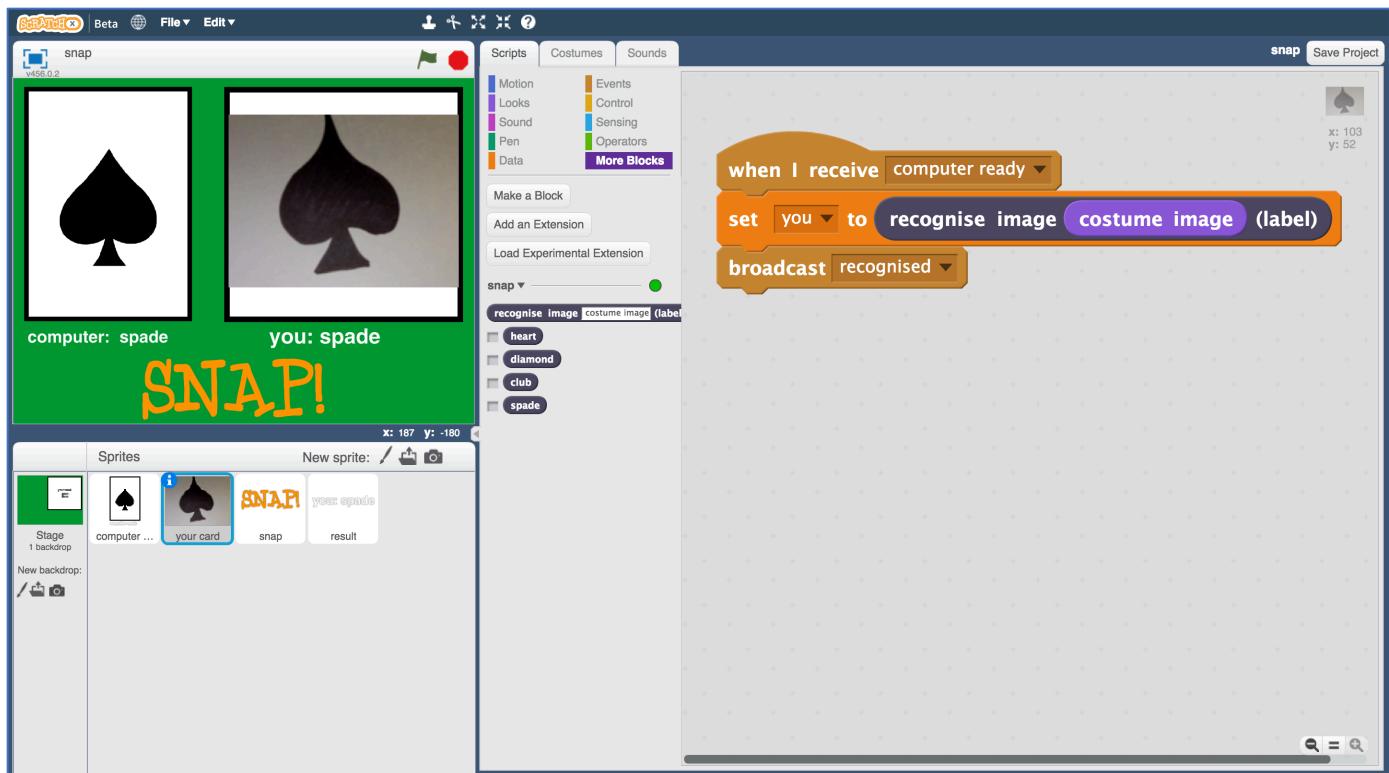


# Snap!

In this project you will make a simple version of the card game “Snap!” in Scratch.

To have your move, you’ll take a photo of your card.

But first, you’ll need to train the computer to look at your photos and recognise the different cards in your pack.



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

**1.** You'll need the **snap.sbx** starter file for this project.

*If you haven't got this, ask your teacher or group leader.*

**2.** Make four cards

*I made these from two sheets of A4 white paper. I cut both of them in half, giving me four large cards. I drew a club, spade, heart and diamond on the centre of each using a felt pen.*



**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 “snap” and set it to learn how to recognise “images”.

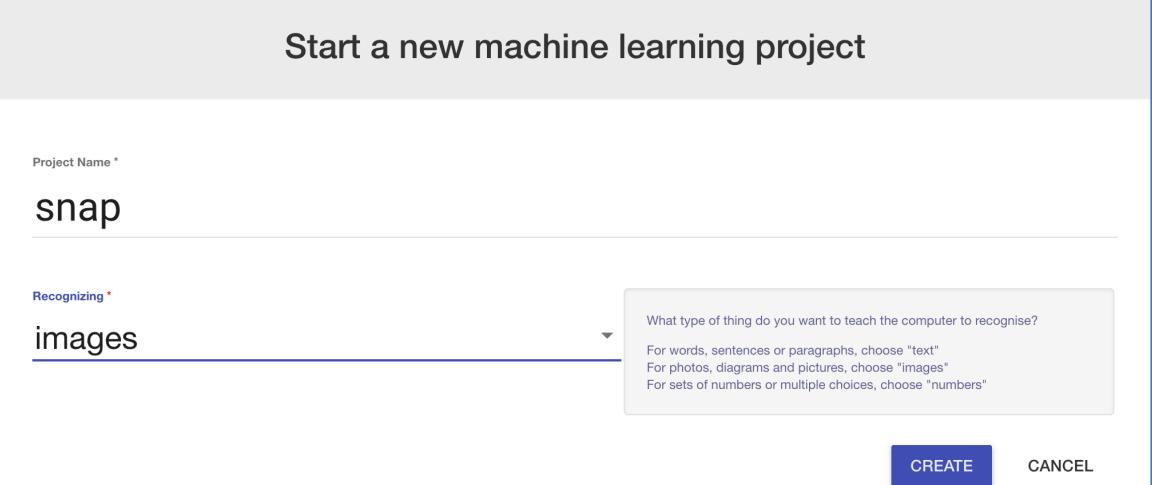
Start a new machine learning project

Project Name \*

Recognizing \*

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"

