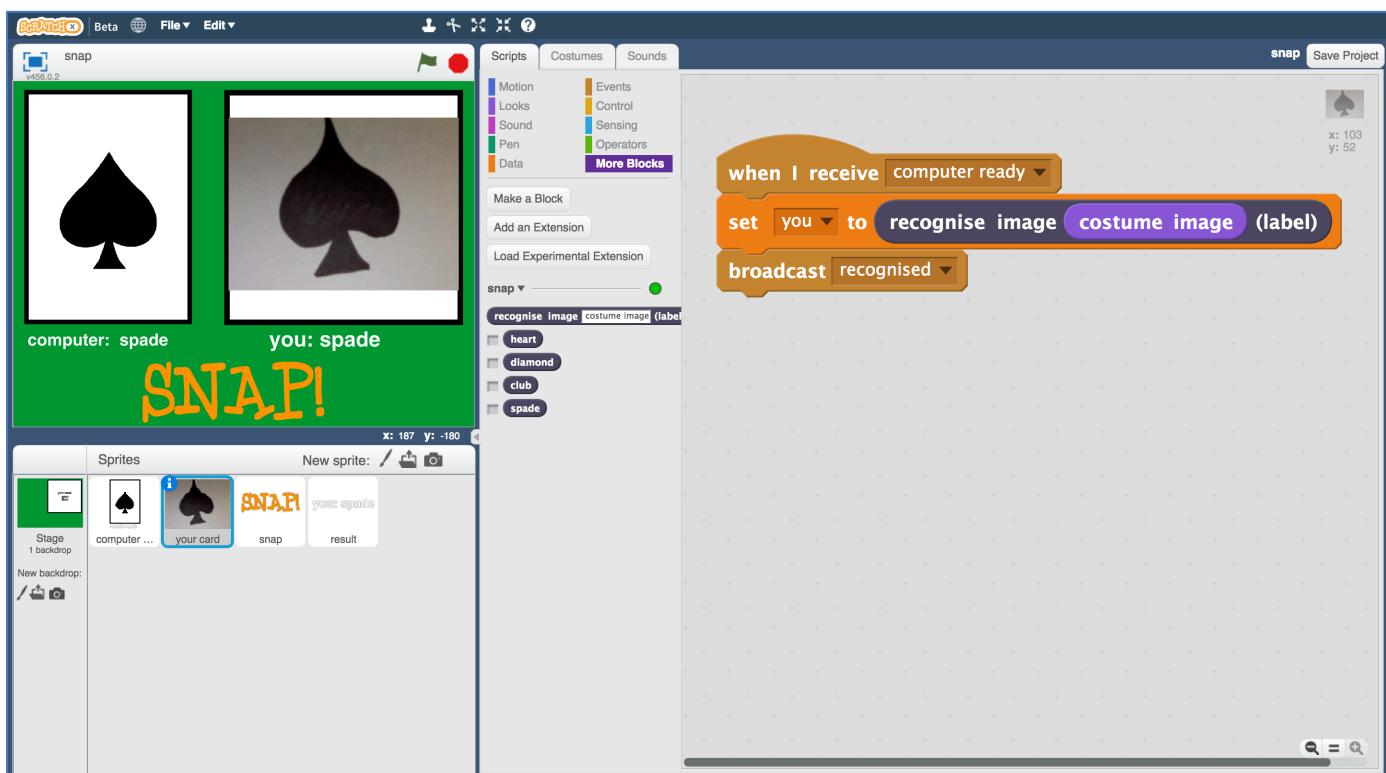


Snap!

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

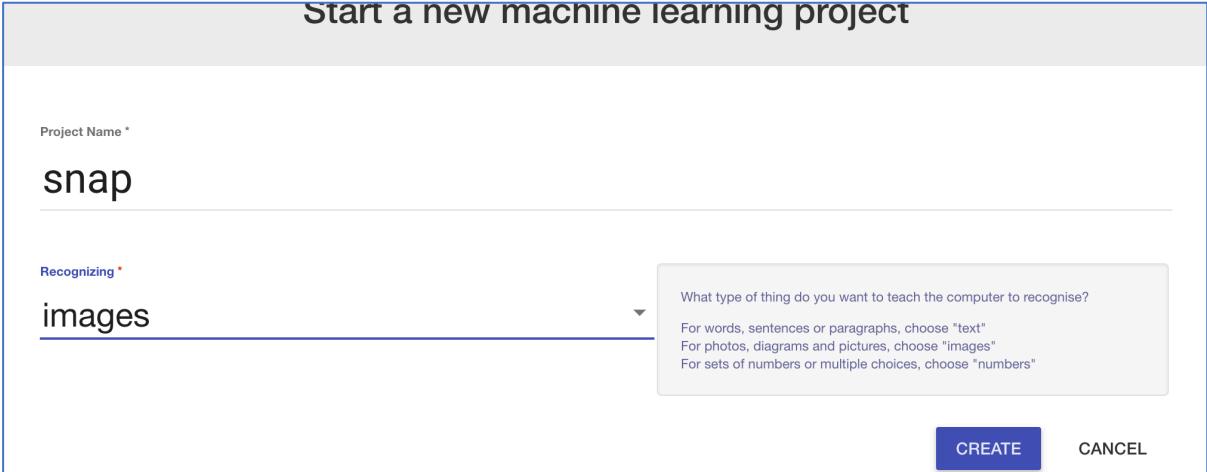
To have your move, you’ll take a photo of your card.

