



Judge a book

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.

The screenshot shows the Scratch project interface. On the left, the script editor displays a script for the 'test' sprite:

```
when green flag clicked
  say [Hello!] for (2) seconds
  switch costume to [test-0 v]
when I receive [new-picture v]
  next costume
  set [classification v] to (recognise image [costume image] [label])
  broadcast [classified v]
```

The stage shows a book cover of "RAVEN STRATAGEM" by YOUNG Adult. The sprite editor on the right shows the 'test' sprite with the following properties:

- Script: Computer says: Sci-fi
- Costume: Sci-fi
- Sound: Thriller
- Variables: Children's
- Events: Romance

The stage also contains a 'Backpack' containing a 'Next' button and a 'human-thr...' label.



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1. Go to <https://machinelearningforkids.co.uk/> in a web browser

2. Click on “**Get started**”

3. Click on “**Log In**” and type in your username and password

If you don't have a username, ask your teacher or group leader.

If you've forgotten your password, ask your teacher or group leader to reset it for you.

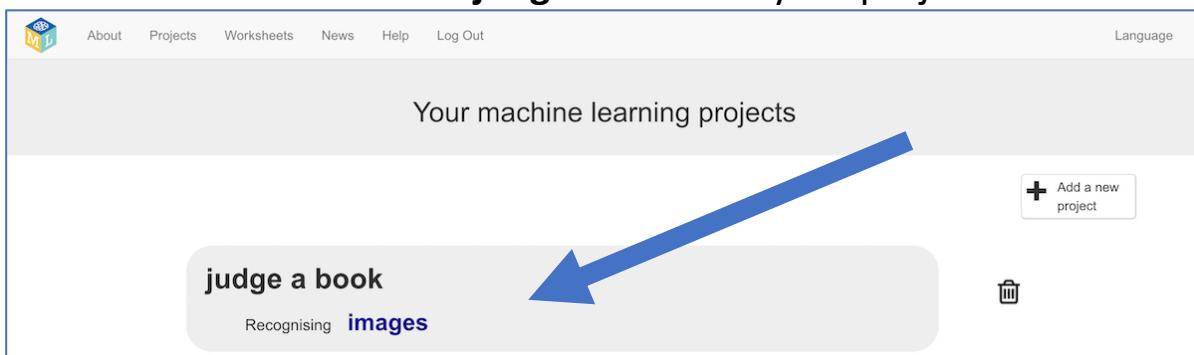
4. Click on “**Projects**” on the top menu bar

5. Click the “**+ Add a new project**” button.

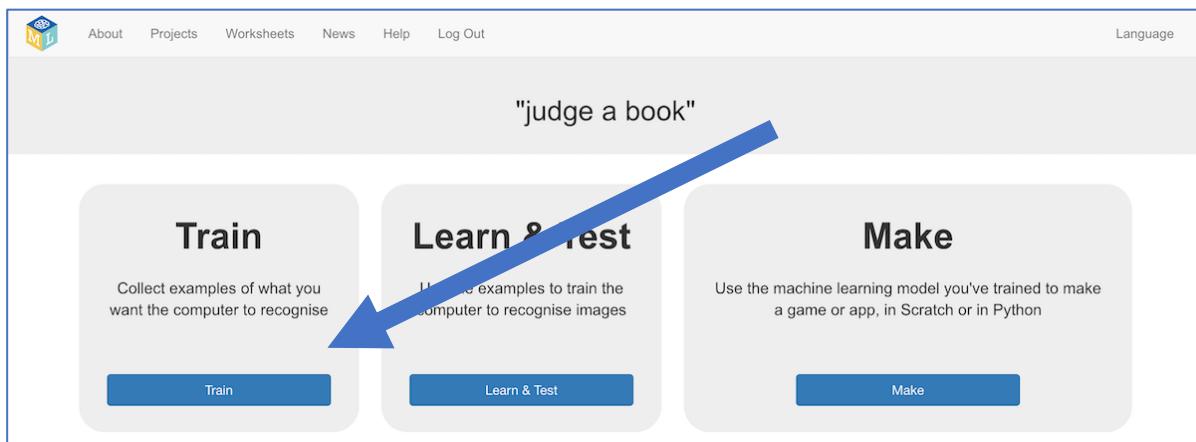
6. Name your project “judge a book” and set it to learn how to recognise “**images**”. Click “**Create**”

