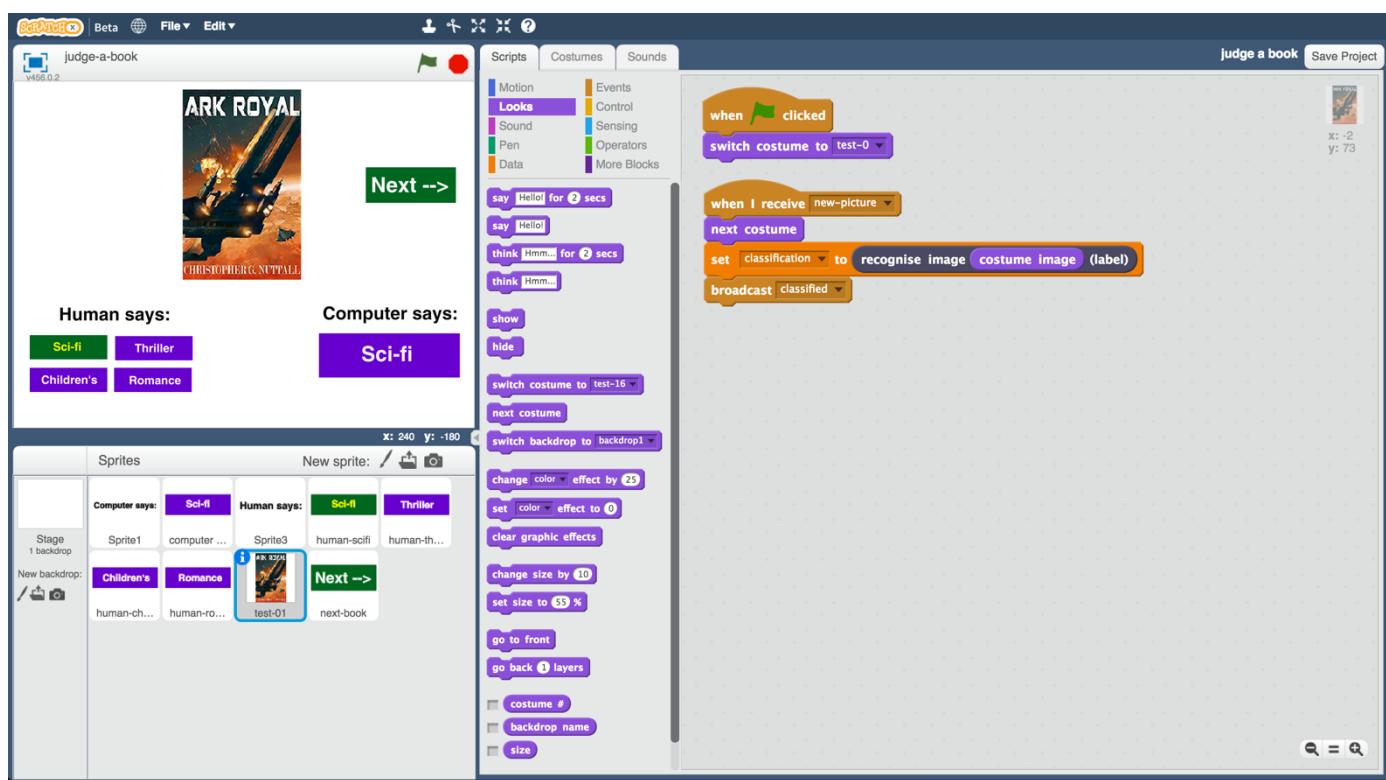


Judge a book by its cover

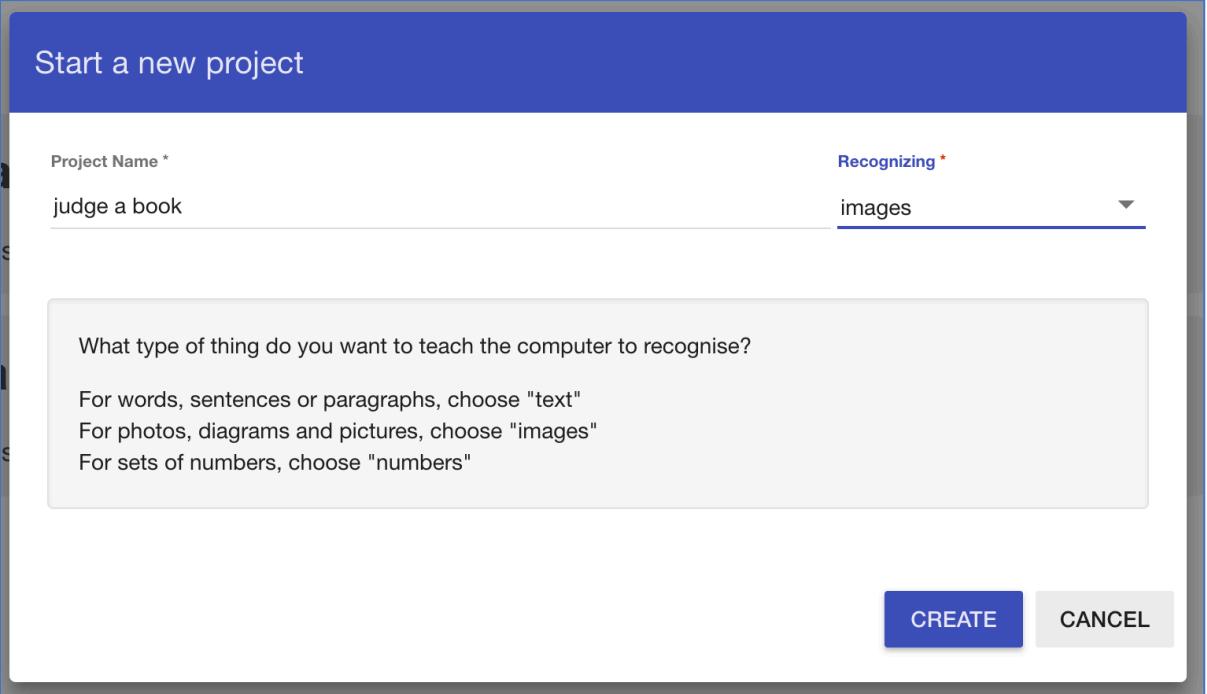
In this project, you will investigate whether it's really possible to judge a book by its cover.

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 shown 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.

The screenshot shows the 'ml-for-kids' website interface. 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 'Your machine learning projects' is displayed. A project card for 'judge a book' is shown, indicating it recognises 'images'. To the right of the project card is a delete icon. In the top right corner of the main content area, there is a button labeled '+ Add a new project'.

