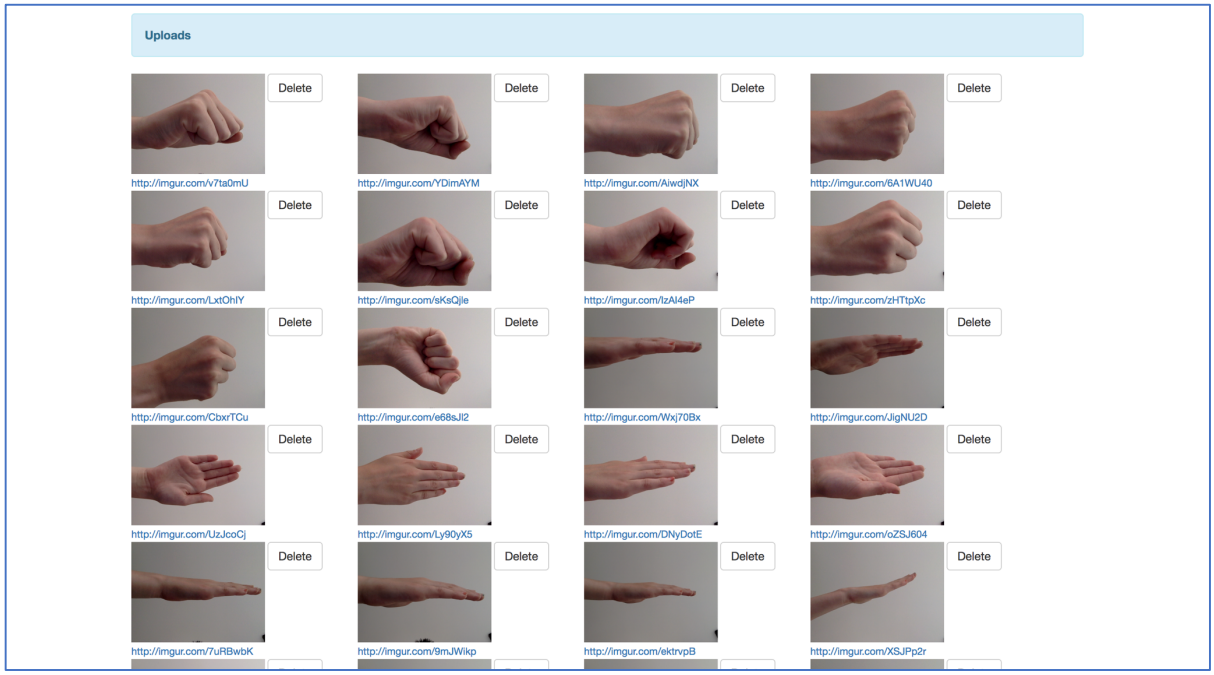


13. Click the "**Take photo and upload to imgur**" button.
Every photo you take is uploaded immediately to imgur.com.

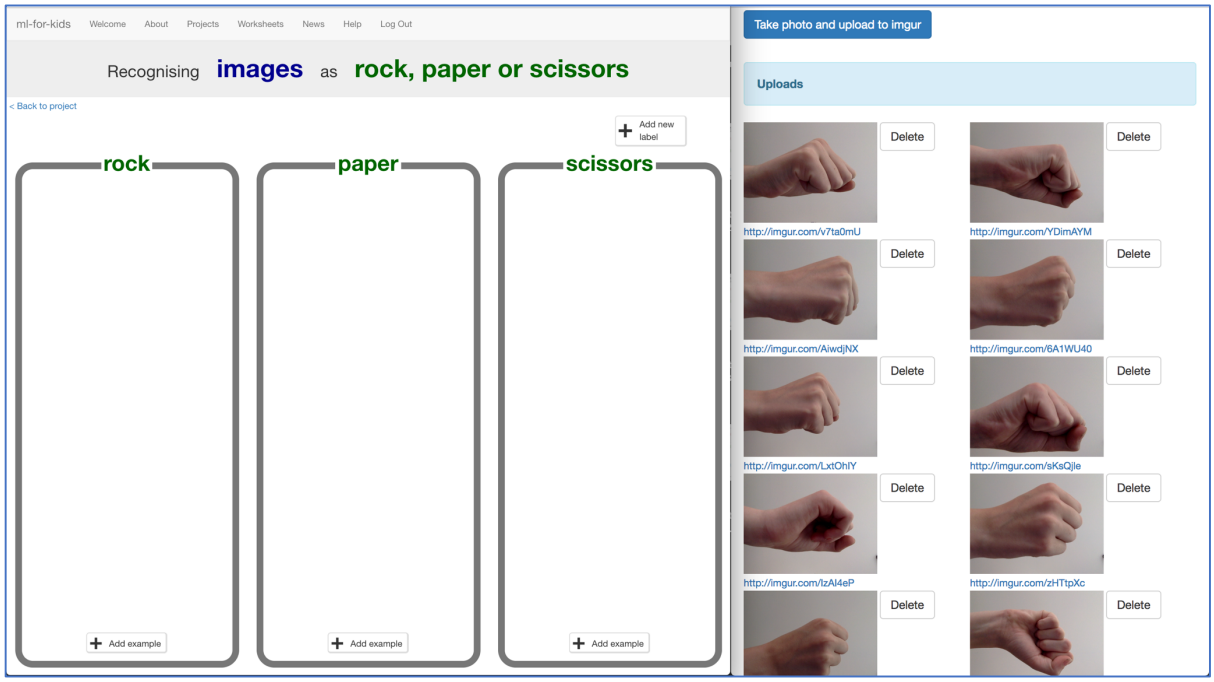


14. Take **10** photos of your hand in a "rock" shape (fist).
