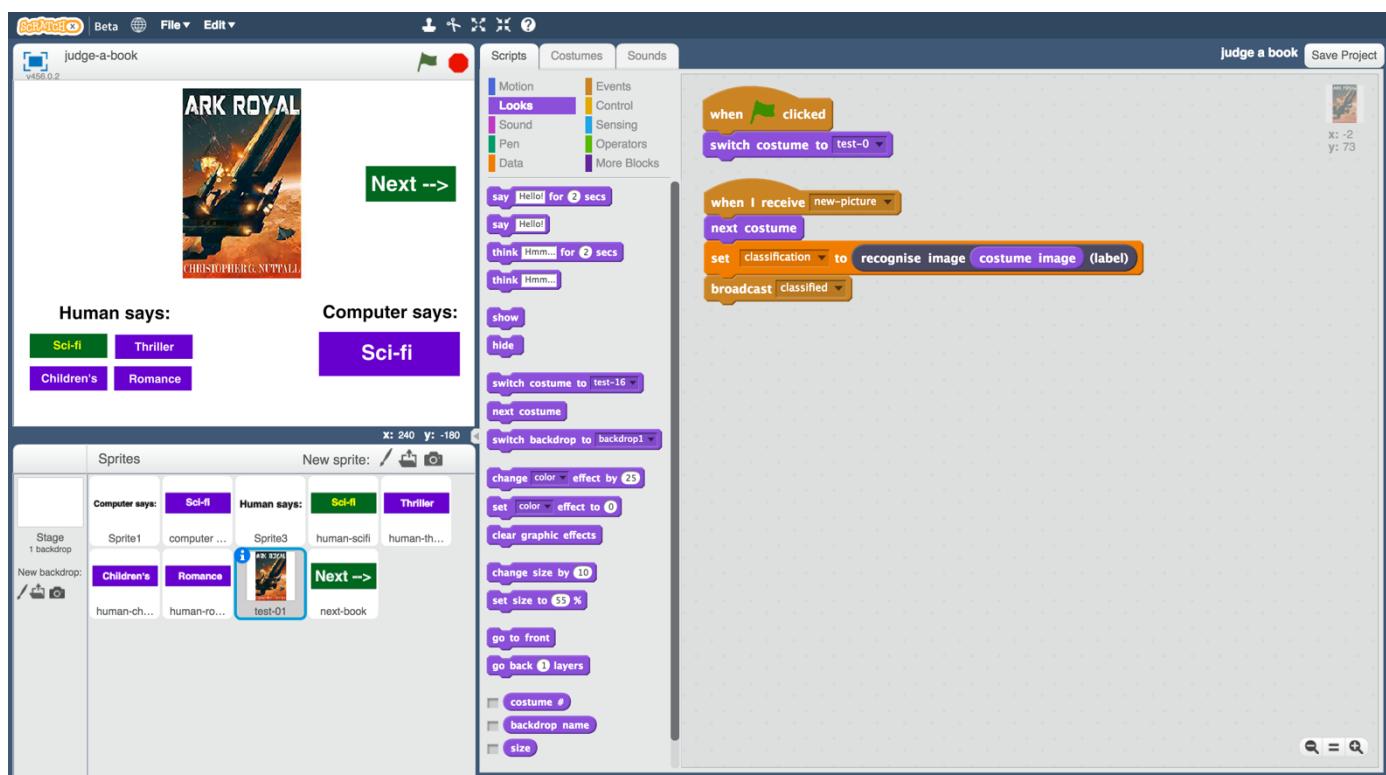


Judge a book by its cover

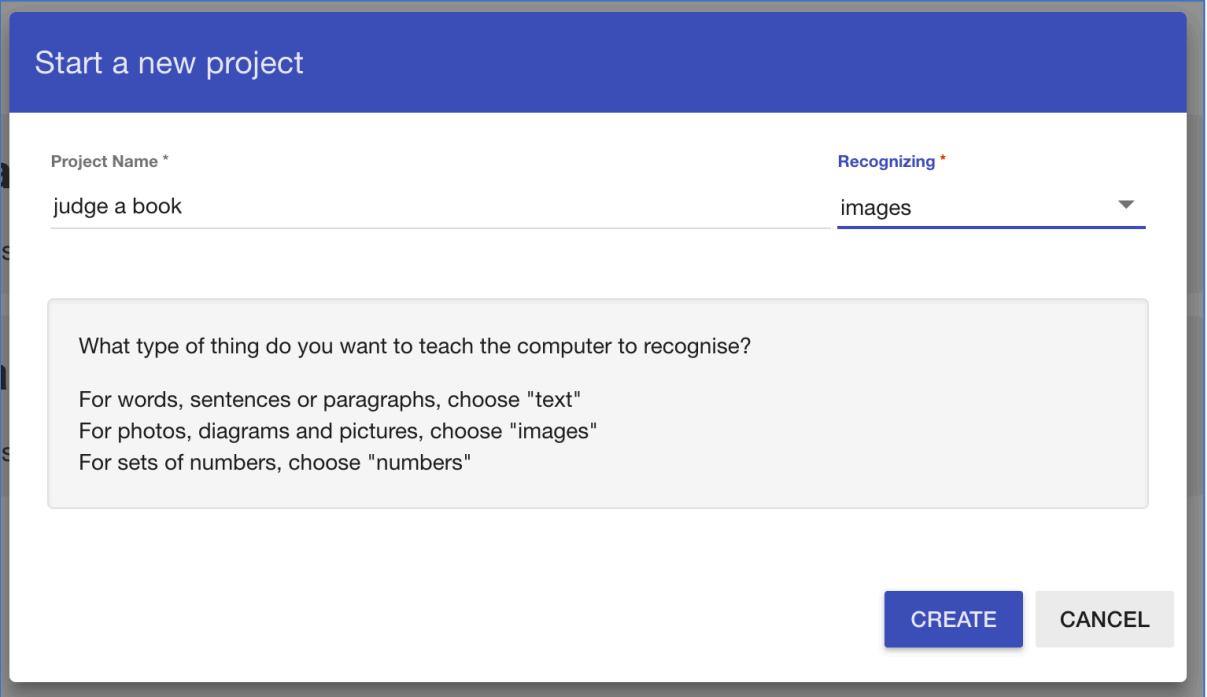
In this project, you will investigate whether it's really possible to judge a book by its cover.