The screenshot shows a web-based form for creating a machine learning project. At the top, there's a navigation bar with links for About, Projects, Worksheets, News, Help, and Log Out, along with a Language selector. Below the navigation is a main title "Start a new machine learning project". The first input field is labeled "Project Name *" and contains the text "judge a book". The second input field is labeled "Recognising *" and has "images" selected. To the right of these fields is a tooltip box with the heading "What type of thing do you want to teach the computer to recognise?". It lists four options: "For words, sentences or paragraphs, choose "text"" (which is not selected), "For photos, diagrams and pictures, choose "images"" (which is selected), "For sets of numbers or multiple choices, choose "numbers"" (which is not selected), and "For voices and sounds, choose "sounds"" (which is not selected). At the bottom right of the form are two buttons: a blue "CREATE" button and a white "CANCEL" button.

7. You should now see “**judge a book**” in your projects list. Click on it.



8. Click the “Train” button



9. Choose a few genres of books.

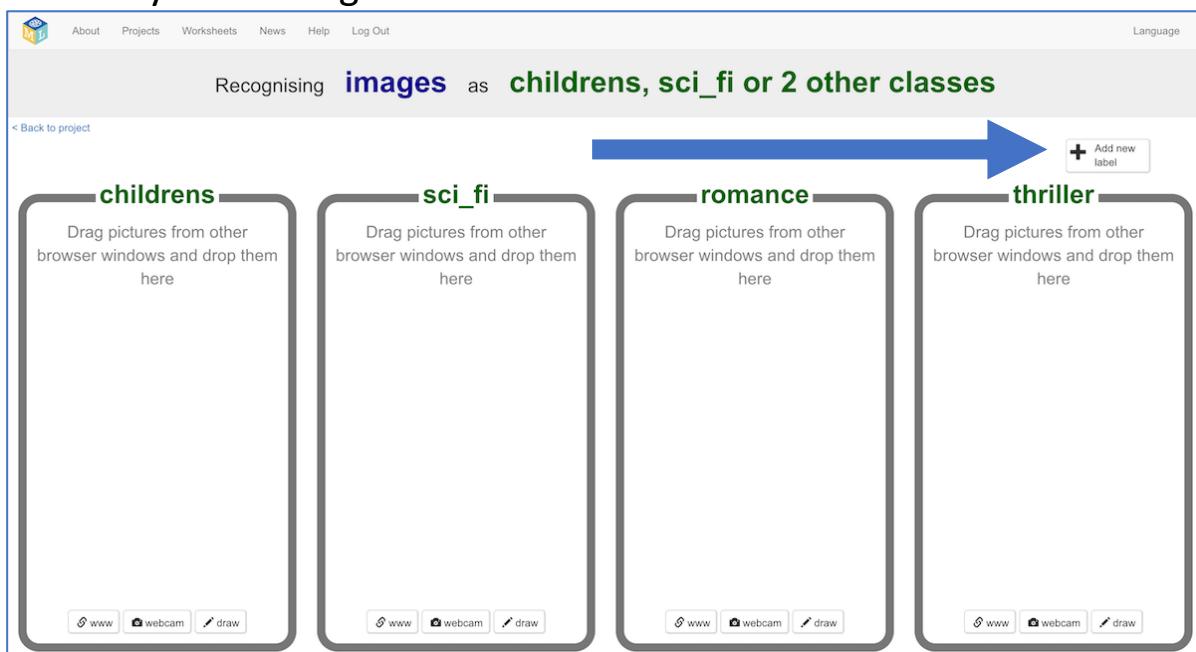
“Genre” means the type of story.