9. Click the “Train” button

The screenshot shows the 'judge a book' project page. At the top, the project name 'judge a book' is displayed. Below the project name, there are three buttons: 'Train', 'Learn & Test', and 'Scratch'. The 'Train' button is highlighted with a blue rectangle. Each button has a corresponding description below it: 'Train' says 'Collect examples of what you want the computer to recognise.', 'Learn & Test' says 'Use the examples to train the computer to recognise images.', and 'Scratch' says 'Use the machine learning model you've trained to make a game in Scratch.'

10. Choose a few genres of books.

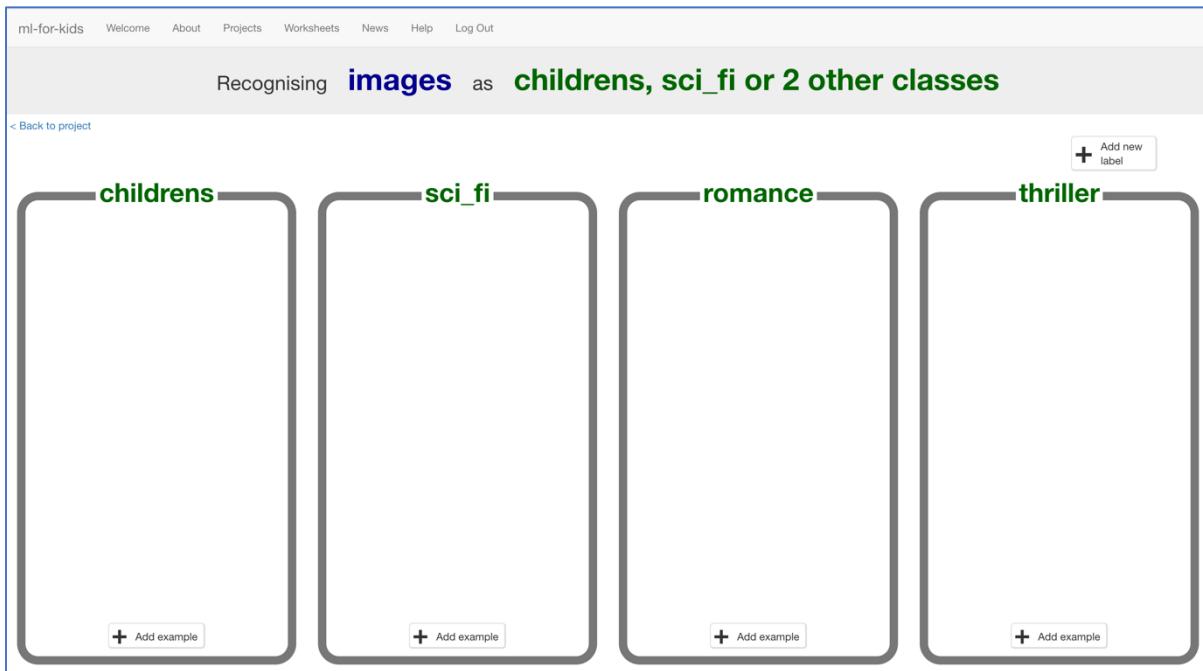
“Genre” means the type of story.