Take **10** photos of your hand in a "paper" shape (flat hand).
Take **10** photos of your hand in a "scissors" shape (two fingers).

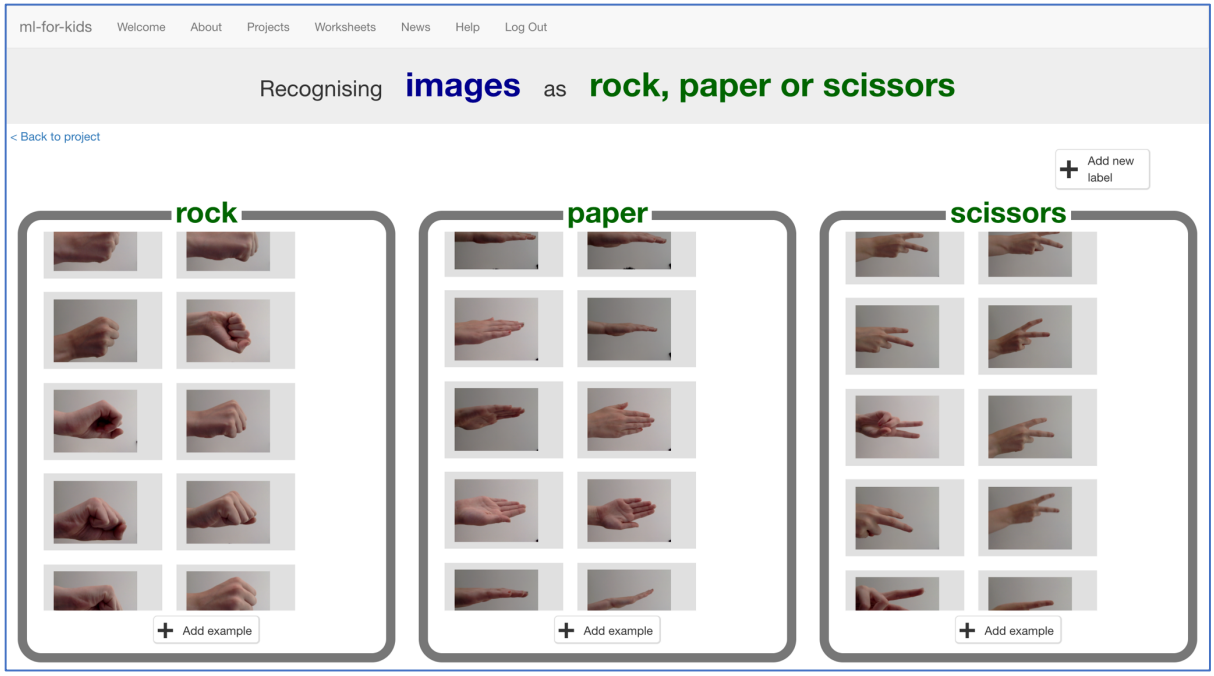
Try to get a variety of positions and angles.
The more variation the computer has to learn from, the better.