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!

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



11. 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 arranges books by genre already to make it easier for you. Resize the windows so your training buckets are next to the book site.

The image shows two side-by-side web pages. On the left is a training interface for a machine learning project titled "Recognising images as childrens, sci_fi or 2 other classes". It features four large rectangular "buckets" labeled "childrens", "sci_fi", "romance", and "thriller". Each bucket has a "+ Add example" button below it. On the right is a screenshot of the Amazon website showing search results for "Children's Books". The results are filtered by "Age Range: Ages 0-2 | Ages 3-5 | Ages 6-8 | Ages 9-11". Several book covers are visible, including "The World's Worst Children 2" by David Walliams and "What the Ladybird Heard on Holiday" by Julia Donaldson. Each book entry includes the author, title, price, and a "Best Seller" badge.

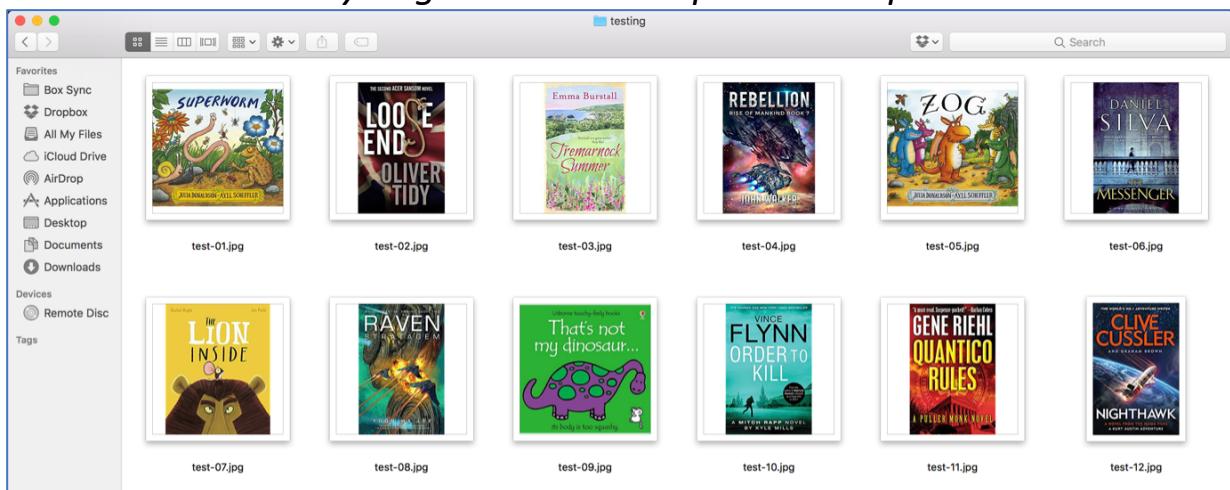
12. Find pictures of book covers in each genre you've chosen. Drag the best examples into the buckets in your training page. Try and find about 20 examples of each genre.

This screenshot shows the same machine learning training interface as above, but now with many book covers added to the buckets. Each bucket contains 20 examples. The "childrens" bucket is filled with various children's book covers. The "sci_fi" bucket contains science fiction titles like "Extincted" and "The Longest Day". The "romance" bucket contains romance novels such as "Love in Bloom" and "Santa Monica". The "thriller" bucket contains thrillers like "The Collector" and "Kill Shot". A "Language" dropdown menu is visible at the top right of the interface.

13. Save some different pictures of book covers to your computer.

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. You need some of each of your four genres. It's important that none of these are the same as the covers you gave to the computer in step 12.



14. Click the “< Back to project” link. Then click “Learn & Test”.

15. 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 a web page titled "Machine learning models". At the top, there is a navigation bar with links for "About", "Projects", "Worksheets", "News", "Help", "Log Out", and "Language". Below the navigation bar, there is a link "[< Back to project](#)". The main content area is divided into two sections: "What have you done?" and "What's next?".