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



This project worksheet is licensed under a Creative Commons Attribution Non-Commercial Share-Alike License
<http://creativecommons.org/licenses/by-nc-sa/4.0/>

1. You'll need four cards for this project
Ask your group leader for a club, spade, heart and diamond.
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 to create one.
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 “snap” and set it to learn to recognise “**images**”.



Start a new machine learning project

Project Name *

snap

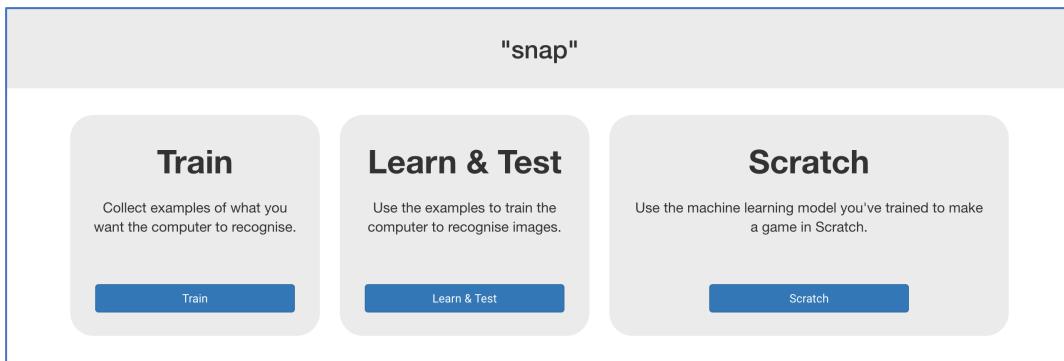
Recognizing *

images

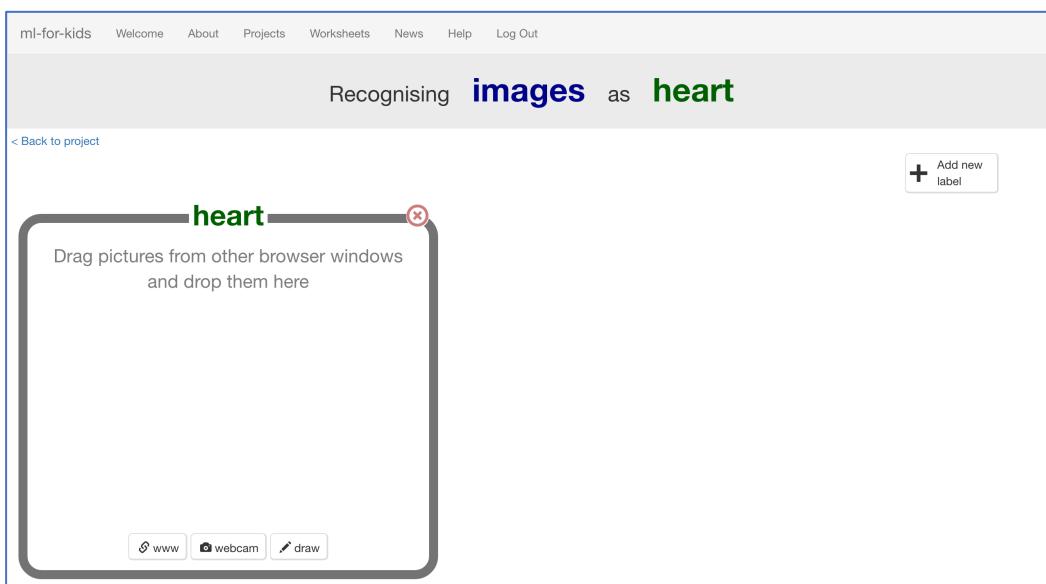
What type of thing do you want to teach the computer to recognise?
For words, sentences or paragraphs, choose "text"
For photos, diagrams and pictures, choose "images"
For sets of numbers or multiple choices, choose "numbers"

CREATE CANCEL
8. Click the “**Create**” button
9. You should see “snap” in the projects list. Click on it.