**CREATE**    **CANCEL**



- 9.** Click the “Create” button
- 10.** You should see “snap” in the projects list. Click on it.
- 11.** Click on “Train”

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“snap”

**Train**

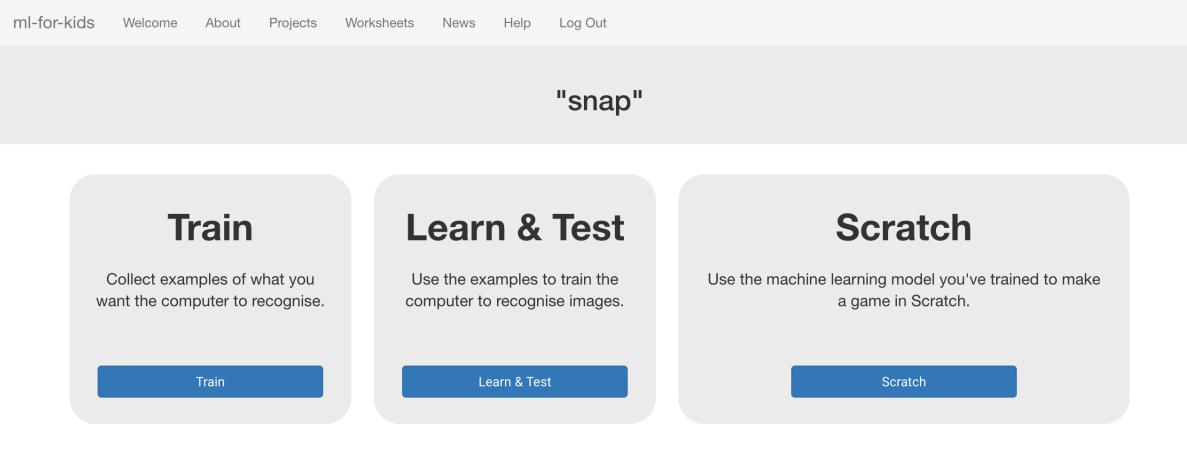
Collect examples of what you want the computer to recognise.

**Learn & Test**

Use the examples to train the computer to recognise images.

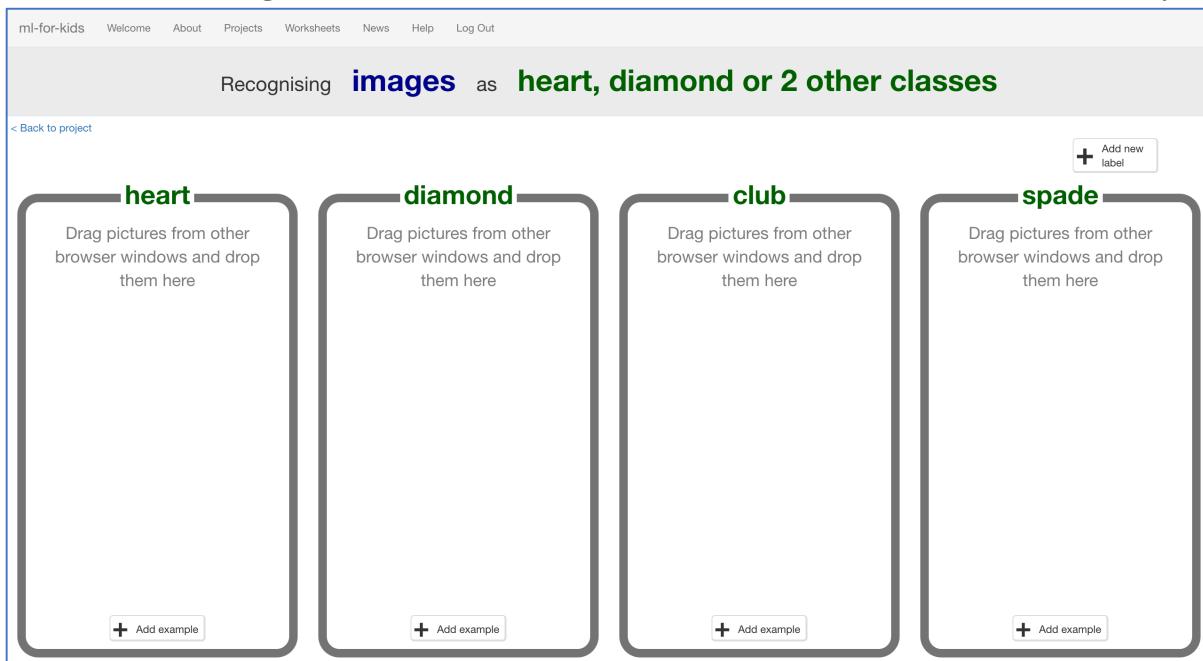
**Scratch**

Use the machine learning model you've trained to make a game in Scratch.



- 12.** Click the “+ Add new label” button and create a bucket called “heart”.

## 13. Do that again, to create buckets for “diamond”, “club” and “spade”.



---

We need to collect example of photos of your cards.

This means taking photos of them, 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 **imagebin.ca**. But any digital camera and any photo sharing website would work just as well.

---

Skip to step 18 if you use a different site to upload your photos to.

---

## 14. Open a new browser window or tab, and go to <https://ibm.biz/mlforkids-webcam>

## 15. 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.*

## 16. Hold one of your cards to the webcam and click the “Take photo and upload to imagebin” button.

Every photo you take is uploaded immediately to imagebin.ca.

Upload webcam photos to imagebin

**Warning**

This tool uploads photos to the website [imagebin](#) where they will be publicly accessible.  
Do not use this tool if you are not happy to post photos to the Internet where anyone can see them.  
You will not be able to delete the photos.