What have you done?

You have collected examples of images for a computer to use to recognise when images are childrens, sci_fi or 2 other classes.

You've collected:

- 20 examples of childrens,
- 20 examples of sci_fi,
- 20 examples of romance,
- 20 examples of thriller

What's next?

Ready to start the computer's training?

Click the button below to start training a machine learning model using the examples you have collected so far

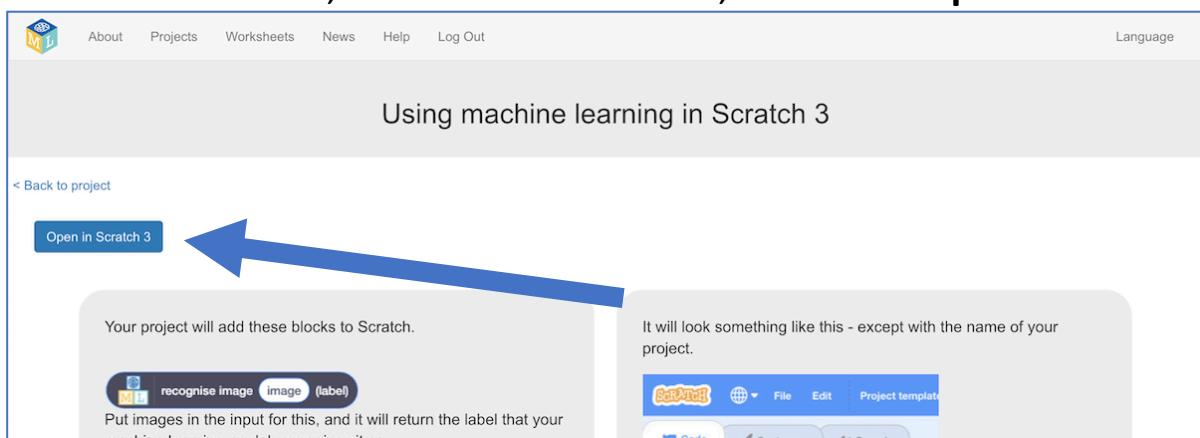
(Or go back to the [Train](#) page if you want to collect some more examples first.)

A large blue arrow points from the bottom left towards the "Train new machine learning model" button.

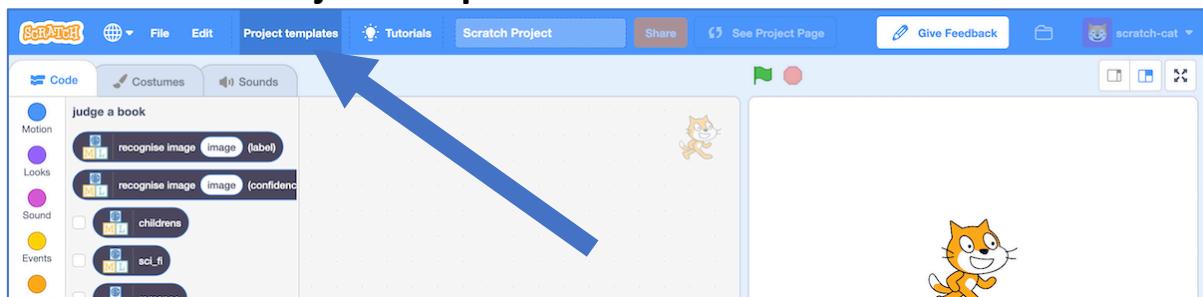
Info from training computer:

[Train new machine learning model](#)

- 16.** Wait for the training to complete. This might take a few minutes.
- 17.** Click the “< Back to project” link”
- 18.** Click “**Make**”, then click “**Scratch 3**”, and then “**Open in Scratch 3**”