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

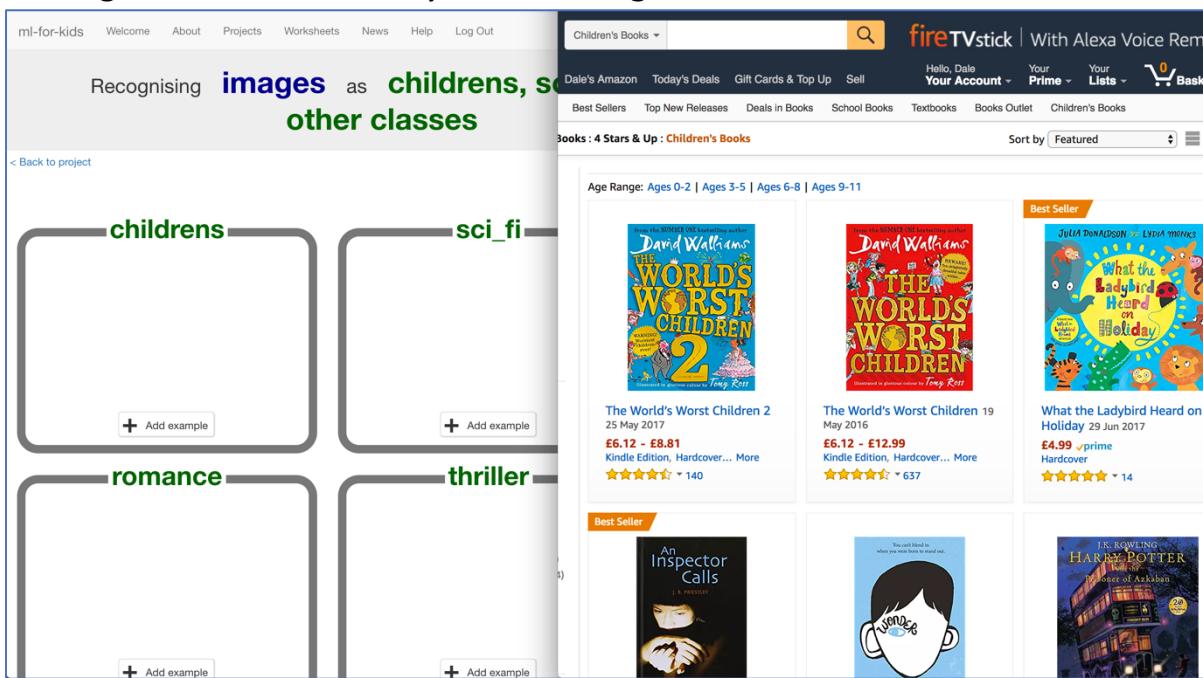
“childrens”, “sci fi”, “romance” and “thriller”.

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!

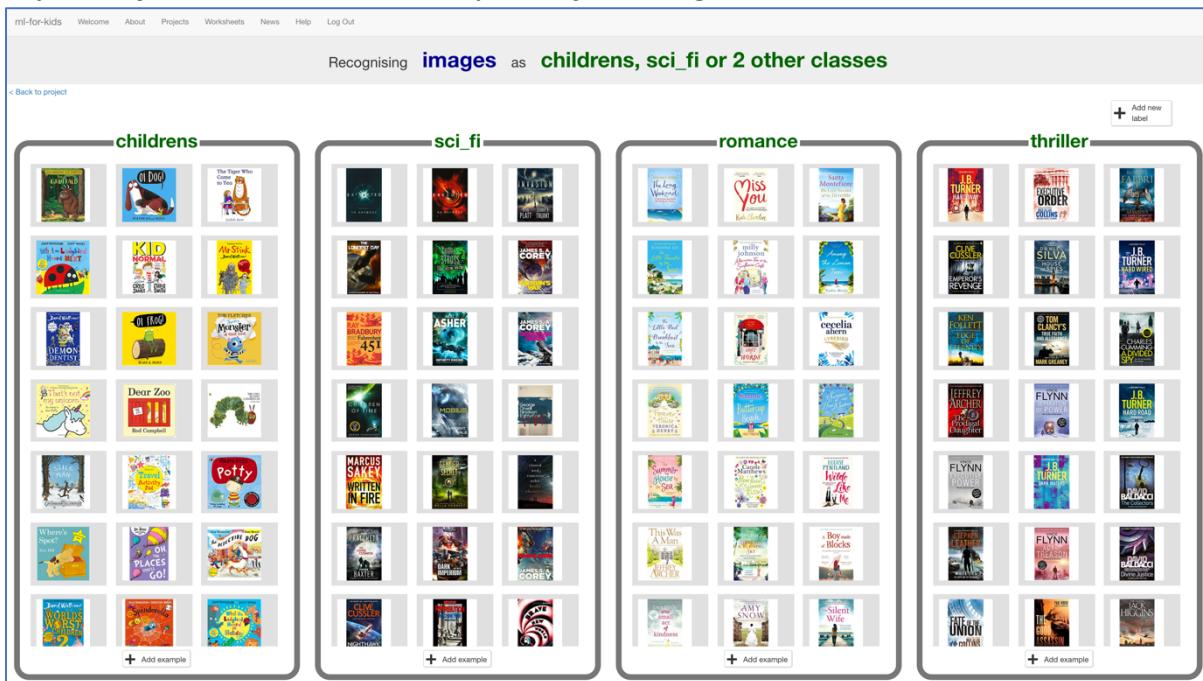
11. Use the “+ Add new label” button to create a bucket for each genre of book you’re using.