15. You need to arrange your windows so both web browser windows (the machine learning training buckets and the photos you've taken) are next to each other.

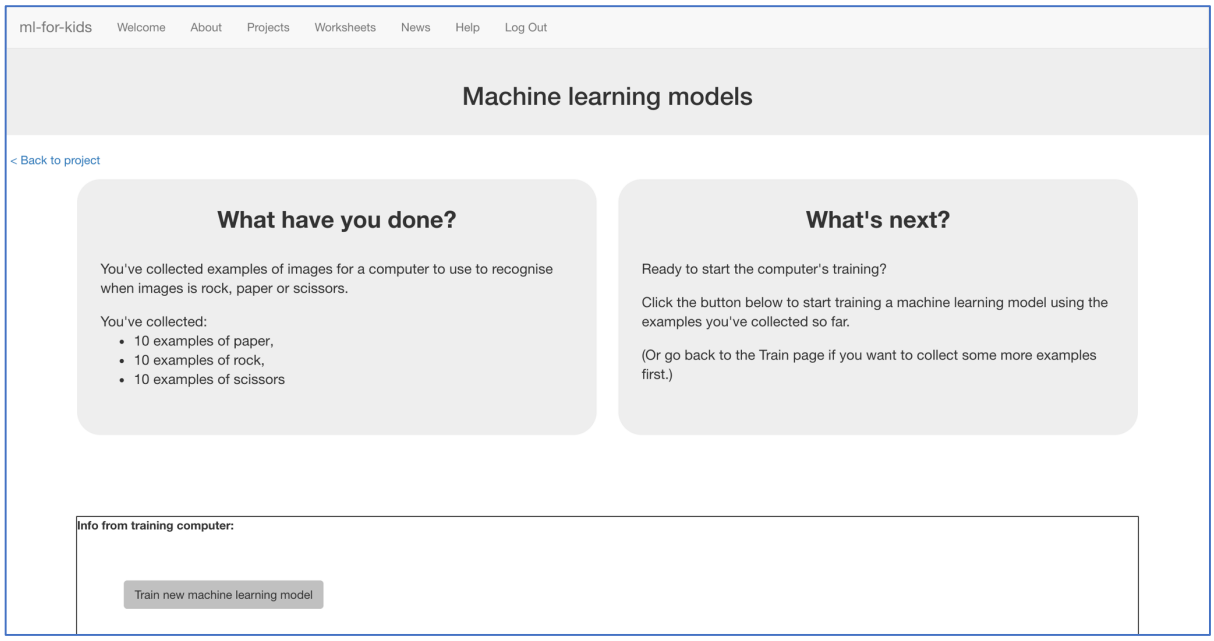


16. Drag the photos from the photo site and drop them in the correct bucket in the machine learning tool.



17. Click the "**< Back to project**" link.
Click the "**Learn & Test**" button.

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



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

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.

20. Click the **"< Back to project**" link, then click the "**Scratch**" button.
This page has instructions on how to use the new blocks in Scratch from your project.
Keep the page open if you need to check back on how to use them.

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.