**Preview**



[Take photo and upload to imagebin](#)

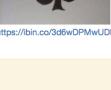
**Uploads**



<https://ibin.co/3d6uCpIdtNvN.jpg>

## 17. Take 10 photos of each of your cards.

**Uploads**

 <a href="https://ibin.co/3d6ucRCAhntMh.jpg">https://ibin.co/3d6ucRCAhntMh.jpg</a>	 <a href="https://ibin.co/3d6uSRax0f3.jpg">https://ibin.co/3d6uSRax0f3.jpg</a>	 <a href="https://ibin.co/3d6uJ0NmWb7T.jpg">https://ibin.co/3d6uJ0NmWb7T.jpg</a>	 <a href="https://ibin.co/3d6uWVf6w2ZL.jpg">https://ibin.co/3d6uWVf6w2ZL.jpg</a>	 <a href="https://ibin.co/3d6ubBbbT4r.jpg">https://ibin.co/3d6ubBbbT4r.jpg</a>
 <a href="https://ibin.co/3d6ucRPGg1v5.jpg">https://ibin.co/3d6ucRPGg1v5.jpg</a>	 <a href="https://ibin.co/3d6ud5kb0xxN.jpg">https://ibin.co/3d6ud5kb0xxN.jpg</a>	 <a href="https://ibin.co/3d6uecXQnBYd.jpg">https://ibin.co/3d6uecXQnBYd.jpg</a>	 <a href="https://ibin.co/3d6ufYvhvOKl.jpg">https://ibin.co/3d6ufYvhvOKl.jpg</a>	 <a href="https://ibin.co/3d6uhQkvqYZ.jpg">https://ibin.co/3d6uhQkvqYZ.jpg</a>
 <a href="https://ibin.co/3d6uuEPju8sV.jpg">https://ibin.co/3d6uuEPju8sV.jpg</a>	 <a href="https://ibin.co/3d6uxyhX04d.jpg">https://ibin.co/3d6uxyhX04d.jpg</a>	 <a href="https://ibin.co/3d6uzXU2h9D.jpg">https://ibin.co/3d6uzXU2h9D.jpg</a>	 <a href="https://ibin.co/3d6v0TZ3wnCS.jpg">https://ibin.co/3d6v0TZ3wnCS.jpg</a>	 <a href="https://ibin.co/3d6v22LHSVPE.jpg">https://ibin.co/3d6v22LHSVPE.jpg</a>
 <a href="https://ibin.co/3d6v3uJtGwUI.jpg">https://ibin.co/3d6v3uJtGwUI.jpg</a>	 <a href="https://ibin.co/3d6v8HDVJto.jpg">https://ibin.co/3d6v8HDVJto.jpg</a>	 <a href="https://ibin.co/3d6vbuDY6kCO.jpg">https://ibin.co/3d6vbuDY6kCO.jpg</a>	 <a href="https://ibin.co/3d6vATDNcVjC.jpg">https://ibin.co/3d6vATDNcVjC.jpg</a>	 <a href="https://ibin.co/3d6vEg0hq8q.jpg">https://ibin.co/3d6vEg0hq8q.jpg</a>
 <a href="https://ibin.co/3d6vLOWCCP3A.jpg">https://ibin.co/3d6vLOWCCP3A.jpg</a>	 <a href="https://ibin.co/3d6va4K0P2wy.jpg">https://ibin.co/3d6va4K0P2wy.jpg</a>	 <a href="https://ibin.co/3d6vcFpAWC3U.jpg">https://ibin.co/3d6vcFpAWC3U.jpg</a>	 <a href="https://ibin.co/3d6vcFpAWQRlU.jpg">https://ibin.co/3d6vcFpAWQRlU.jpg</a>	 <a href="https://ibin.co/3d6vcaXV7e4W.jpg">https://ibin.co/3d6vcaXV7e4W.jpg</a>
 <a href="https://ibin.co/3d6vmYceIUnY.jpg">https://ibin.co/3d6vmYceIUnY.jpg</a>	 <a href="https://ibin.co/3d6voJPU0TCi.jpg">https://ibin.co/3d6voJPU0TCi.jpg</a>	 <a href="https://ibin.co/3d6vpMq9QDzo.jpg">https://ibin.co/3d6vpMq9QDzo.jpg</a>	 <a href="https://ibin.co/3d6vqJue7eRM.jpg">https://ibin.co/3d6vqJue7eRM.jpg</a>	 <a href="https://ibin.co/3d6vrhTdlVw.jpg">https://ibin.co/3d6vrhTdlVw.jpg</a>
 <a href="https://ibin.co/3d6vYQOxy1Y.jpg">https://ibin.co/3d6vYQOxy1Y.jpg</a>	 <a href="https://ibin.co/3d6vz2vla8Sz.jpg">https://ibin.co/3d6vz2vla8Sz.jpg</a>	 <a href="https://ibin.co/3d6vObi85rOT.jpg">https://ibin.co/3d6vObi85rOT.jpg</a>	 <a href="https://ibin.co/3d6v0HIObYP.jpg">https://ibin.co/3d6v0HIObYP.jpg</a>	 <a href="https://ibin.co/3d6w2AUxbXgH.jpg">https://ibin.co/3d6w2AUxbXgH.jpg</a>
 <a href="https://ibin.co/3d6w2DID20.jpg">https://ibin.co/3d6w2DID20.jpg</a>	 <a href="https://ibin.co/3d6w3jHn7SsC.jpg">https://ibin.co/3d6w3jHn7SsC.jpg</a>	 <a href="https://ibin.co/3d6w54ccx6L.jpg">https://ibin.co/3d6w54ccx6L.jpg</a>	 <a href="https://ibin.co/3d6wDPMwUDH7.jpg">https://ibin.co/3d6wDPMwUDH7.jpg</a>	 <a href="https://ibin.co/3d6wELRROQif.jpg">https://ibin.co/3d6wELRROQif.jpg</a>

**Notes**

This tool uses the [imagebin API](#) but is not provided, supported or endorsed by them.