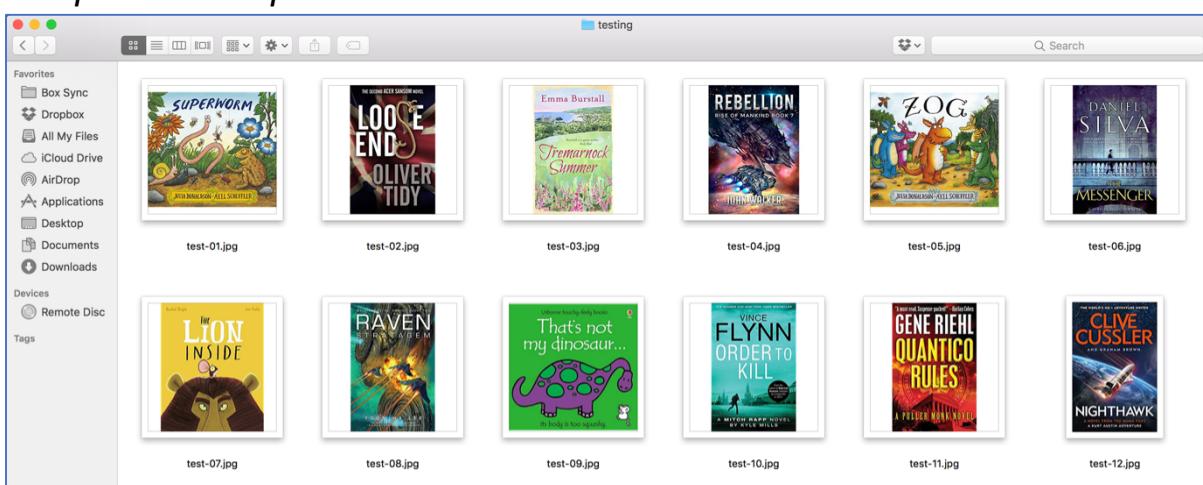
12. In another web browser window, find pictures of book covers. You need to find a website of pictures of book covers. This could be a library website, or a site that sells books like Amazon. Find a site that groups books by genre already to make it easier for you.
Arrange the windows so your training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



- 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. Underneath the title, there is a link '< Back to project'. The main content area is divided into two sections: 'What have you done?' and 'What's next?'. The 'What have you done?' section contains text about collected examples and a bulleted list of 22 examples including childrens, sci_fi, romance, and thriller genres. The 'What's next?' section contains text about starting training and a button labeled 'Train new machine learning model'. At the bottom of the page, there is a box labeled 'Info from training computer:' containing a button labeled 'Train new machine learning model'.

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

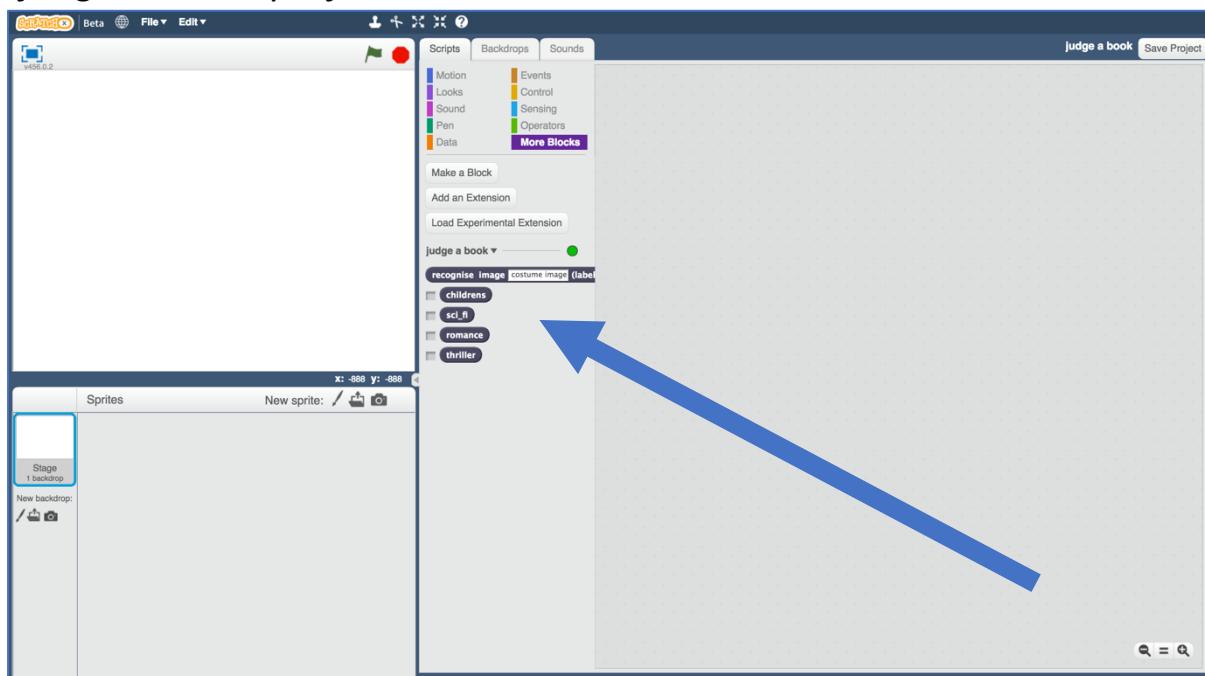
The screenshot shows the 'Machine learning models' page after the training process has started. The layout is identical to the previous screenshot, with the 'What have you done?' and 'What's next?' sections and the 'Info from training computer:' box. However, the 'Info from training computer:' box now displays information about the training status: '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'. There is also a 'Cancel training' button at the bottom of this box.