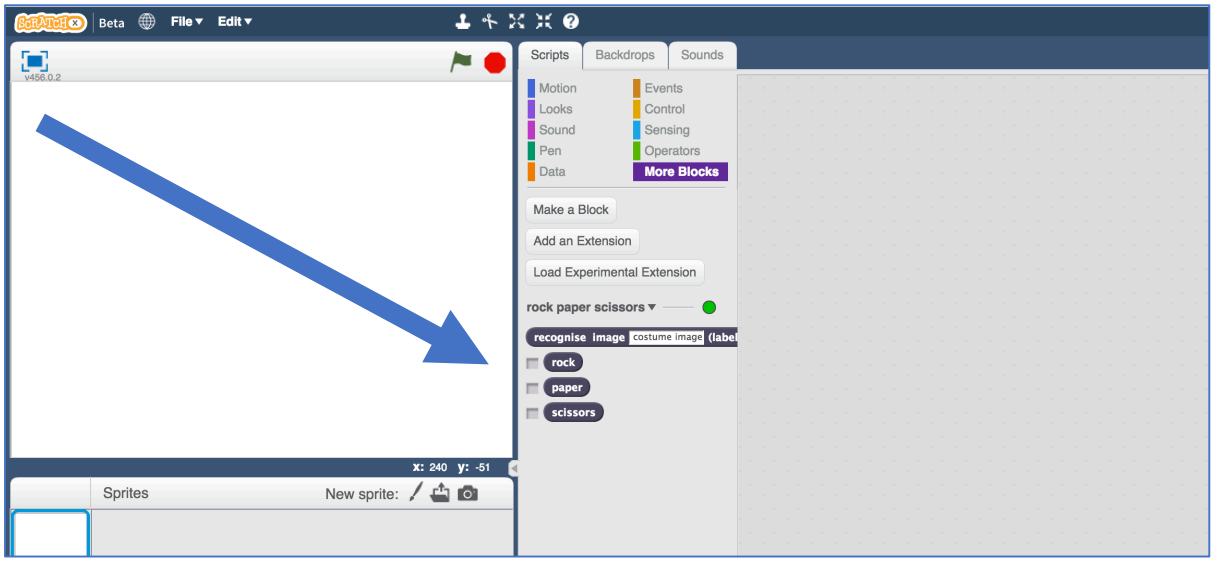
Mix things up with your examples

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

For example, include examples of your hand coming from the left side of the photo and examples of your hand coming from the right side.

21. Click the "**Open in Scratch**" button at the bottom to launch the Scratch editor.

You should see four new blocks in the "More blocks" section from your "rock paper scissors" project.