10. Click on “Train”



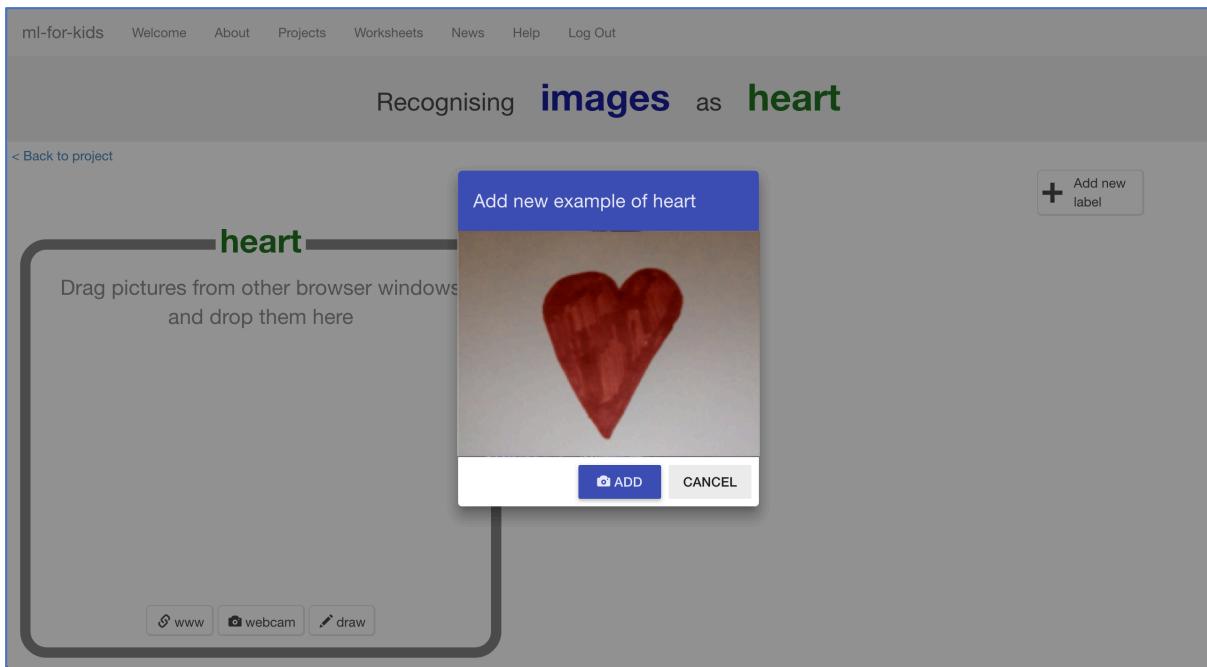
11. Click on “+ Add new label” and create a bucket called “heart”.



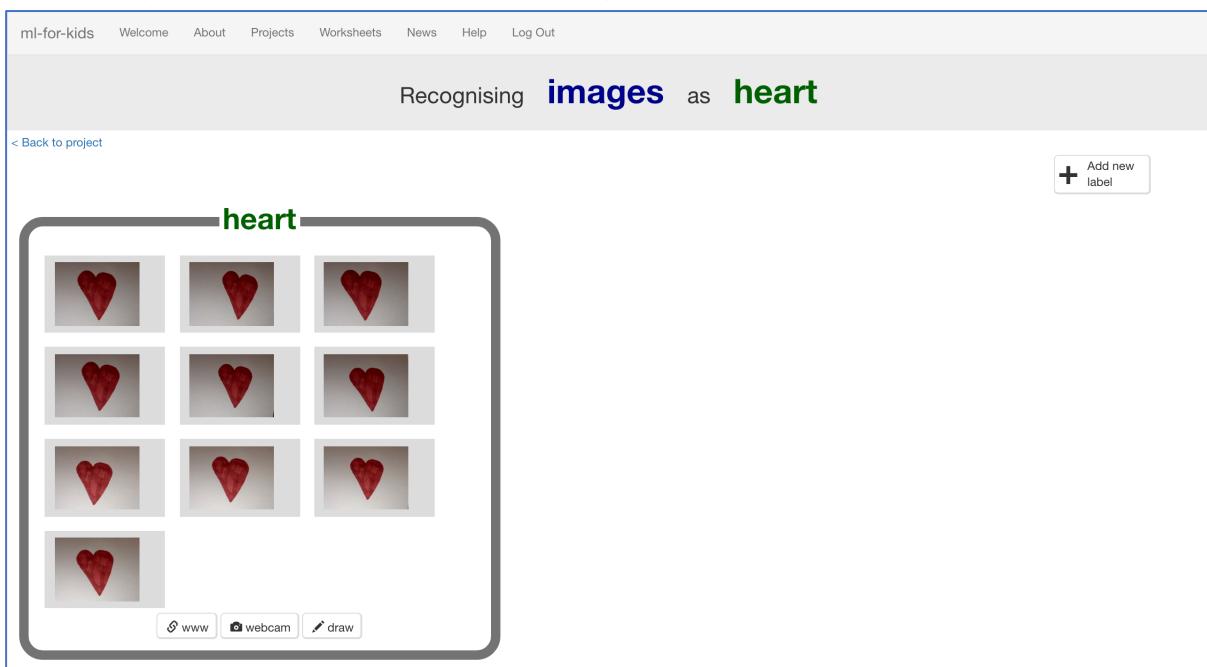
12. Click the “webcam” button

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. Hold the Heart card to the webcam and click “Add” to take a photo



14. Repeat until you've taken 10 photos of the Heart card



15. Click “+ Add new label” and create one called “diamond”

16. Use the “webcam” button in the “diamond” bucket to take 10 photos of your Diamond card

17. Repeat for “club” and “spade”.

The screenshot shows the 'ml-for-kids' interface for a machine learning project. At the top, there's a navigation bar with links for 'ml-for-kids', 'Welcome', 'About', 'Projects', 'Worksheets', 'News', 'Help', and 'Log Out'. Below the navigation is a title 'Recognising images as heart, diamond or 2 other classes'. There are four main sections labeled 'heart', 'diamond', 'club', and 'spade', each containing a 5x2 grid of images. Each grid has three buttons at the bottom: 'www', 'webcam', and 'draw'. In the top right corner, there's a button labeled '+ Add new label'.