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

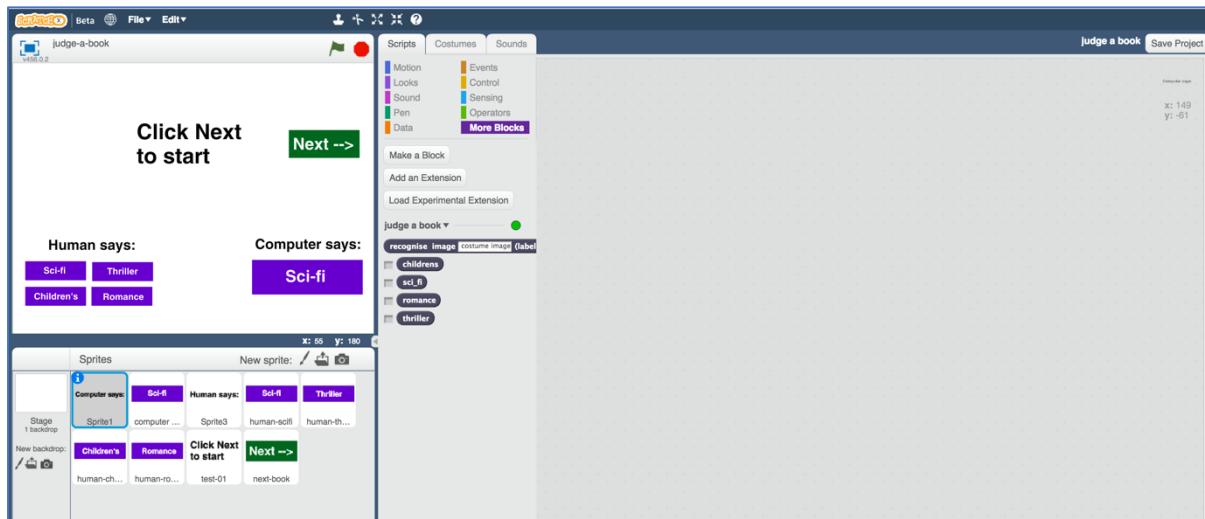
The screenshot shows a web-based interface for a machine learning project titled "Using machine learning in Scratch". On the left, a sidebar lists blocks added to the "More Blocks" tab: "recognise images (label)" and "recognise images (confidence)". It also shows four categories: "childrens", "sci_fi", "romance", and "thriller". A note says, "These blocks represent the labels you've created in your project, so you can use their names in your scripts." Below this is a placeholder text: "This means you can do something like this:". On the right, a preview of the Scratch script palette shows a "make me happy" script with two "recognise test" blocks. A legend explains the colored circles: green means trained, yellow means training in progress, and red means an error. At the bottom is a "Open in Scratch" button.