You will make a game in Scratch for a friend to compete against your computer to see who is better at guessing the genre of a book based only on its cover.

To do this, you'll first need to train your computer to recognise book covers.

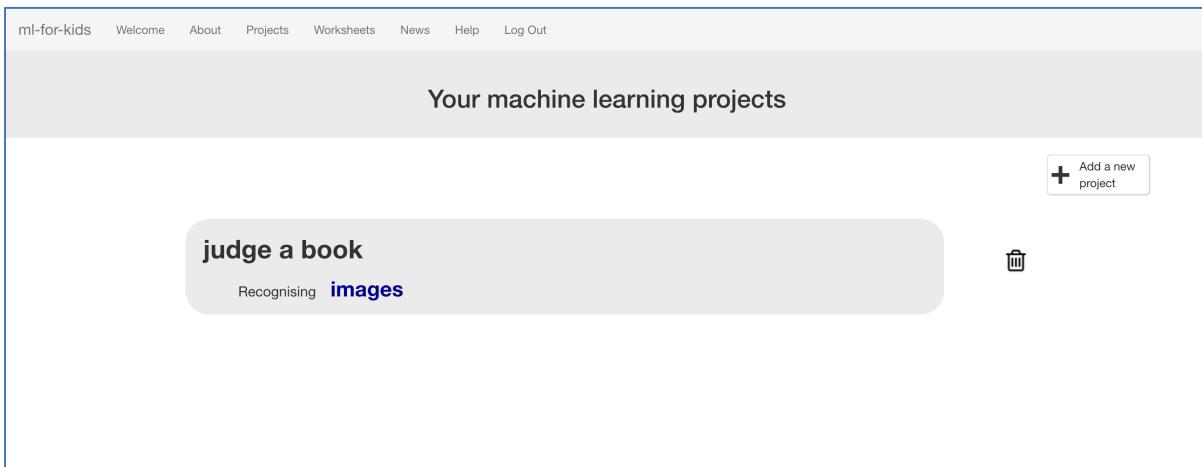


1. You'll need the **judge-a-book.sbx** starter file for this project.
If you haven't got this, ask your teacher or group leader.
2. Go to <https://machinelearningforkids.co.uk/> in a web browser
3. Click on “**Get started**”
4. Click on “**Log In**” and type in your username and password
If you don't 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 “judge a book” and set it to learn how to recognise “**images**”