18. Click on the “< Back to project” link.

19. Click the “Learn & Test” button.

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

This screenshot shows the 'Learn & Test' page. On the left, under 'What have you done?', it says: 'You've collected examples of images for a computer to use to recognise when images are heart, diamond or 2 other classes.' Below this, it lists: 'You've collected: • 10 examples of club, • 10 examples of diamond, • 10 examples of heart, • 10 examples of spade'. On the right, under 'What's next?', it says: 'Ready to start the computer's training? Click the button below to start training a machine learning model using the examples you've collected so far. (Or go back to the Train page if you want to collect some more examples first.)'. At the bottom, there's a text input field labeled 'Info from training computer:' and a blue button labeled 'Train new machine learning model'.

21. 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.

22. Click the "< Back to project" link, then click the "Scratch" button.

This page has instructions on how to use the new Scratch.

Keep the page open if you need to check back on how to use them.

Using machine learning in Scratch

< Back to project

Open in Scratch

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

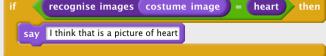
recognise images [costume image] (label)
Put images in the input for this, and it will return the label that your machine learning model recognises it as.

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).

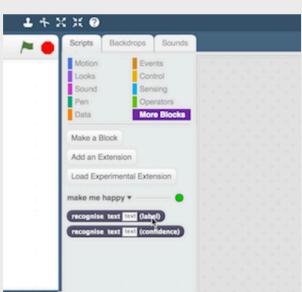
heart diamond club spade
These blocks represent the labels you've created in your project, so you can use their names in your scripts.

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:



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.

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

Tips

More examples!

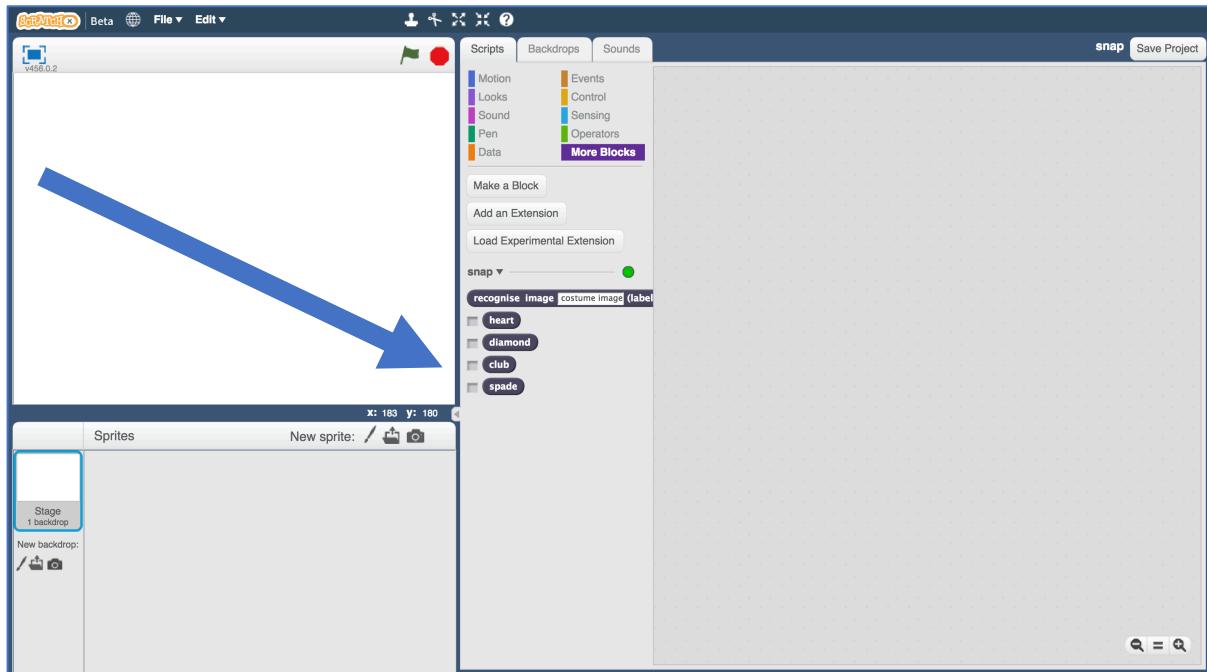
The more examples you give it, the better the computer should get at recognising whether a card is heart, diamond, club or spades.