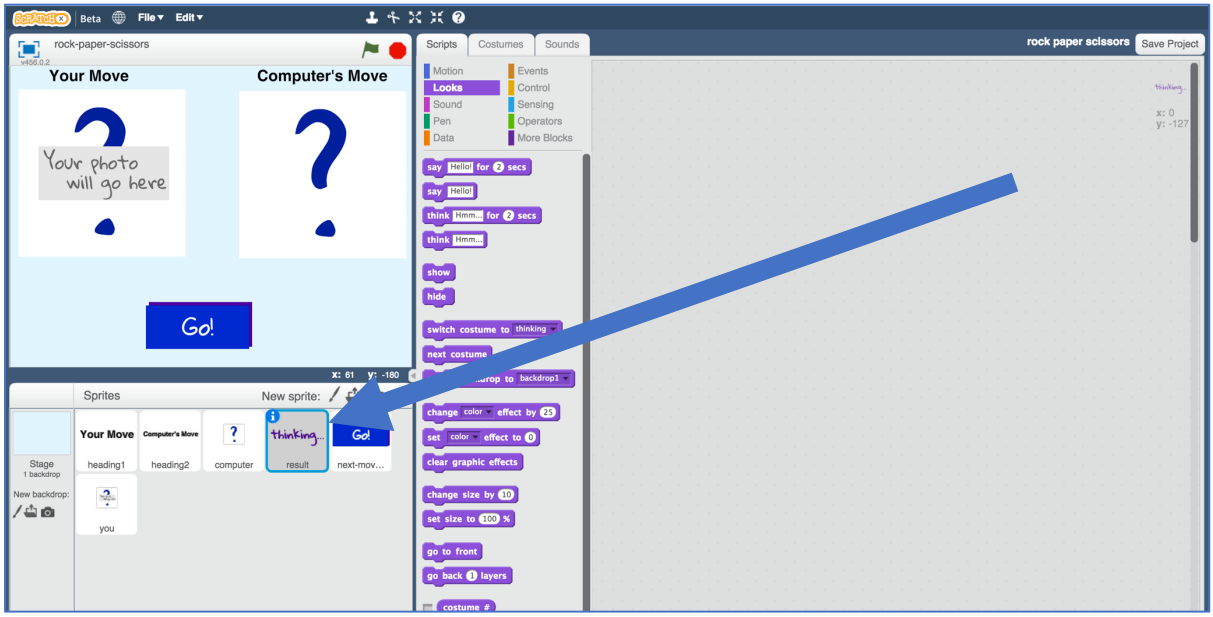


22. Open the "rock-paper-scissors.sbx" project file.

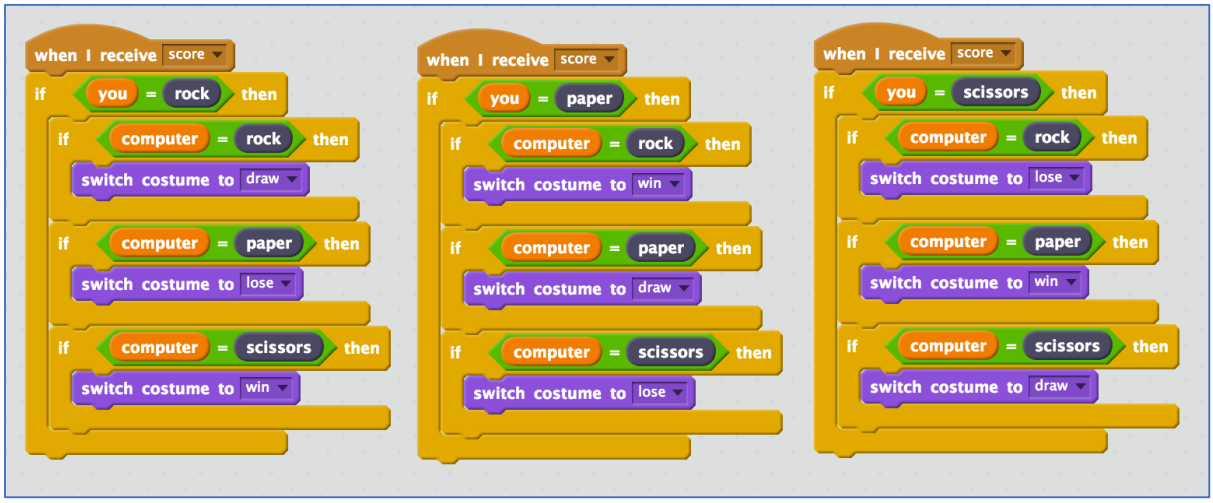
Click **File** -> **Load Project**

*Click **OK** when it asks to replace the contents of the current project.*