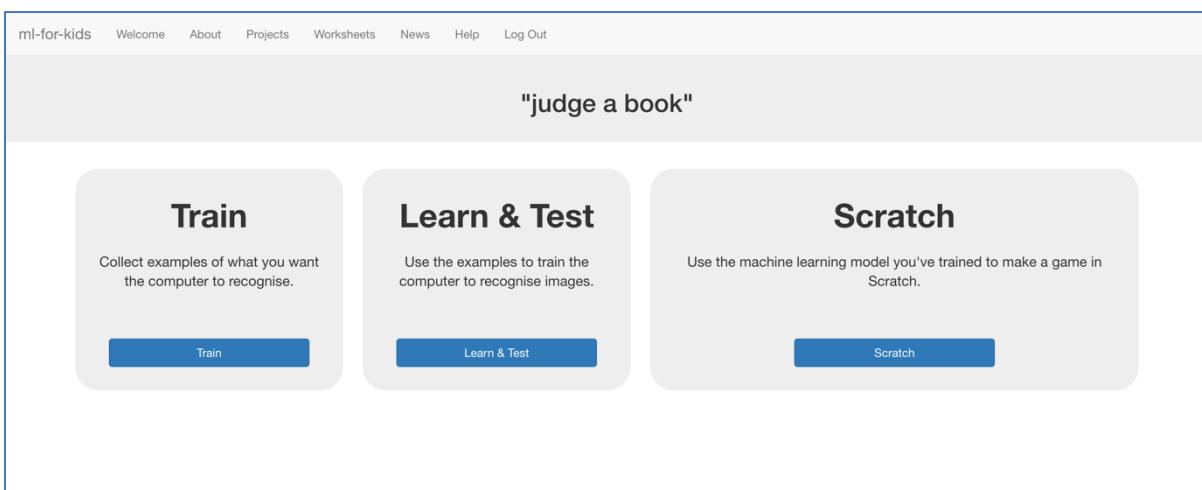


The screenshot shows a 'Start a new project' dialog box. At the top, there's a blue header bar with the text 'Start a new project'. Below this, the main form has two input fields: 'Project Name *' containing 'judge a book' and 'Recognizing *' containing 'images'. A dropdown arrow is visible next to the 'images' field. A large text area below asks 'What type of thing do you want to teach the computer to recognise?' with three options: 'For words, sentences or paragraphs, choose "text"', 'For photos, diagrams and pictures, choose "images"', and 'For sets of numbers, choose "numbers"'. At the bottom right of the dialog are 'CREATE' and 'CANCEL' buttons.

- 8.** You should now see “judge a book” show up in the list of your projects. Click on it.



- 9.** Click the “Train” button



- 10.** Choose a few genres of books.

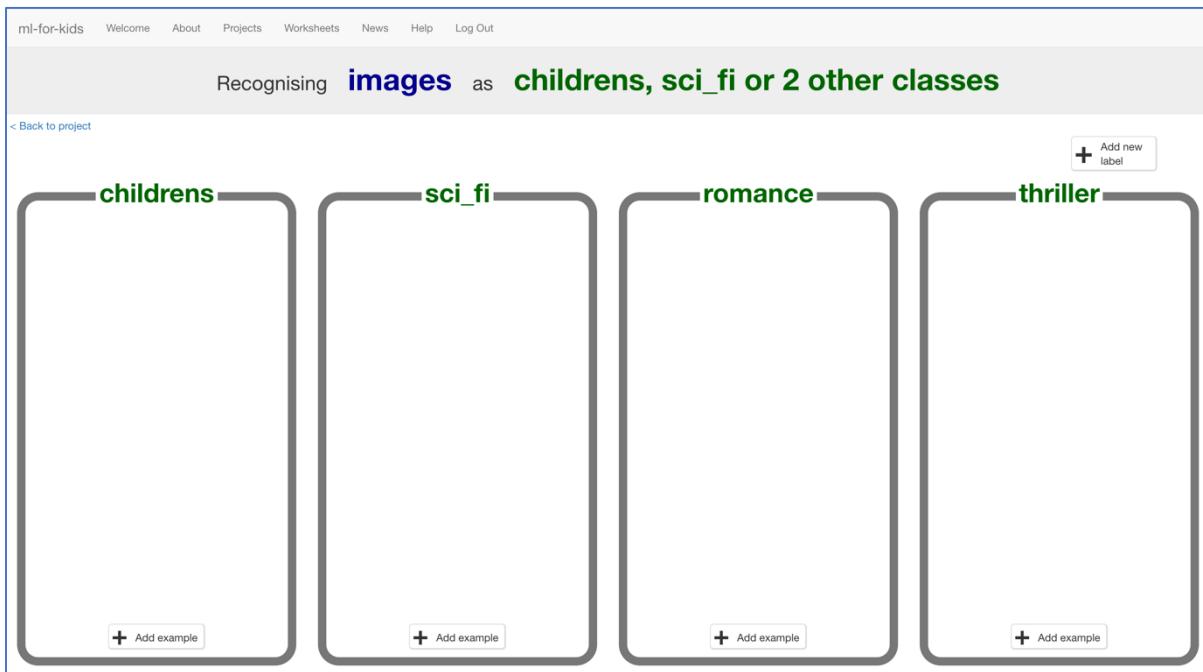
“Genre” means *the type of story*.

For the rest of this worksheet, I’ll be using:

“children’s”, “sci fi”, “romance” and “thriller”.

The project will be easier if you use these as well. But if you’re feeling adventurous, try choosing between 3 and 5 of your own instead!