Try and be even

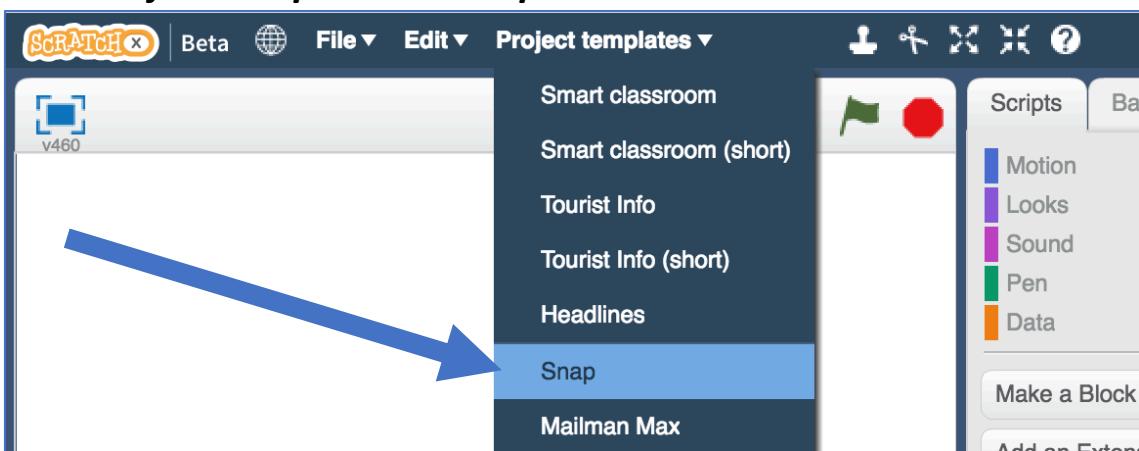
Try and come up with roughly the same number of examples for each shape.

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.

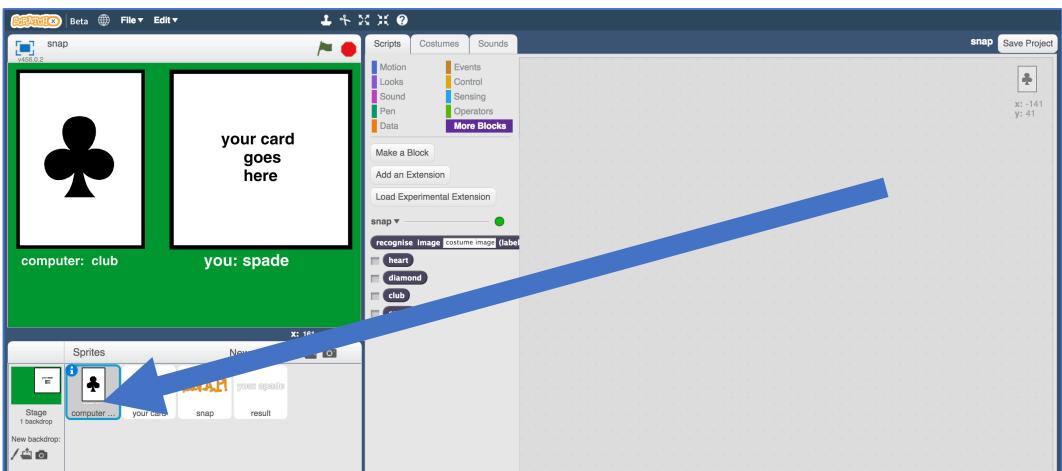
23. Click the “Open in Scratch” button to launch the Scratch editor.
You should see five new blocks in the “More blocks” section from your “snap” project.



24. Open the Snap project template.
Click **Project templates** -> **Snap**



25. Click on the “computer card” sprite

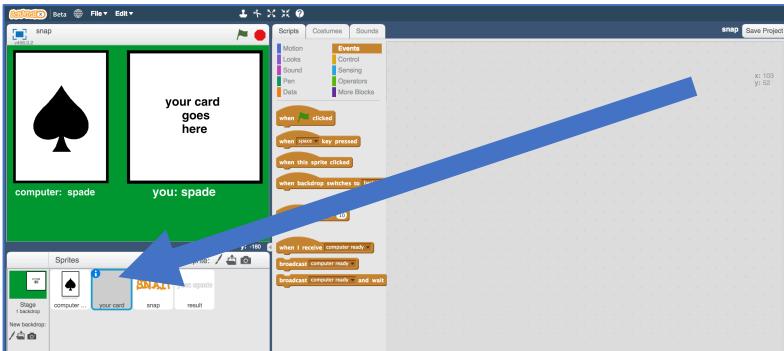


26. Create this script

This script will let the computer pick a random card.