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

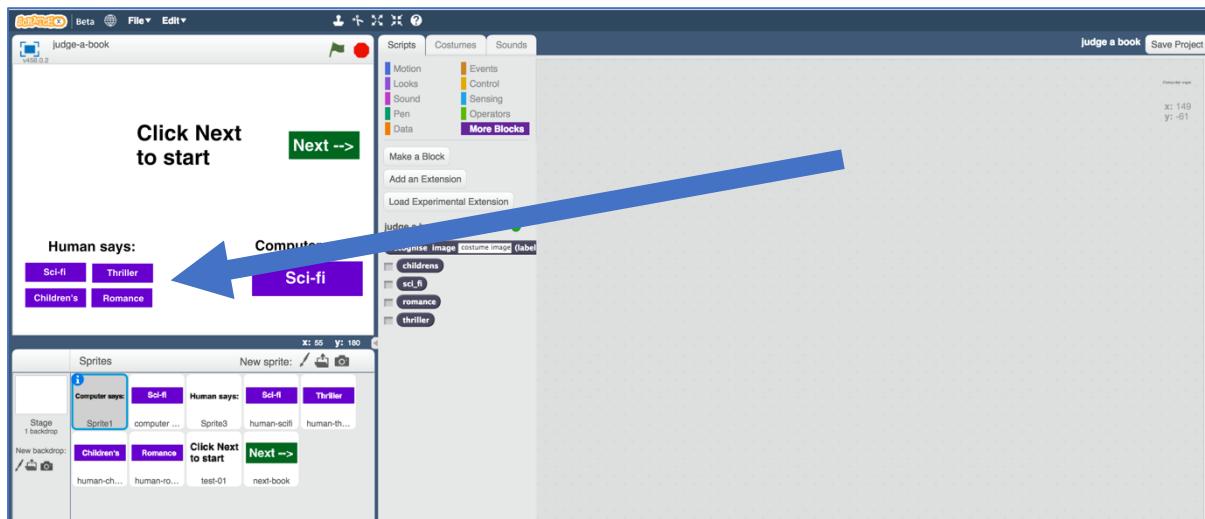
You should see four new blocks in the “More blocks” section from your “judge a book” project.



20. Open the judge-a-book.sbx starter project. Use *File -> Load Project*

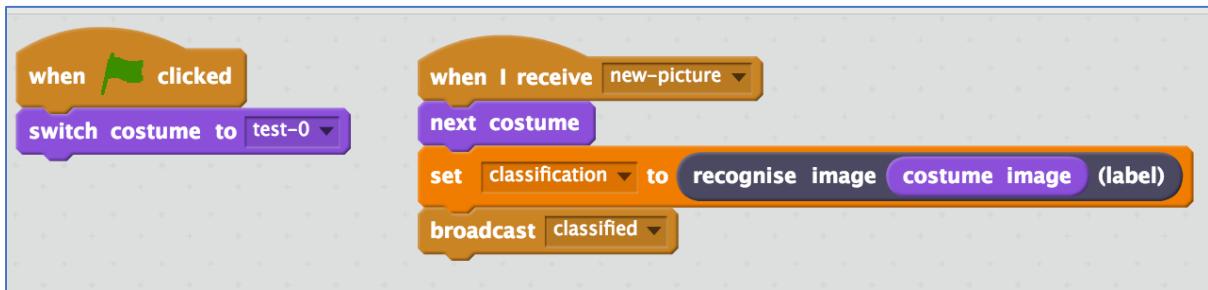


21. If you used different book genres to me, you'll need to update the “Human says” buttons. Use the costume editor to update the buttons so their labels match your project. *There are a few small scripts in these buttons that make them look different when they are clicked, but these aren't affected by the names on the labels, so you won't need to update them.*



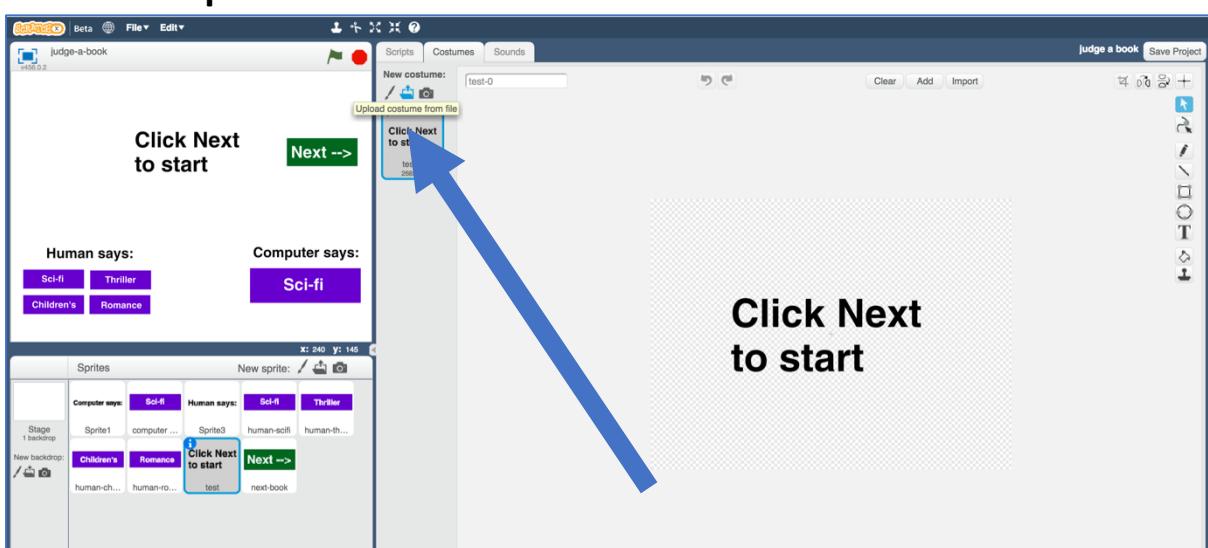
22. Click on the “test” sprite *It's the one that has the “Click Next to start” message.*