## 18. Arrange your windows so both web browser windows (the machine learning training buckets and the photos you've taken) are side by side.

Recognising **images** as **heart, diamond or other classes**

< Back to project

**heart**      **diamond**

Drag pictures from other browser windows and drop them here

+ Add example

**club**      **spade**

Drag pictures from other browser windows and drop them here

+ Add example

Uploads

- https://bin.co/3d6uFCAH+Tmh.jpg
- https://bin.co/3d6uBRax0R3.jpg
- https://bin.co/3d6uJ0NmWB7T.jpg
- https://bin.co/3d6uWVFBz2Z.jpg
- https://bin.co/3d6ublbo143.jpg
- https://bin.co/3d6u52GtVb5.jpg
- https://bin.co/3d6u3KHN.jpg
- https://bin.co/3d6uXmYd.jpg
- https://bin.co/3d6uYbvnvOKL.jpg
- https://bin.co/3d6uQevWnVYZ.jpg
- https://bin.co/3d6uUPhuhU.jpg
- https://bin.co/3d6uuy3O4d.jpg
- https://bin.co/3d6uZJ2HqHQ.jpg
- https://bin.co/3d6v0T2wncS.jpg
- https://bin.co/3d6v22LB9PE.jpg
- https://bin.co/3d6vLhGwU.jpg
- https://bin.co/3d6vWV7nVc.jpg
- https://bin.co/3d6vEo7sQ.jpg
- https://bin.co/3d6vWTNnVc.jpg
- https://bin.co/3d6vC4L.jpg
- https://bin.co/3d6vLWCP3A.jpg
- https://bin.co/3d6v4KOP9ay.jpg
- https://bin.co/3d6vPnACbU.jpg
- https://bin.co/3d6vYQWORU.jpg
- https://bin.co/3d6vqLr7vRM.jpg
- https://bin.co/3d6vbmYeaJxV.jpg
- https://bin.co/3d6v7PU0TC.jpg
- https://bin.co/3d6vqMg9Qzno.jpg
- https://bin.co/3d6vqLr7vRM.jpg
- https://bin.co/3d6vbmYeaJxV.jpg
- https://bin.co/3d6v7PU0TC.jpg
- https://bin.co/3d6vqMg9Qzno.jpg

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

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Recognising **images** as **heart, diamond or 2 other classes**

< Back to project

**heart**      **diamond**      **club**      **spade**

+ Add new label

+ Add example

+ Add example

+ Add example

## 20. Click on the “< Back to project” link.

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

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

The screenshot shows a web page titled "Machine learning models". At the top, there is a navigation bar with links: ml-for-kids, Welcome, About, Projects, Worksheets, News, Help, and Log Out. Below the navigation bar, there is a section titled "Machine learning models" with a sub-section titled "What have you done?". This section contains text stating: "You've collected examples of images for a computer to use to recognise when images are heart, diamond or 2 other classes." It also lists the collected items: "You've collected:" followed by a bulleted list: • 10 examples of club, • 10 examples of diamond, • 10 examples of heart, • 10 examples of spade. To the right of this section is another section titled "What's next?". It contains text: "Ready to start the computer's training?" followed by "Click the button below to start training a machine learning model using the examples you've collected so far." and "(Or go back to the Train page if you want to collect some more examples first.)". At the bottom of the page, there is a button labeled "Train new machine learning model".

**23.** 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 cards as being heart, diamond, club or spades. 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.

**24.** 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.

< Back to project

Your project will add these blocks to the **More Blocks** tab in Scripts.

**recognise images [costume image (label)]**  
Put images in the input for this, and it will return the label that your machine learning model recognises it as.

**recognise images [costume 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).

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

**costume image**  
This block is in the Looks palette for Sprites and will return the image of the currently selected costume.

**This means you can do something like this:**

```
if [recognise images [costume image] = heart] then
[say [I think that is a picture of heart]]
```

**Open in Scratch**

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

The coloured circle next to your project name tells you if your machine learning model is okay.

- **green** means your model is trained and ready to go
- **yellow** means your model hasn't finished training yet
- **red** means something went wrong. Go back to the [Learn & Test](#) page to see what went wrong with training.

## Tips

### More examples!

The more examples you give it, the better the computer should get at recognising whether a card is heart, diamond, club or spades.

### Try and be even

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

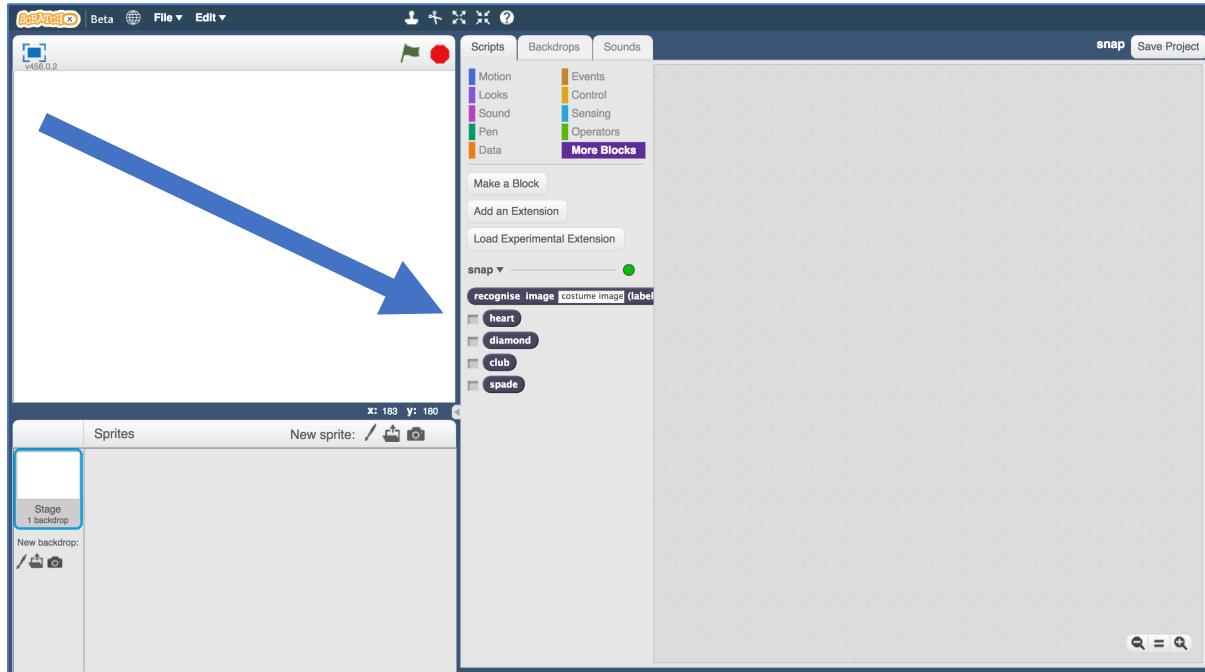
If you have a lot of examples for one type, and not the other, the computer might learn that type is more likely, so you'll affect the way that it learns to recognise photos.