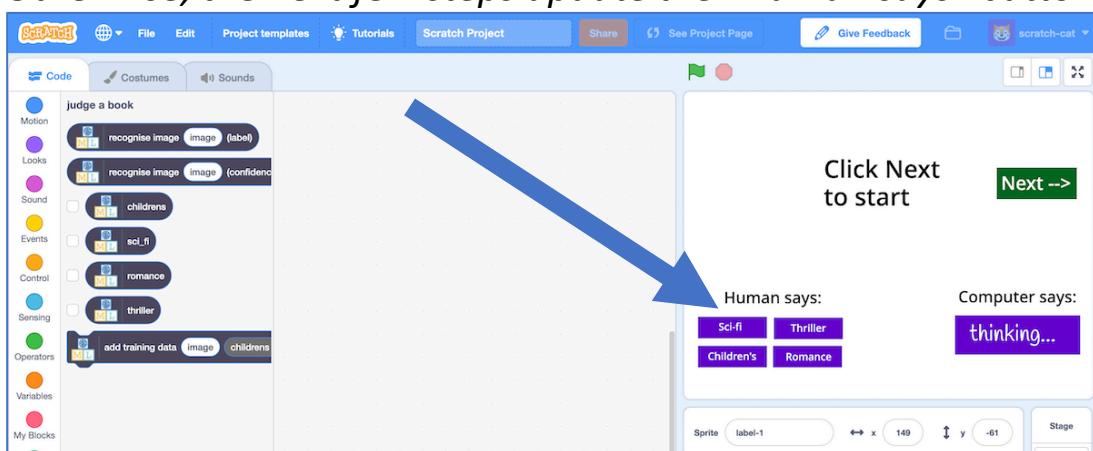


- 19.** Click on “**Project templates**”