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

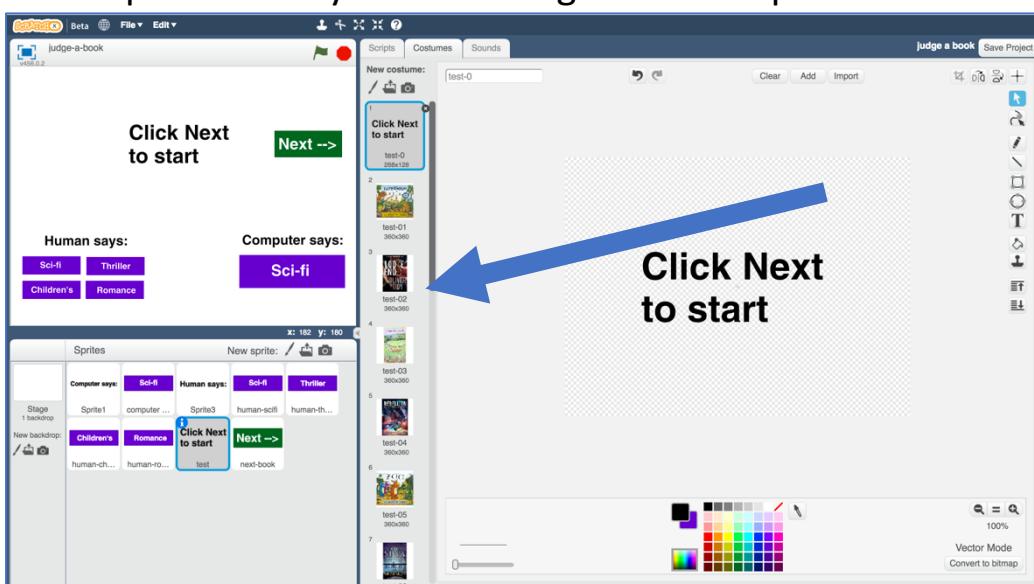


24. Click the “Costumes” tab.

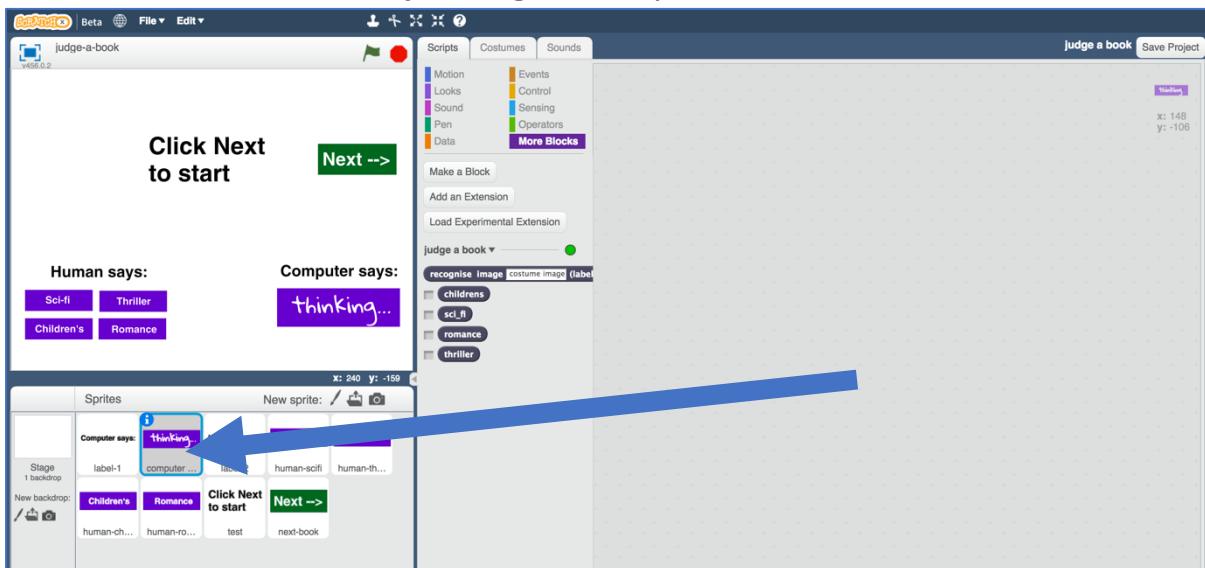
Click the “Upload costume from file” button with the folder icon.