### If you'd rather use imgur.com than imagebin...

use <https://dalelane.github.io/webcam-to-imgur> instead

**25.** Click the “Open in Scratch” button at the bottom to launch the Scratch editor.

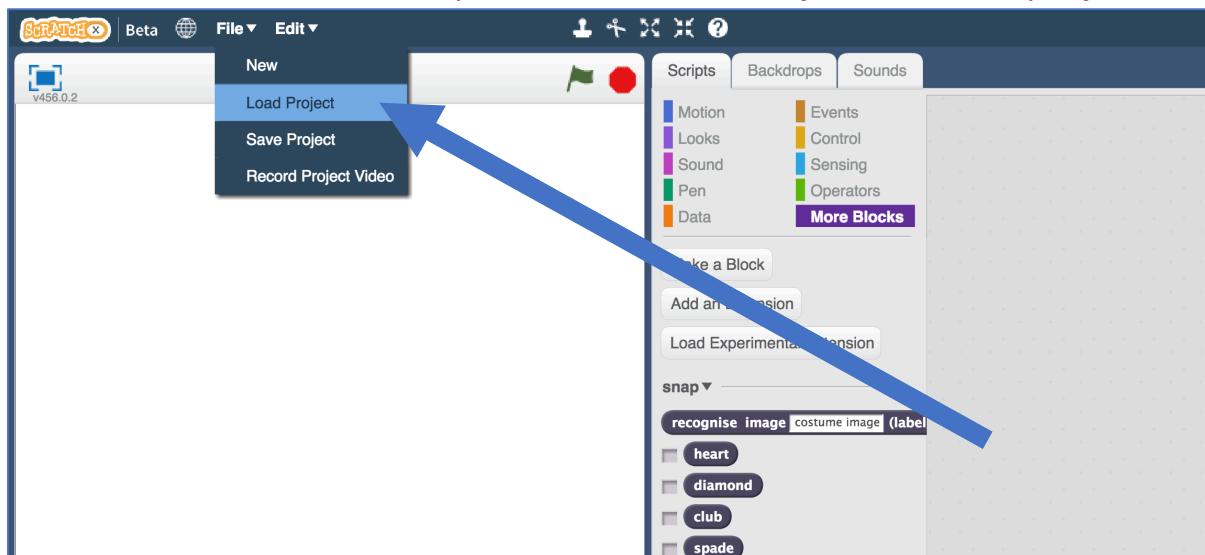
*You should see five new blocks in the “More blocks” section from your “snap” project.*



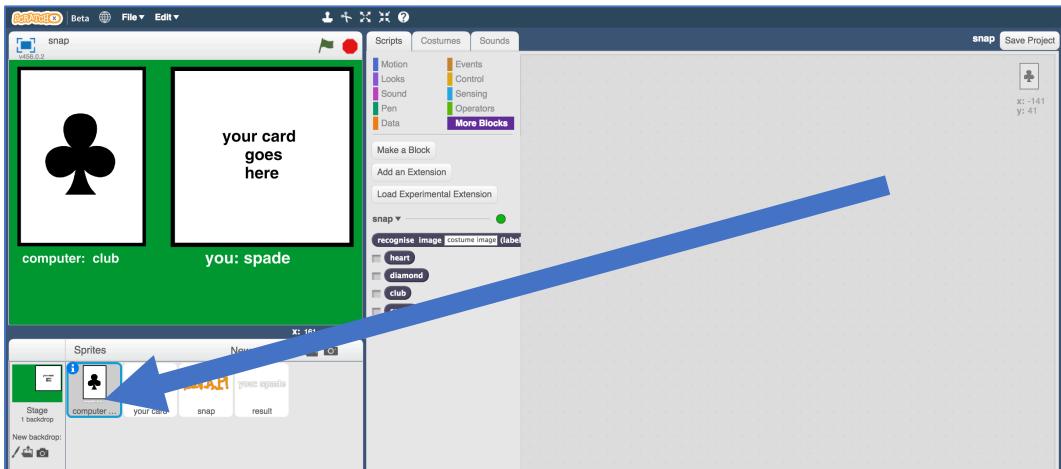
**26.** Open the “snap.sbx” project file.