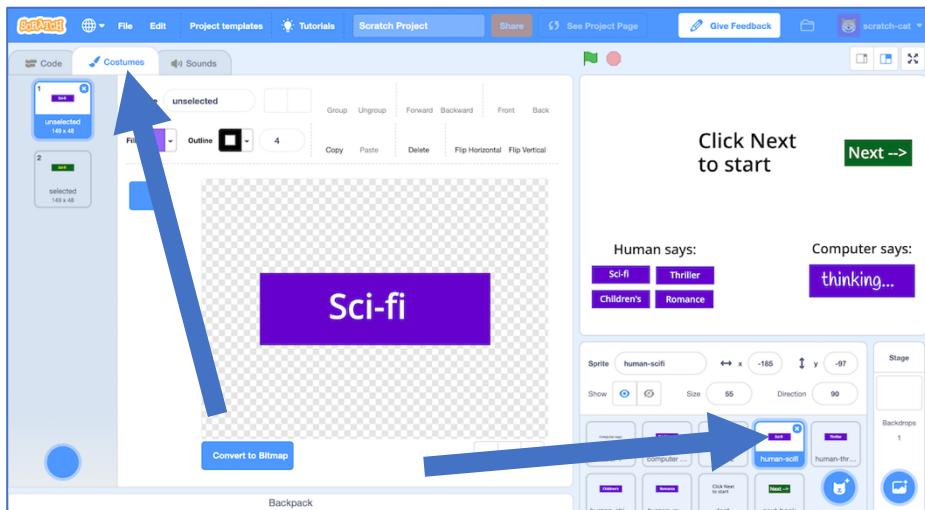


- 20.** Click on the “**Judge a book**” project template

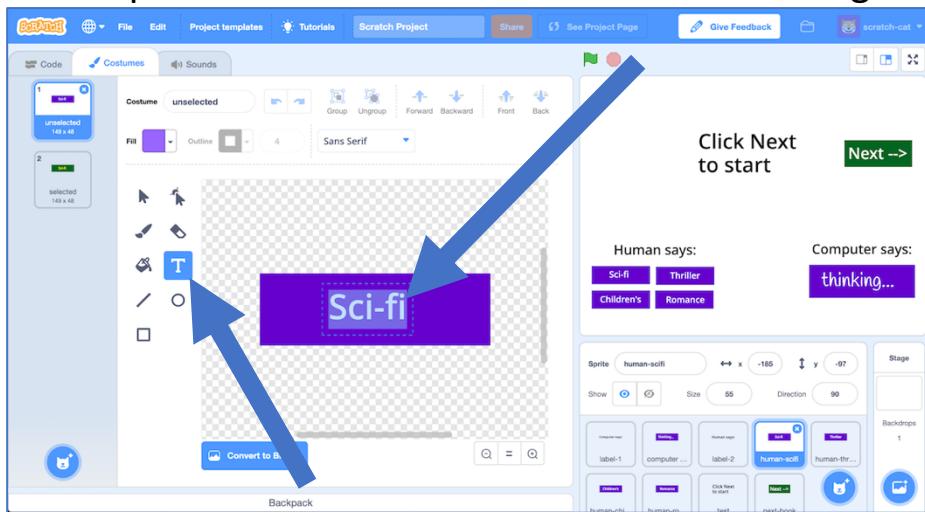
- 21.** If you used the same book genres as me, you can skip to step 26.
Otherwise, the next few steps update the “Human says” buttons.



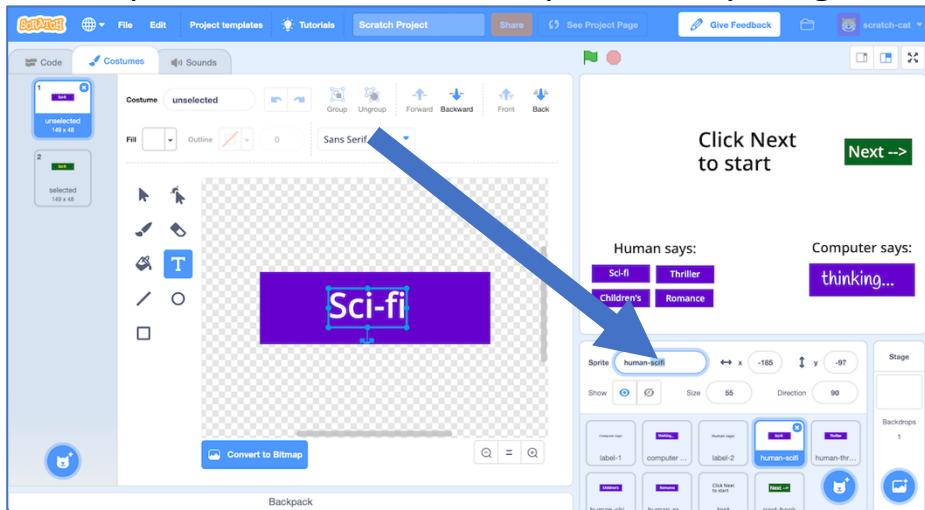
22. Click on one of the buttons with a name that starts “human-” and then click on the “Costumes” tab