23. Click on the "**result**" sprite



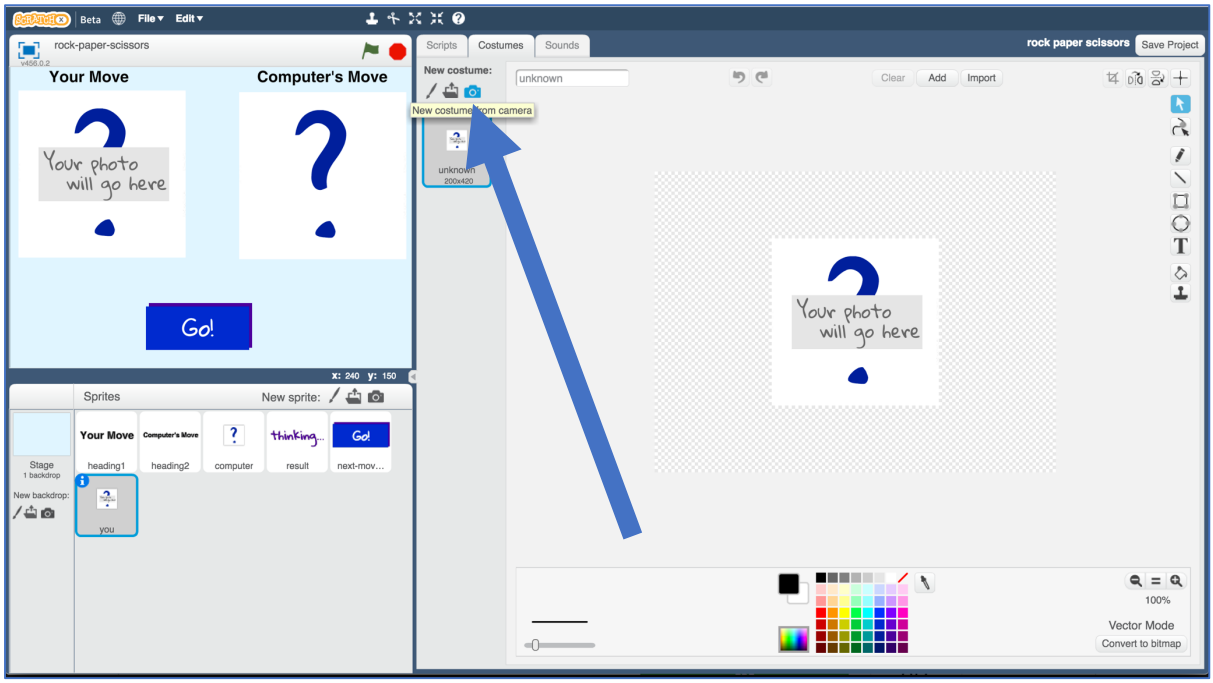
24. Add the following script blocks with the rules for the game to the "result" sprite.



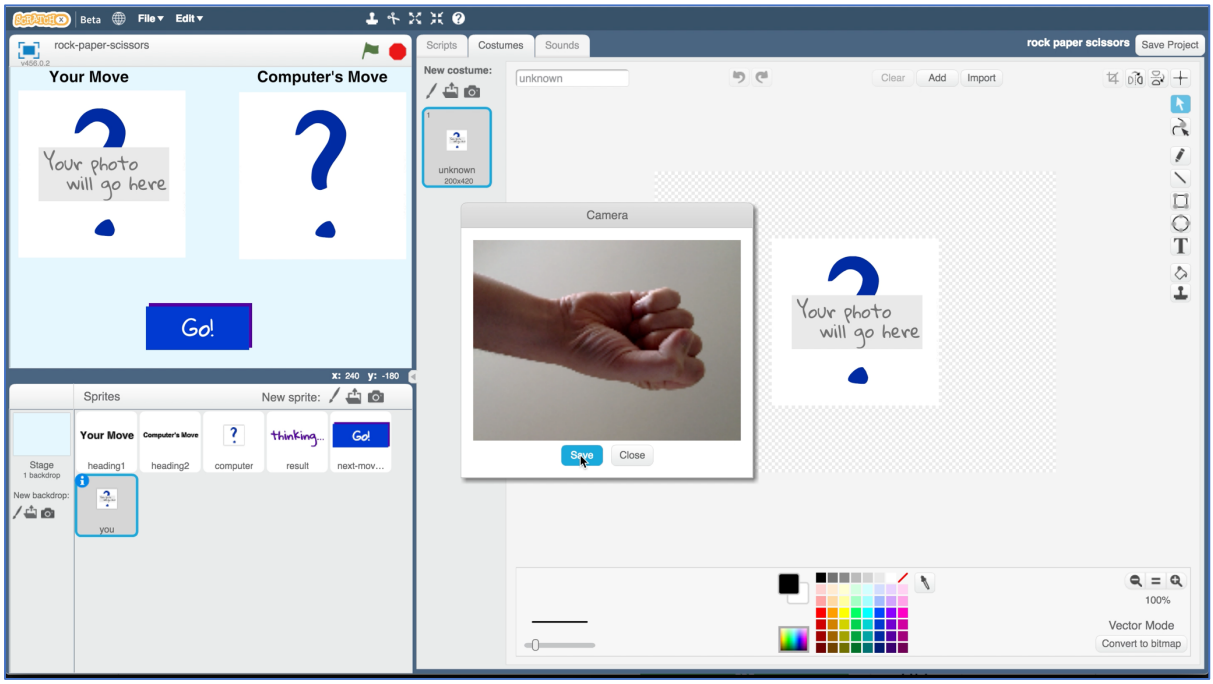
25. Click on the "**you**" sprite.