Click **File -> Load Project**

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



## 27. Click on the “computer card” sprite

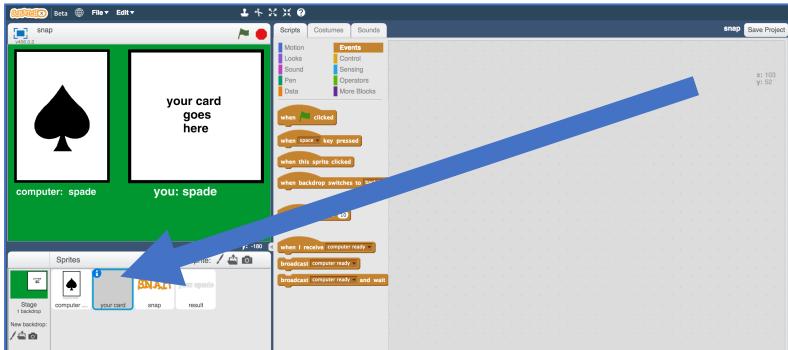


## 28. Create this script

*This script will let the computer pick a random card.*

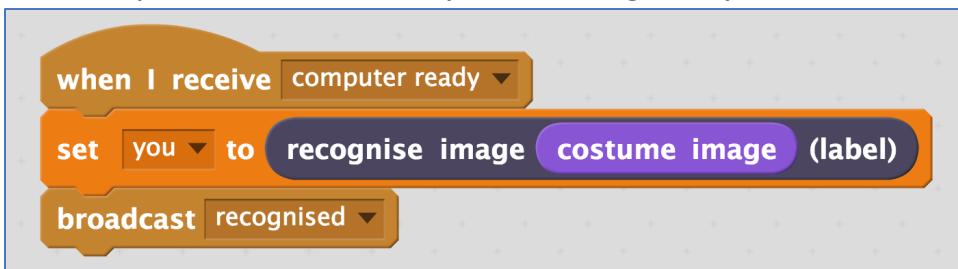


## 29. Click on the “your card” sprite

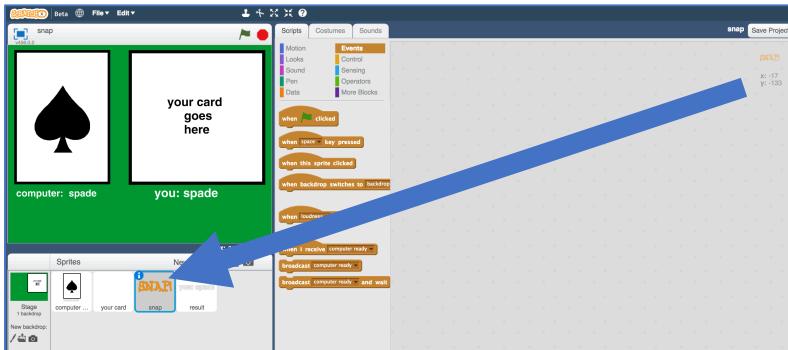


## 30. Create this script

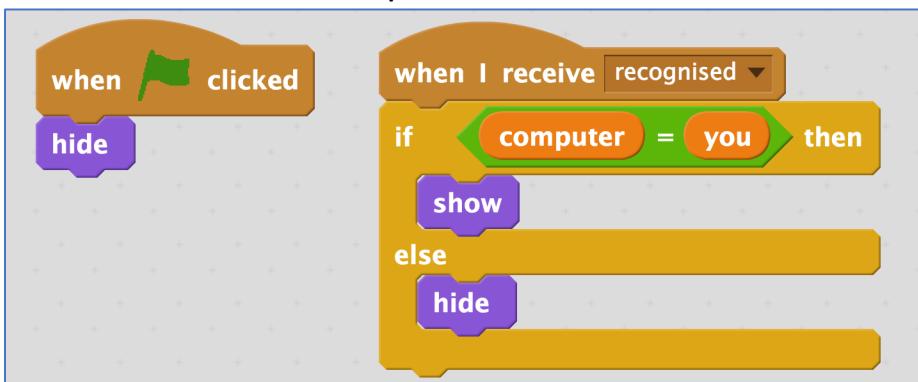
*This script will let the computer recognise your card.*