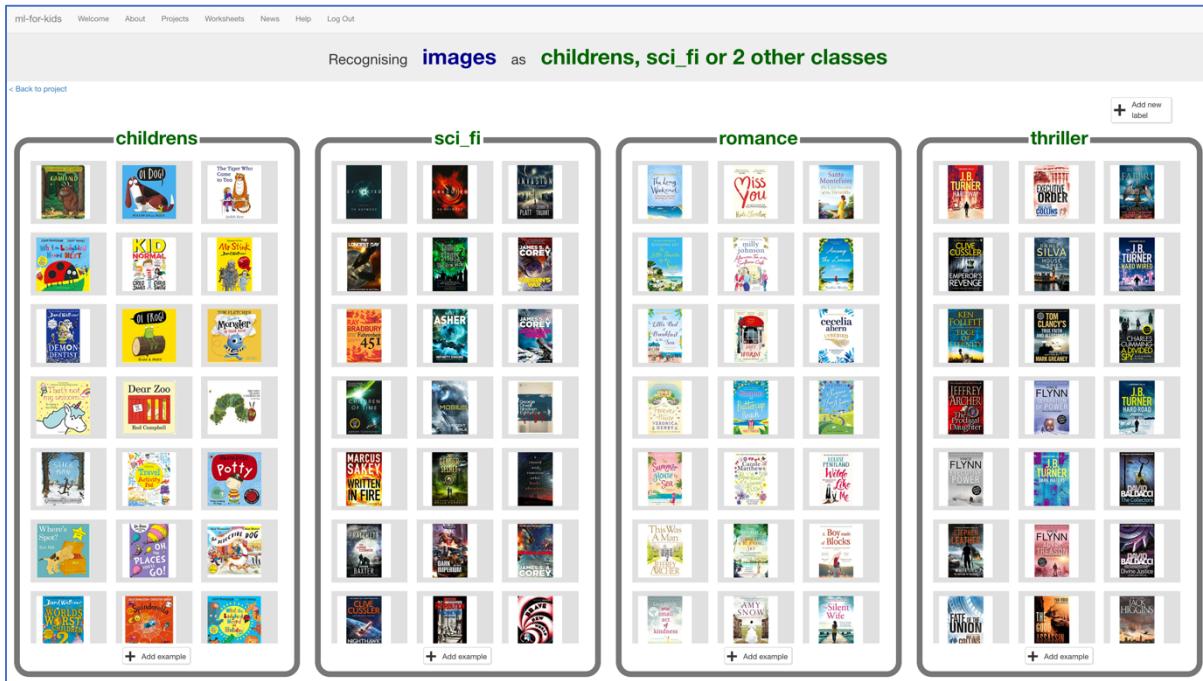
11. Use the “+ Add new label” button to create a bucket for each genre of book you’re using.



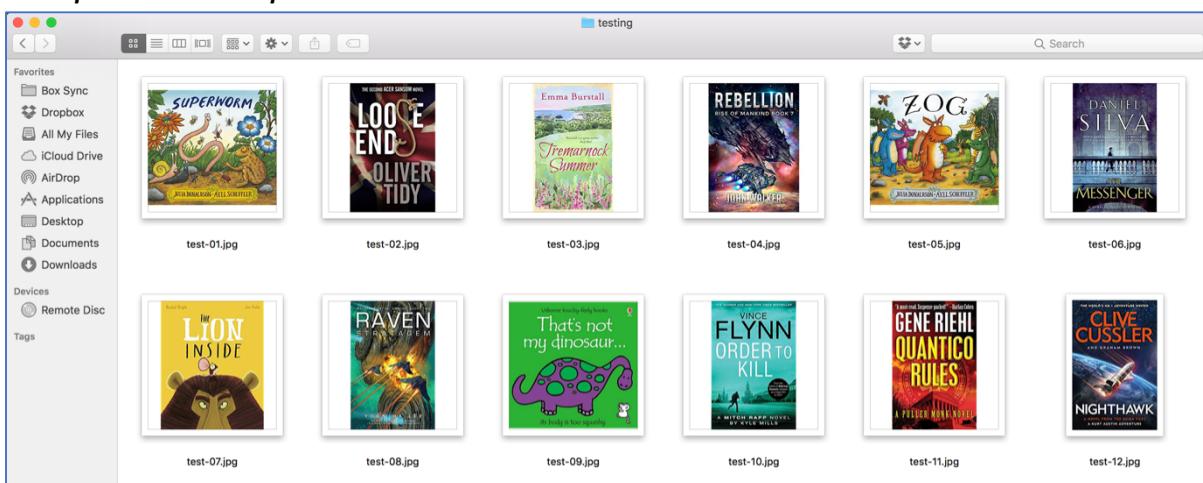
12. In another web browser window, find pictures of book covers. You need to find a website of pictures of book covers. This could be a library website, or a site that sells books like Amazon. Find a site that groups books by genre already to make it easier for you.
Arrange the windows so your training buckets are next to the book site.

The screenshot displays two side-by-side web pages. On the left is the 'ml-for-kids' interface, which is identical to the one in step 11 but with four empty training buckets labeled 'childrens', 'sci_fi', 'romance', and 'thriller'. Each bucket has a '+ Add example' button. On the right is an Amazon search results page for 'Children's Books'. The search bar shows 'Children's Books'. The results are filtered to 'Books : 4 Stars & Up : Children's Books' and sorted by 'Featured'. The results show three children's book covers: 'The World's Worst Children 2' (by David Walliams), 'The World's Worst Children' (by David Walliams), and 'What the Ladybird Heard on Holiday' (by Julia Donaldson and Lydia Monks). Each book entry includes the title, author, price, and a star rating.

- 13.** Find pictures of book covers in each genre you've chosen. Drag the best examples into the buckets in your training page.
Try and find about 20 examples of each genre.



- 14.** Save some different pictures of book covers to a folder.
Ask your teacher or group leader if you're not sure how to save a picture from a website.
These are the pictures that you'll use to test the computer with. It's important that none of these are the same as the covers you gave to the computer in step 13.