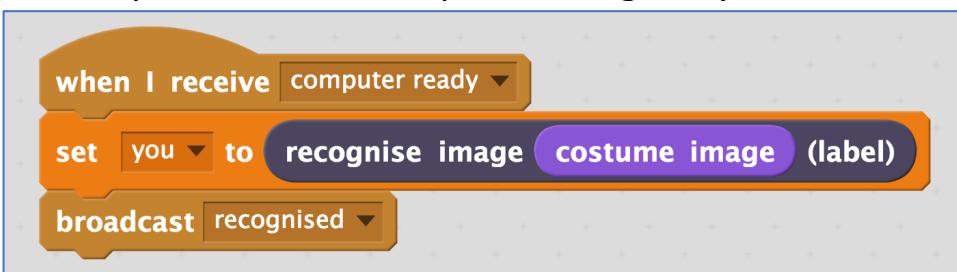


27. Click on the “your card” sprite

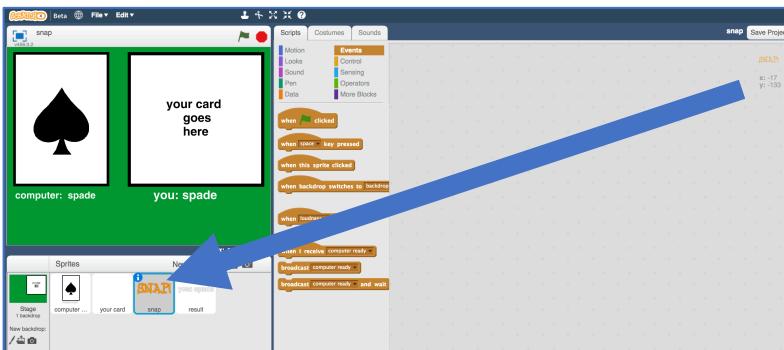


28. Create this script

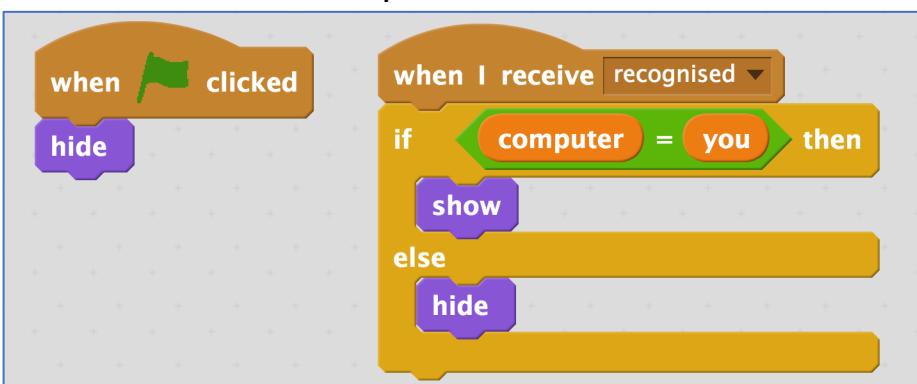
This script will let the computer recognise your card.