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

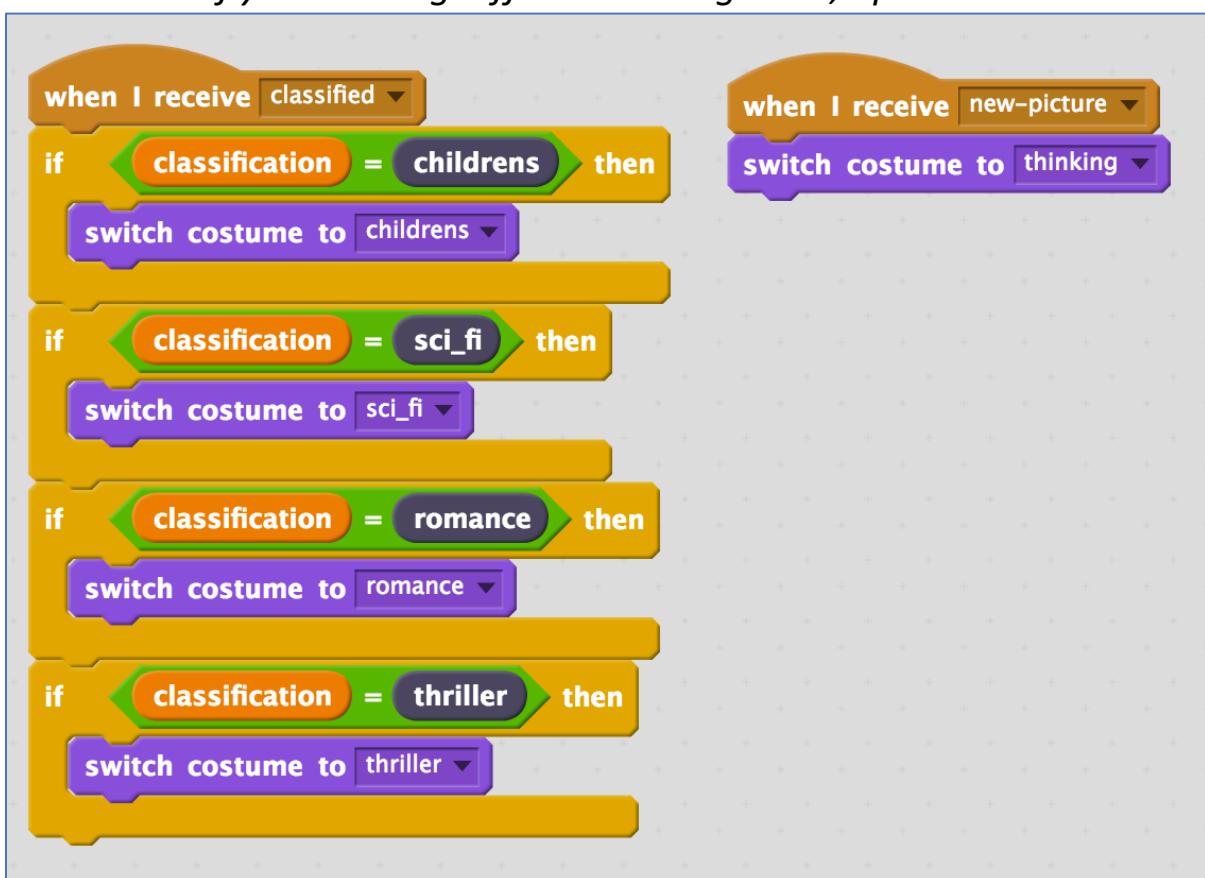


26. Click on the “computer guess” sprite



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.

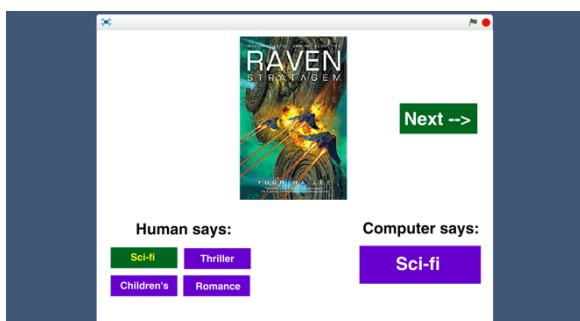
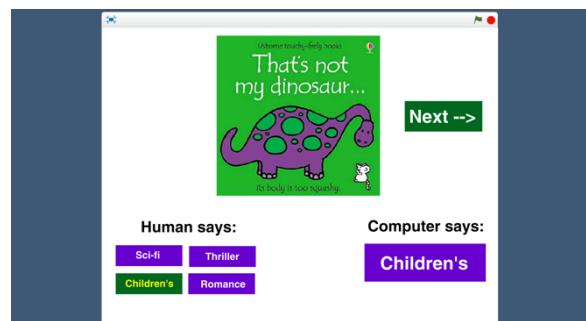
Click the fullscreen icon, and then click green flag.

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?