15. Click the “< Back to project” link. Then click “Learn & Train”.

16. Click “Train new machine learning model”.

As long as you've collected enough examples, the computer should start to learn how to recognise covers from the examples you've given to it.

The screenshot shows the 'Machine learning models' page. 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, the title 'Machine learning models' is centered. On the left, a section titled 'What have you done?' contains text about collecting images and a list of categories: childrens, sci_fi, romance, and thriller, each with 22 examples. On the right, a section titled 'What's next?' contains text about starting training and a button labeled 'Train new machine learning model'. At the bottom, a box titled 'Info from training computer:' displays the status of the training process, which has started at Saturday, July 29, 2017 9:22 PM and will end at Saturday, July 29, 2017 10:22 PM. A 'Cancel training' button is also present in this box.

17. Wait for the training to complete. This might take a few minutes.

The screenshot shows the 'Machine learning models' page during the training process. The 'What have you done?' section indicates that training has started since Saturday, July 29, 2017 9:22 PM. The 'What's next?' section suggests waiting for the model to finish training or taking a quiz. The 'Info from training computer:' box at the bottom provides detailed training information: Model started training at Saturday, July 29, 2017 9:22 PM, Current model status: Training, and Model will automatically be deleted after Saturday, July 29, 2017 10:22 PM. A 'Cancel training' button is also present in this box.

18. Click the “< Back to project link”. Then click “Scratch”.

Using machine learning in Scratch

< Back to project

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

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

`recognise images (confidence)`
This will return how confident your machine learning model is that it recognises the type of images. (As a number from 0 - 100).

`childrens` `sci_fi` `romance` `thriller`
These blocks represent the labels you've created in your project, so you can use their names in your scripts.

This means you can do something like this:

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



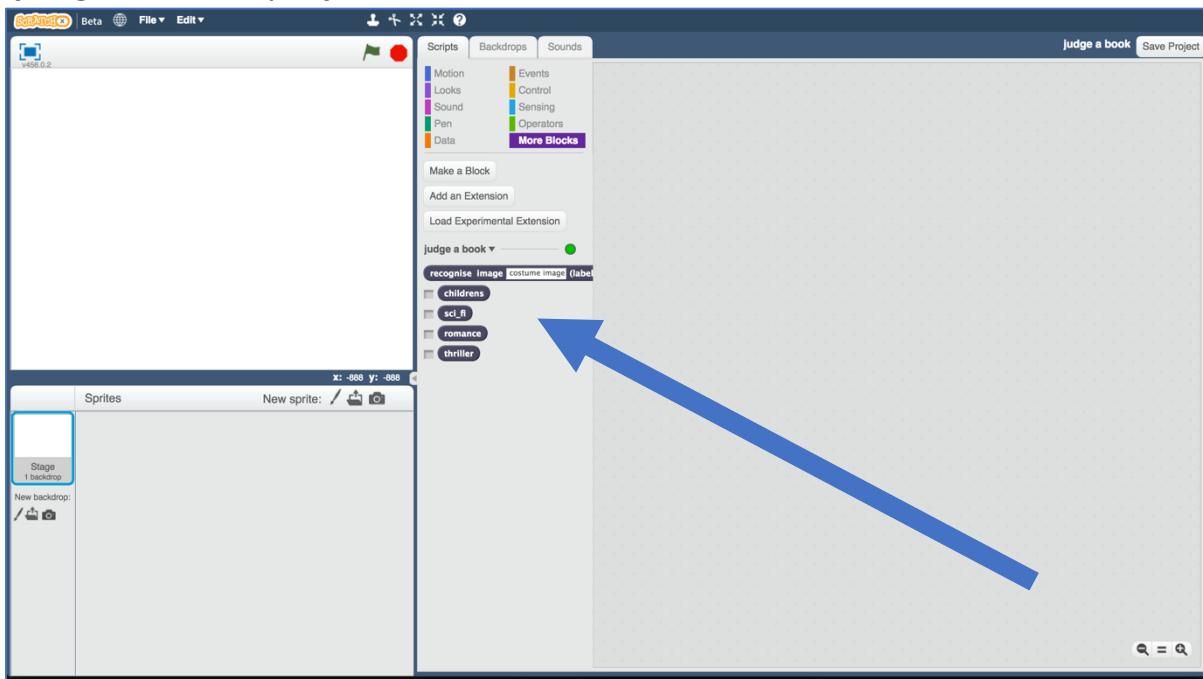
The coloured circle next to your project name tells you if your machine learning model is okay.

- **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.