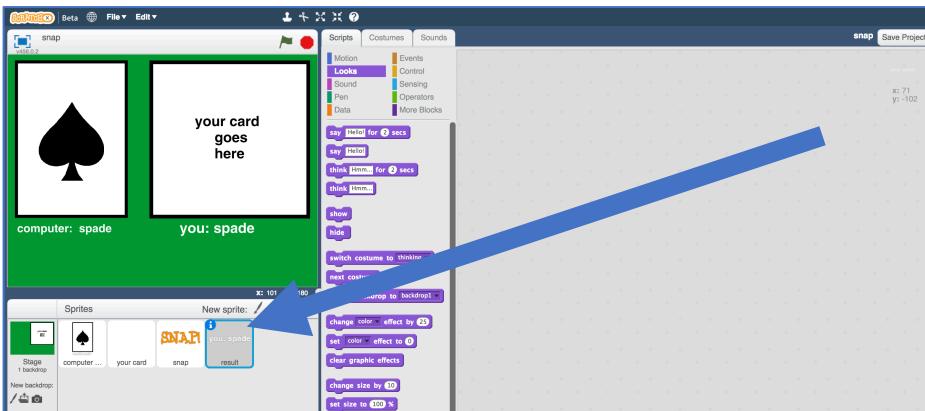
29. Click on the “snap” sprite



30. Create these scripts

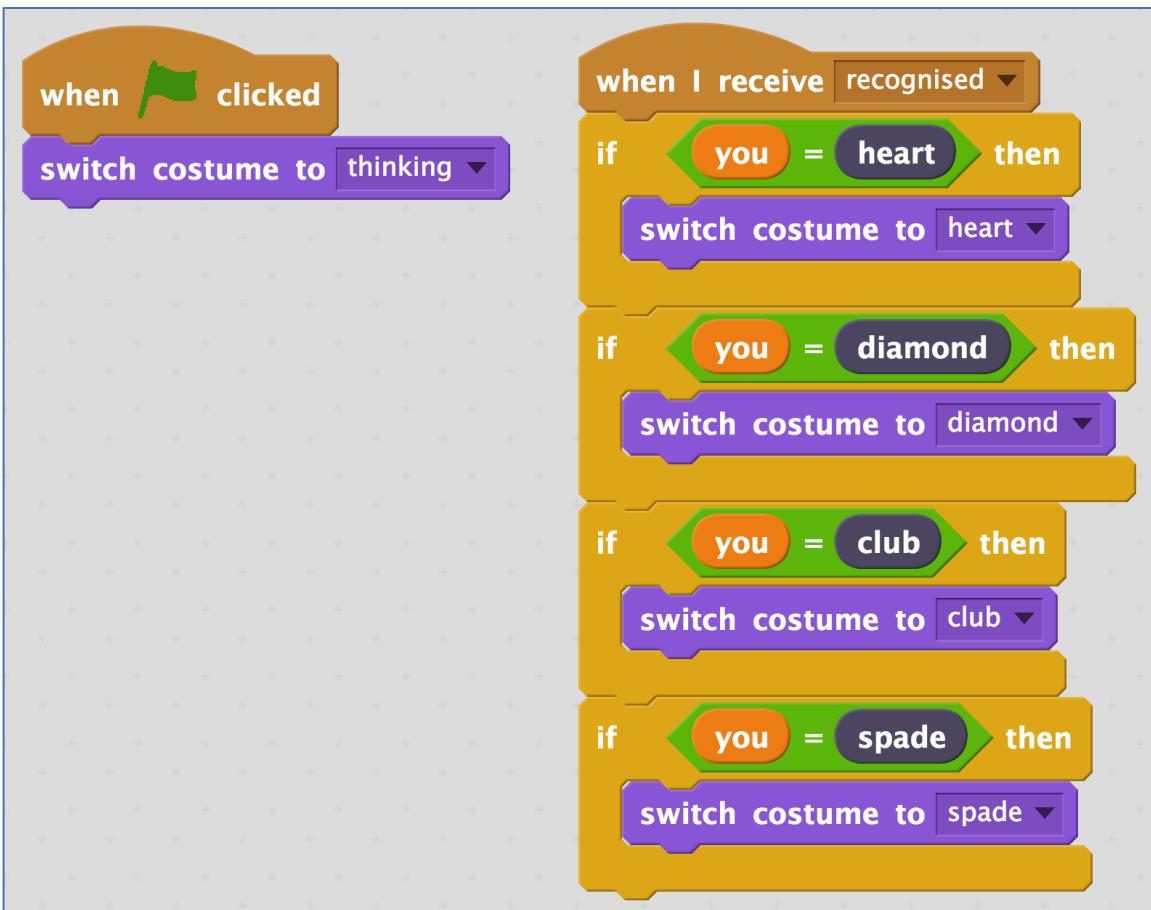


31. Click on the “result” sprite



32. Create these scripts

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

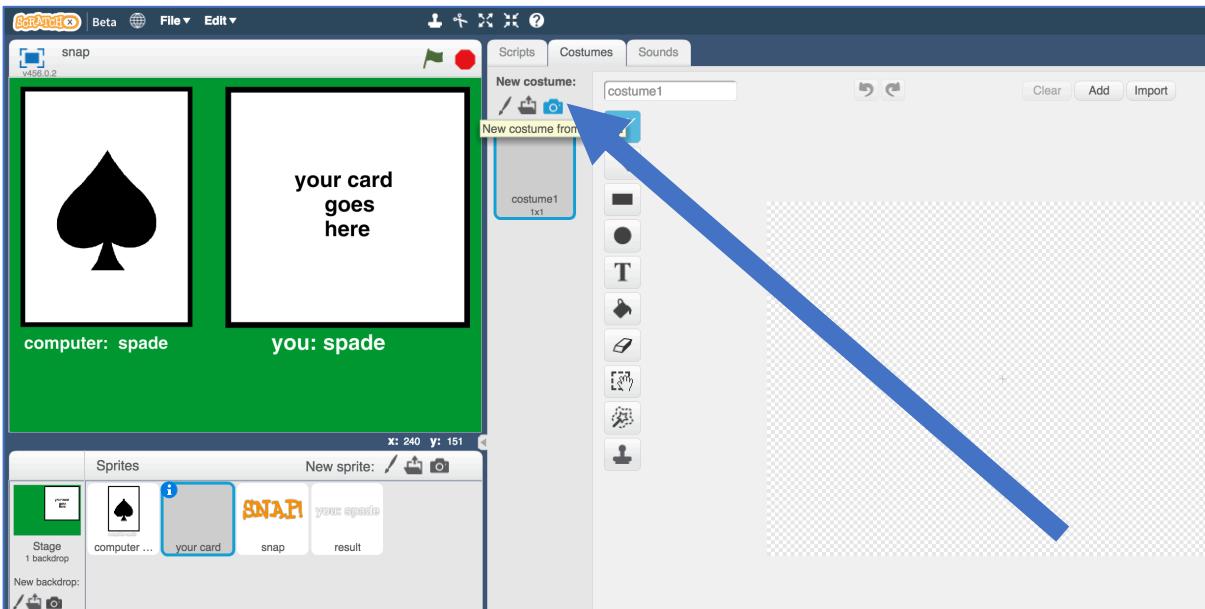


33. Save your project

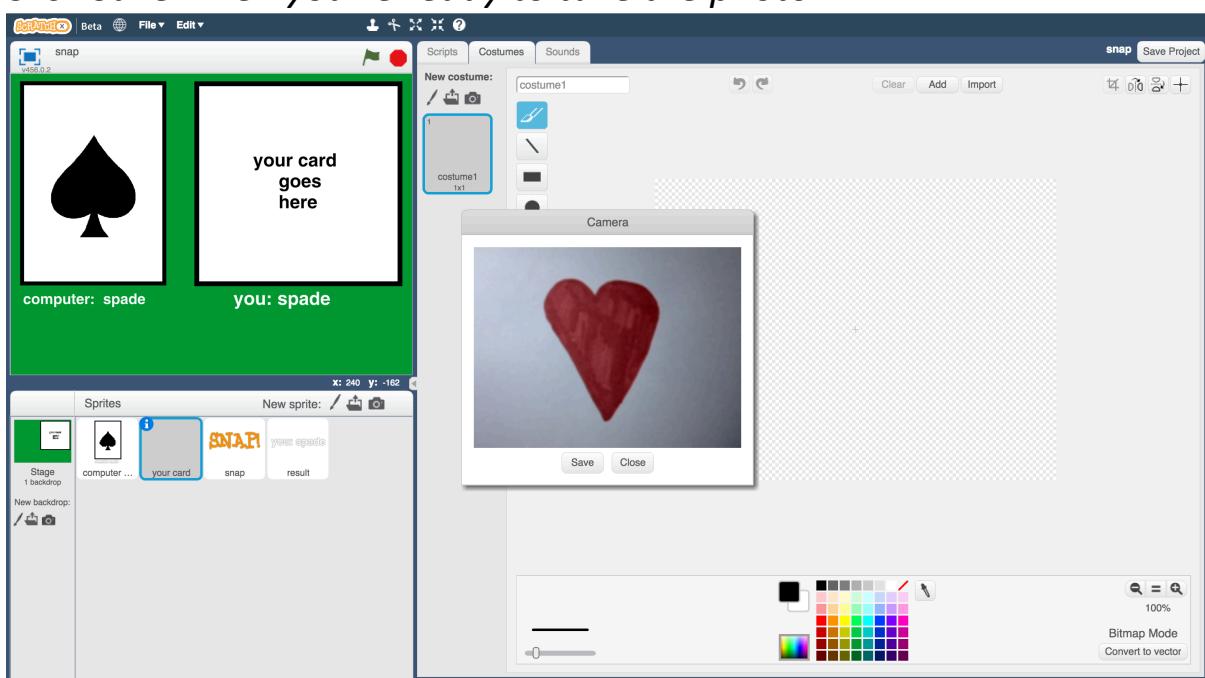