26. Click on the "**costumes**" tab.

27. Click the "**New costume from camera**" button
It's the camera icon shown below.



28. Take a photo of your hand



29. Click on the "**Scripts**" tab

30. Add the following script blocks to the "you" sprite to let the computer recognise your move

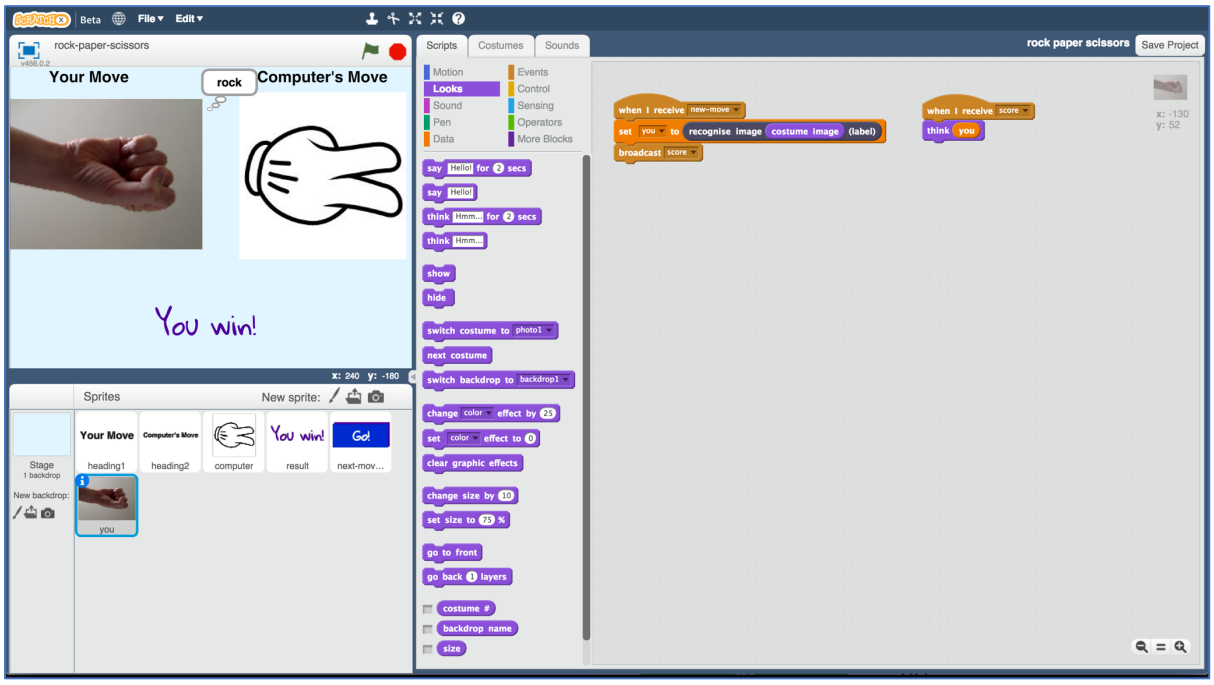
31. Save your project.

*Click **File** -> **Save project***

32. Test your project

Click the **Green Flag**, then click the "Go!" button in the game.

The computer will choose a random picture for its side. It will try to recognise the shape of your hand, and then use the rules you entered to work out who won.



33. If the computer is not very good at recognising your hand shapes, go back to step 16, and add more examples for the computer to learn from. You'll need to repeat step 18 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.