Open in Scratch

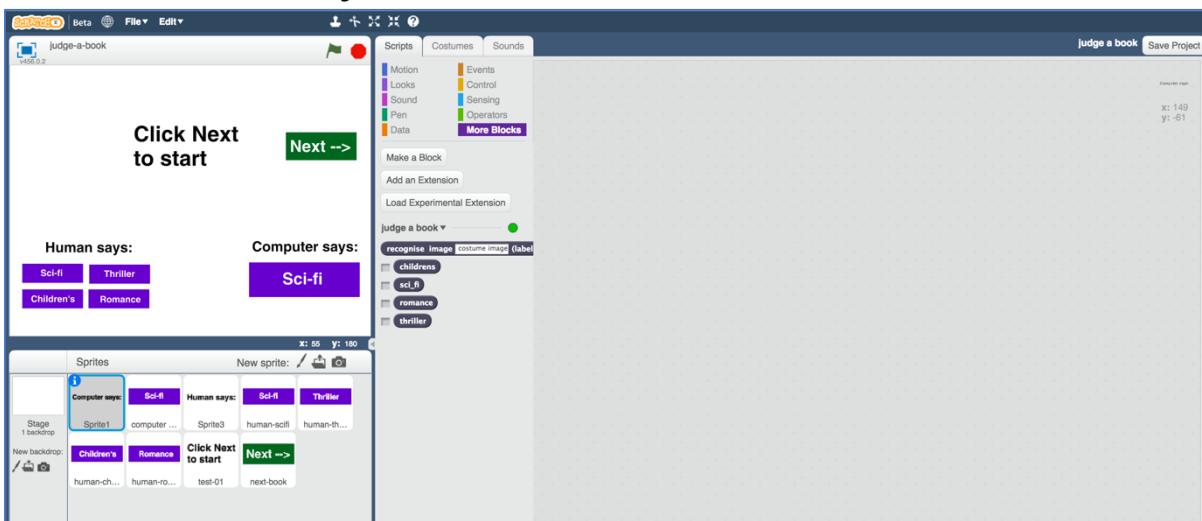
19. Click the “Open in Scratch” button to start making the game.

You should see four new blocks in the “More blocks” section from your “judge a book” project.



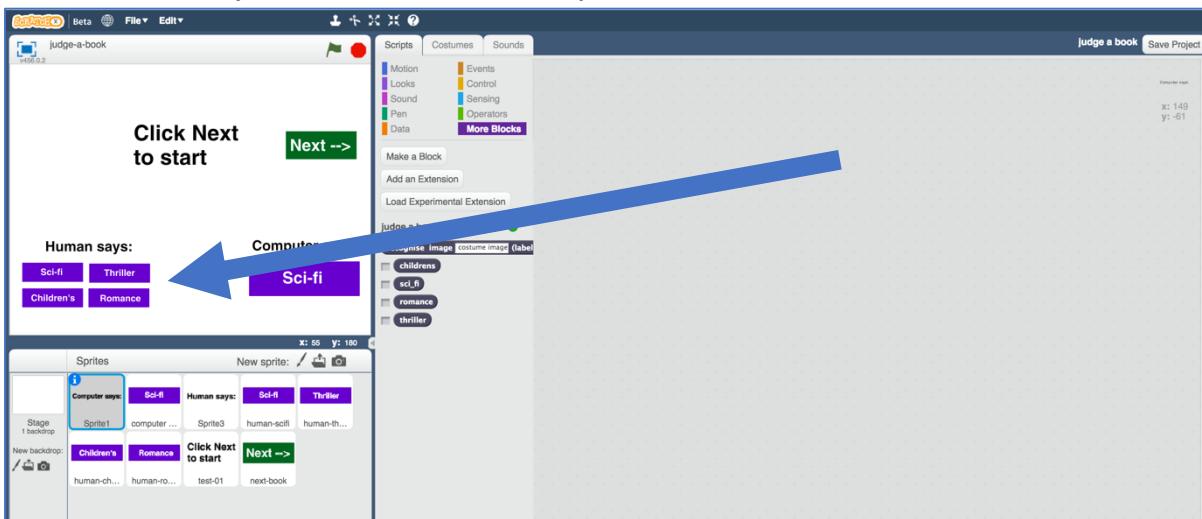
20. Open the judge-a-book.sbx starter project.

Use *File -> Load Project*



21. If you used different book genres to me, you'll need to update the "Human says" buttons. Use the costume editor to update the buttons so their labels match your project.

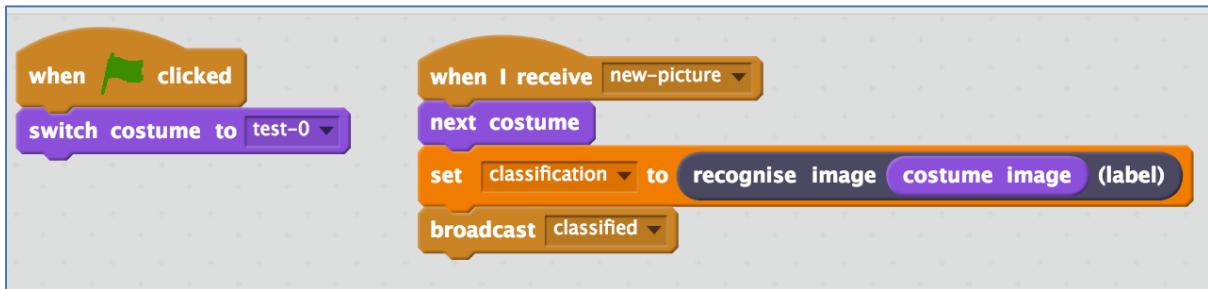
There are a few small scripts in these buttons that make them look different when they are clicked, but these aren't affected by the names on the labels, so you won't need to update them.