*Click **File** -> **Save Project***

34. Shuffle your paper cards and pick one at random

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



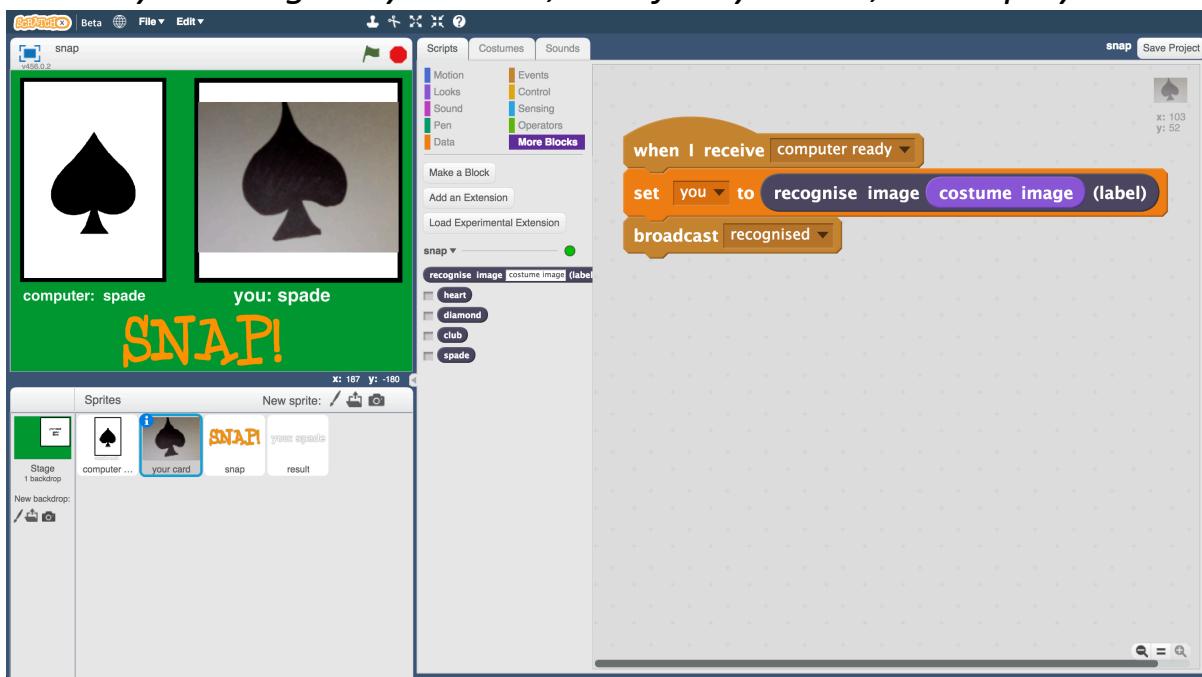
36. Use the webcam to take a photo of the card you picked
Click Save when you're ready to take the photo



37. 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?