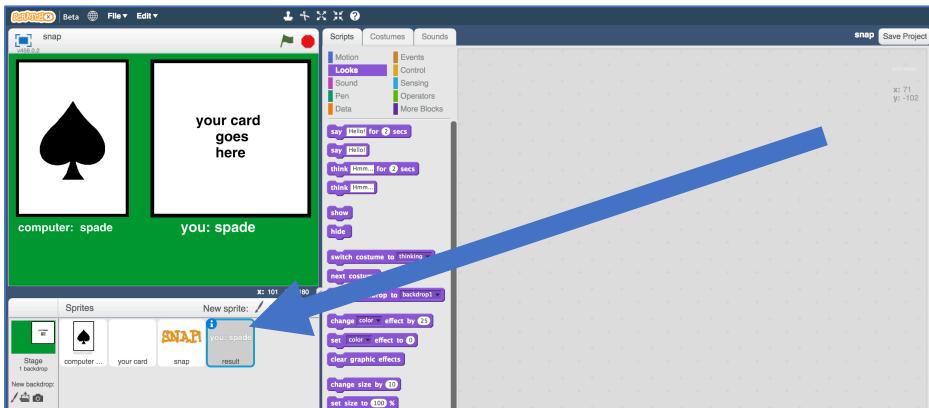
## 31. Click on the “snap” sprite



## 32. Create these scripts

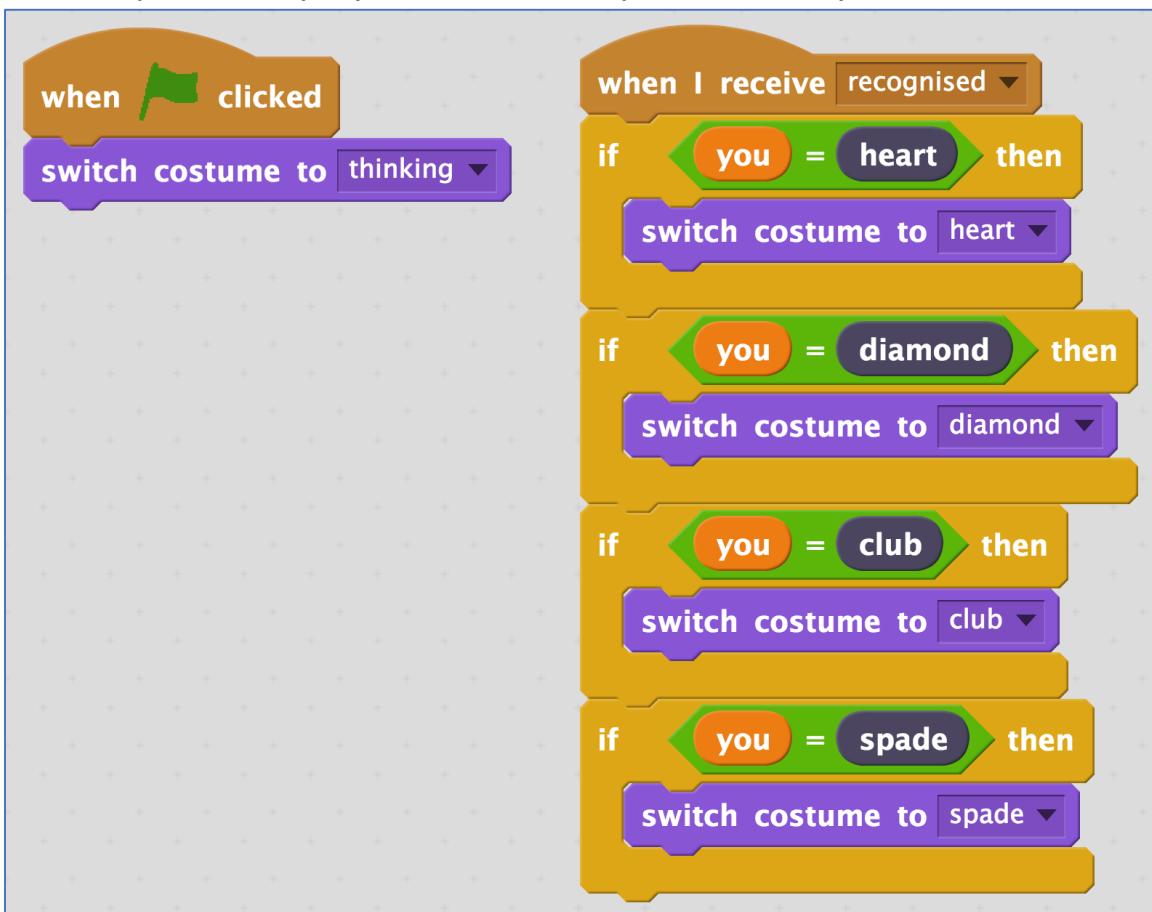


### 33. Click on the “result” sprite



### 34. Create these scripts

*This script will display what the computer thinks your card looks like*

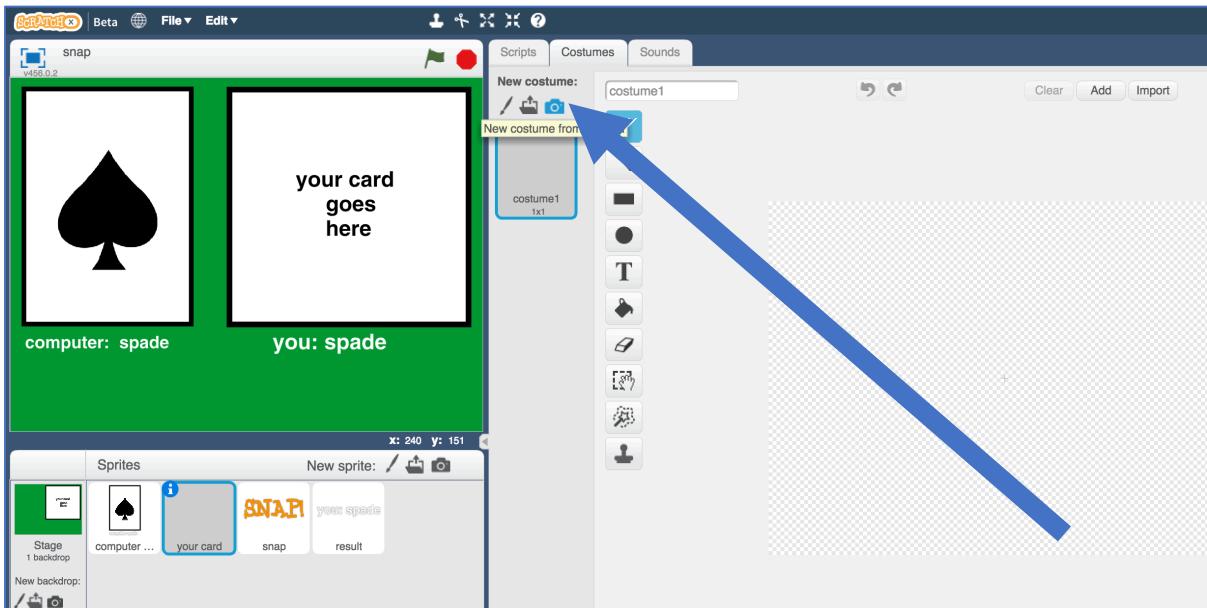


### 35. Save your project

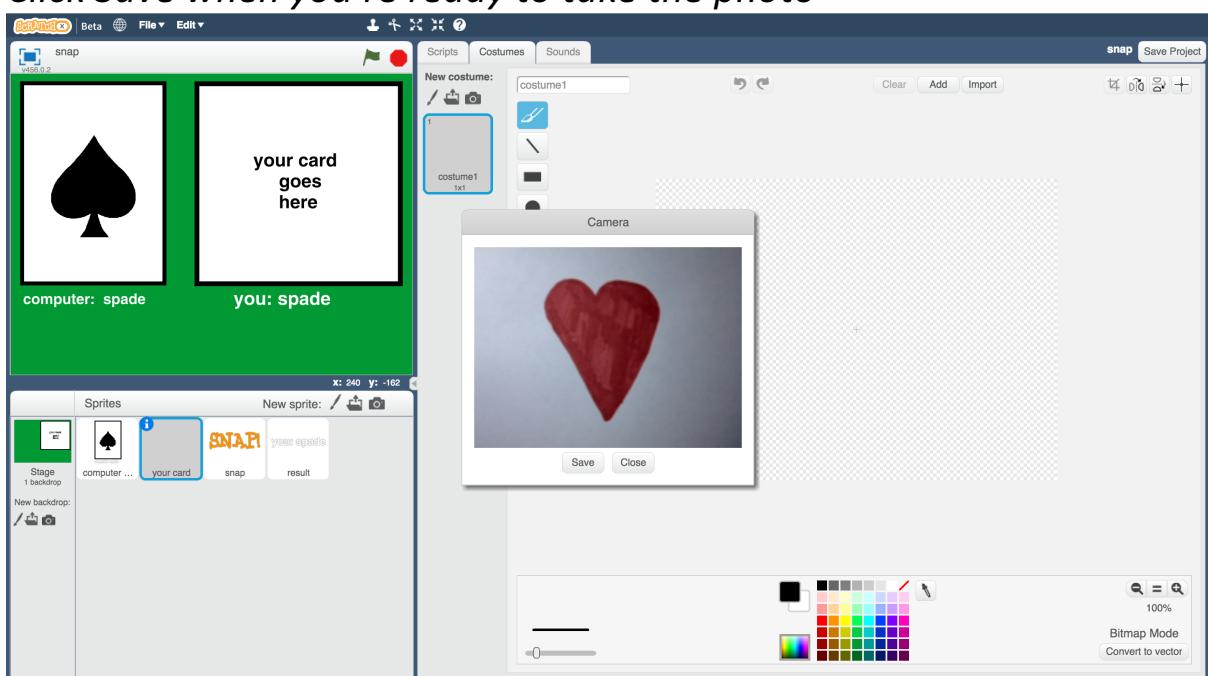
*Click File -> Save Project*

**36.** Shuffle your paper cards and pick one at random

**37.** Click on the “your card” sprite, then the costumes tab.  
Click on the “New costume from camera” button



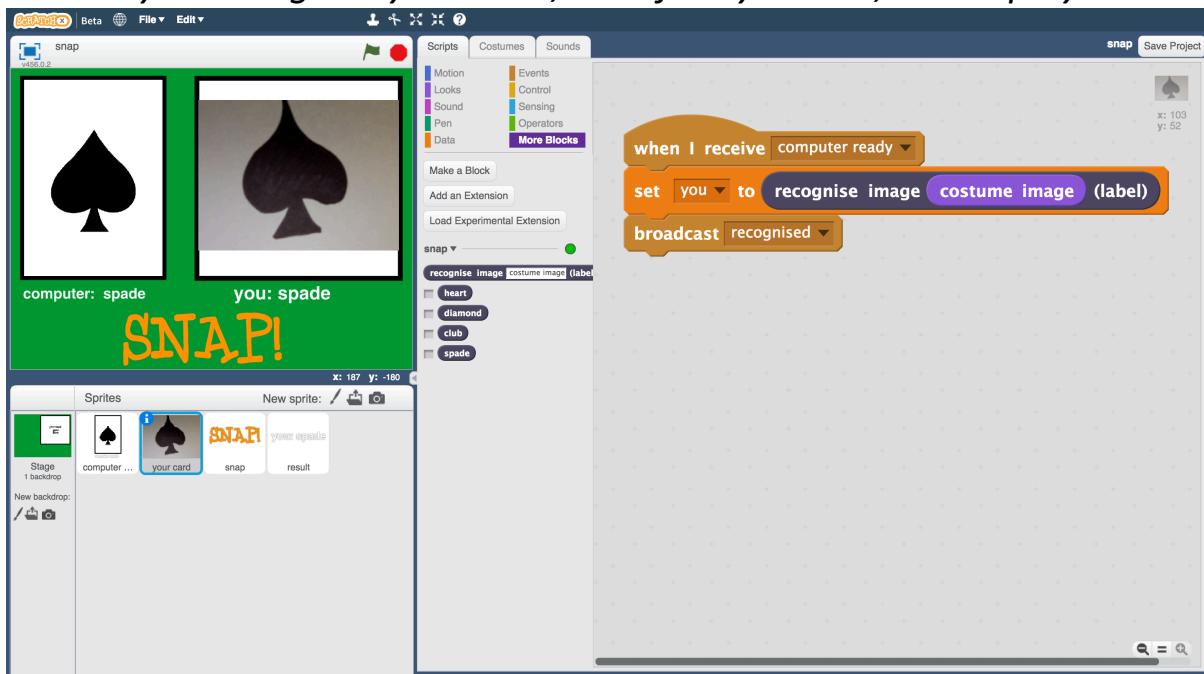
**38.** Use the webcam to take a photo of the card you picked  
*Click Save when you're ready to take the photo*



## 39. Click the Green Flag

The computer will choose a random card for its side.

It will try to recognise your card, and if they match, it'll display "SNAP!"



## What have you done?

You've made a simple card game in Scratch.

The game uses a webcam to take pictures of your card, and uses machine learning to recognise the card in the photo.

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

## 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?

### **Design your own cards**

Instead of hearts, spades, clubs and diamonds, why not make your own cards?

### **Shout “snap!”**

Instead of just displaying “SNAP!” can you record yourself shouting “Snap!” and get your Scratch project to play that when the cards match?

### **Make the game competitive**

Modify the game so it doesn't display the computer's card at first. Let it display the card at the same time it starts to recognise yours.

Who is quicker at saying “snap”? You or the computer?