22. Click on the “**test**” sprite

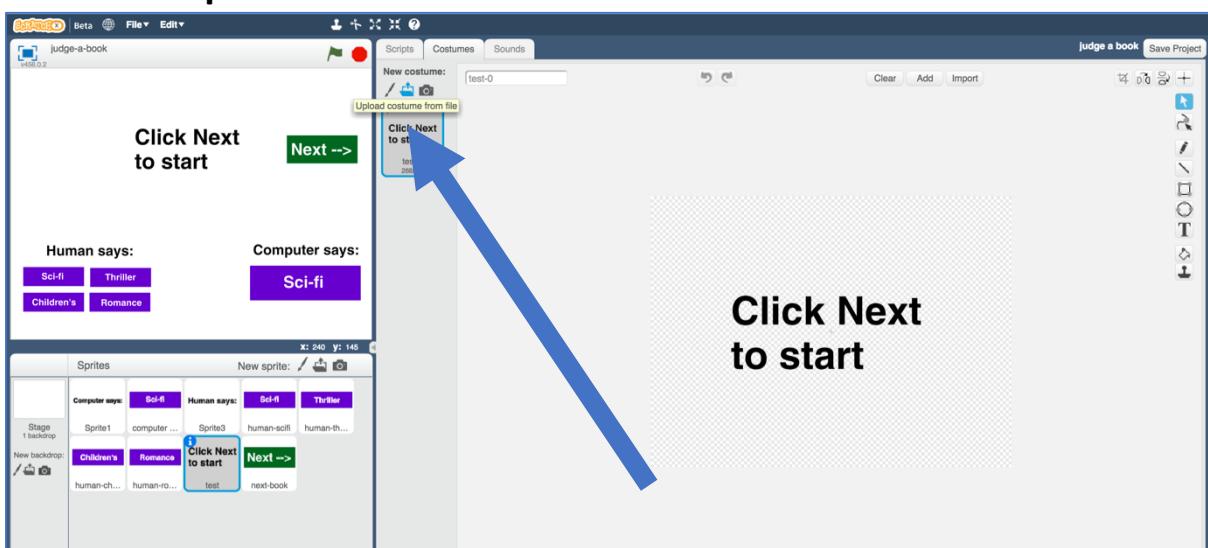
It's the one that has the "Click Next to start" message.

23. Enter the following script blocks for the “test” sprite

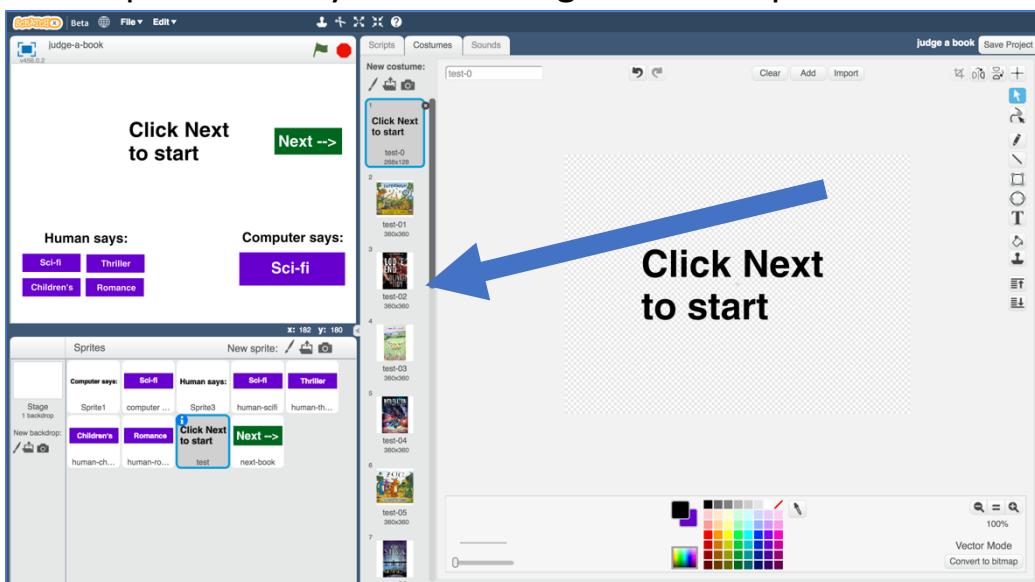


24. Click the “Costumes” tab.

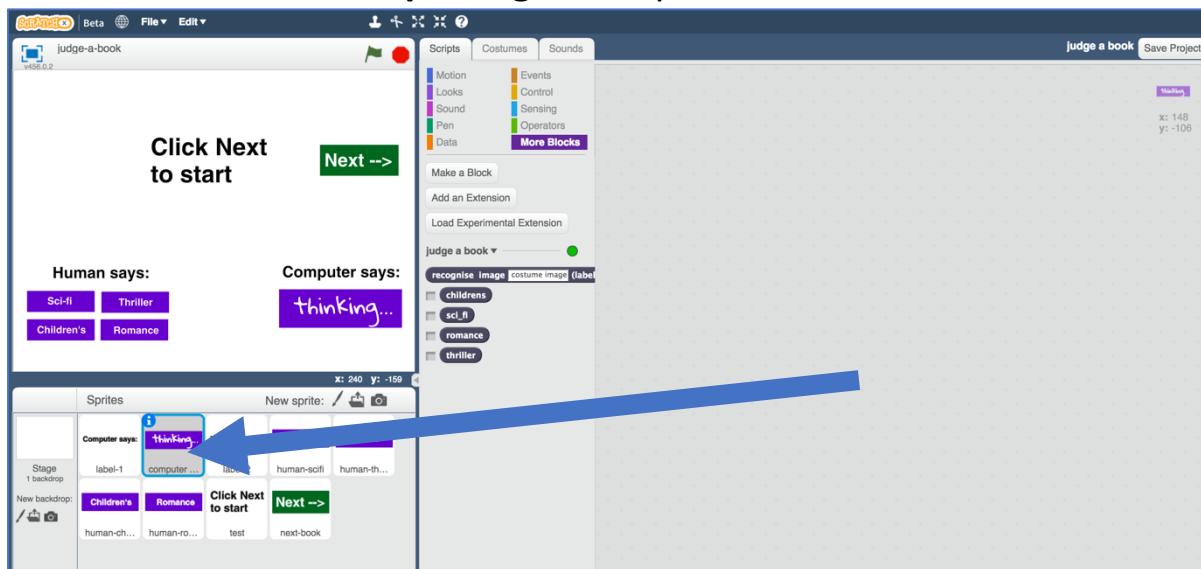
Click the “Upload costume from file” button with the folder icon.



25. Upload all of your test images from step 14.



26. Click on the “computer guess” sprite



27. Enter the following script blocks for the “computer guess” sprite

This is how the computer will display its guess for each book cover you will test it with. If you're using different book genres, update it to match.



28. It's time to test!

To make this fair, you haven't shown the test images to the machine learning computer.

To be equal, find a friend to test this that hasn't seen your test images either.

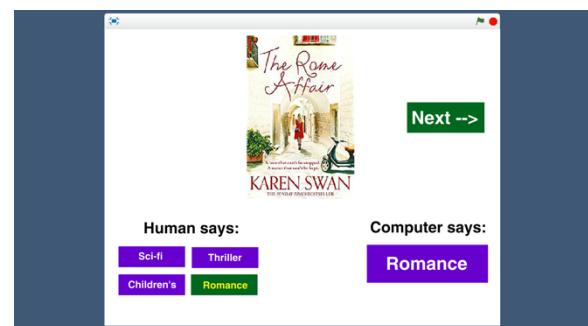
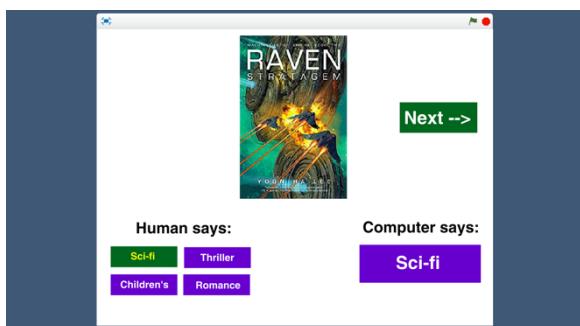
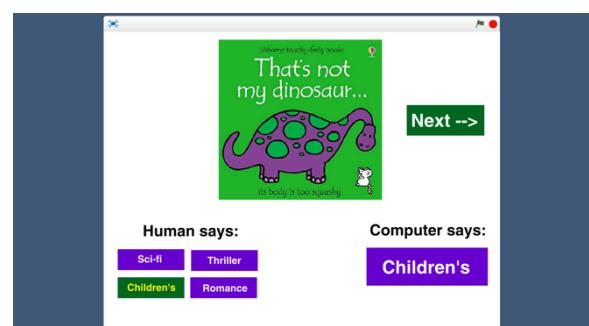
Click the fullscreen icon, and then click green flag.

They should click the "Next" button and they'll see a book cover.

Ask them to guess what genre book it is from the cover, and click one of the "Human says" buttons on the left to confirm their choice. (It doesn't do anything other than look different).

The computer will try and decide what genre it looks like, and display its answer under "Computer says" on the right.

If they click "Next" they will move to the next book – ask them to keep going through all your test images.



Was your friend good at guessing the genre?

Was the computer?

What have you done?

You've created a game that tests whether people and computers can judge a book by its cover.

Specifically, you've trained a machine learning model to classify pictures. The computer learned from patterns in the colours and shapes from each of the images you've given it. These were used to recognise new photos.

You've also learned about a key way that we measure how good a machine learning system is: by comparing its performance against a person. This is a common approach for tasks where the right answer isn't already known.

A good example is the task of recognising the words someone is saying : “speech recognition”. Humans miss one to two words out of every 20 we hear. So computer systems trained to recognise speech are compared against this.

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?

Keeping score

Can you update the Scratch game so that it keeps score?

Is the computer as good at recognising book genres as the people that you can get to test it?