23. Update the button text with the name of a genre you chose

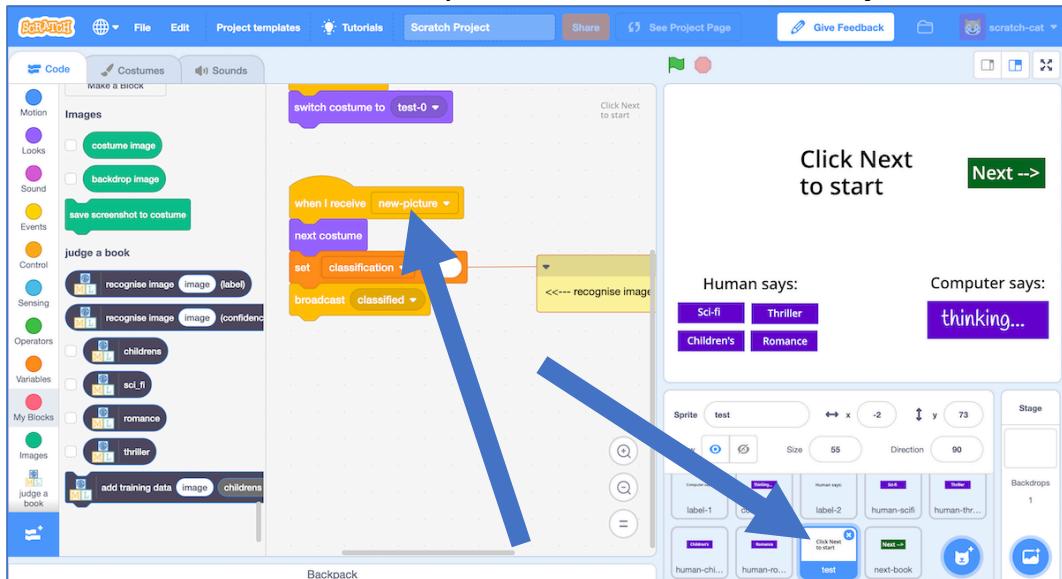


24. Update the name of the sprite with your genre

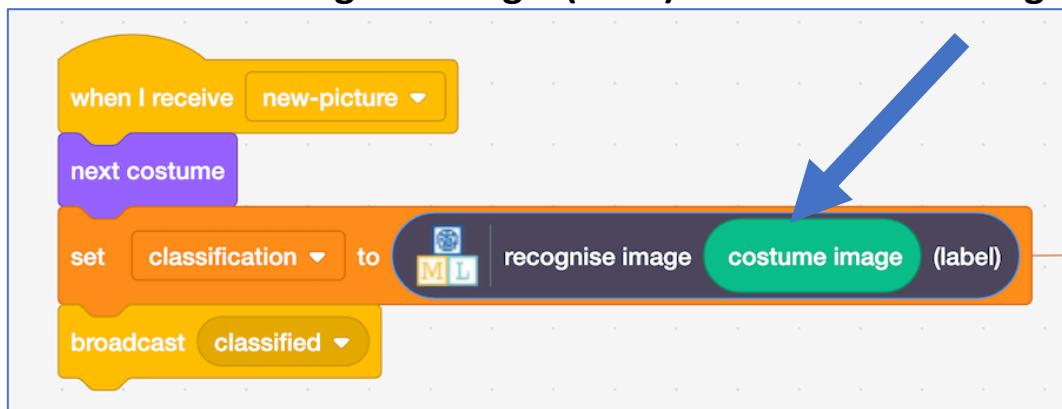


25. Repeat steps 22-24 for the other three human-GENRE buttons

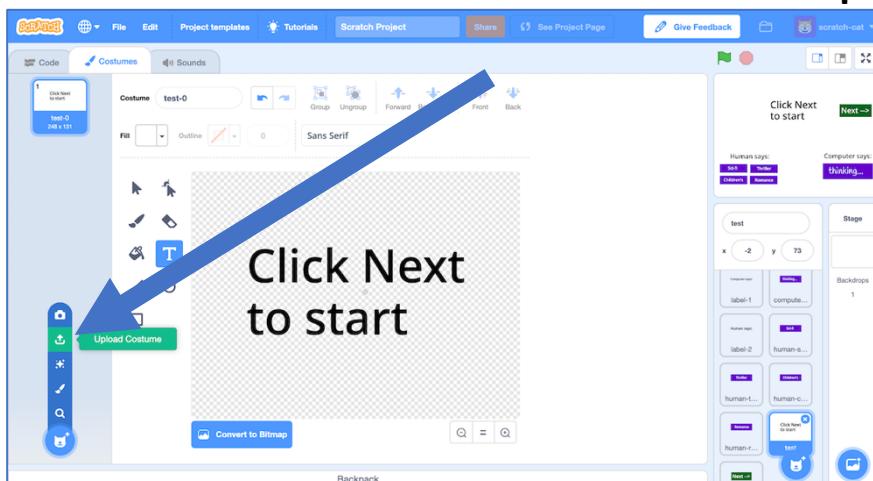
26. Click on the “test” sprite and find the “new-picture” code



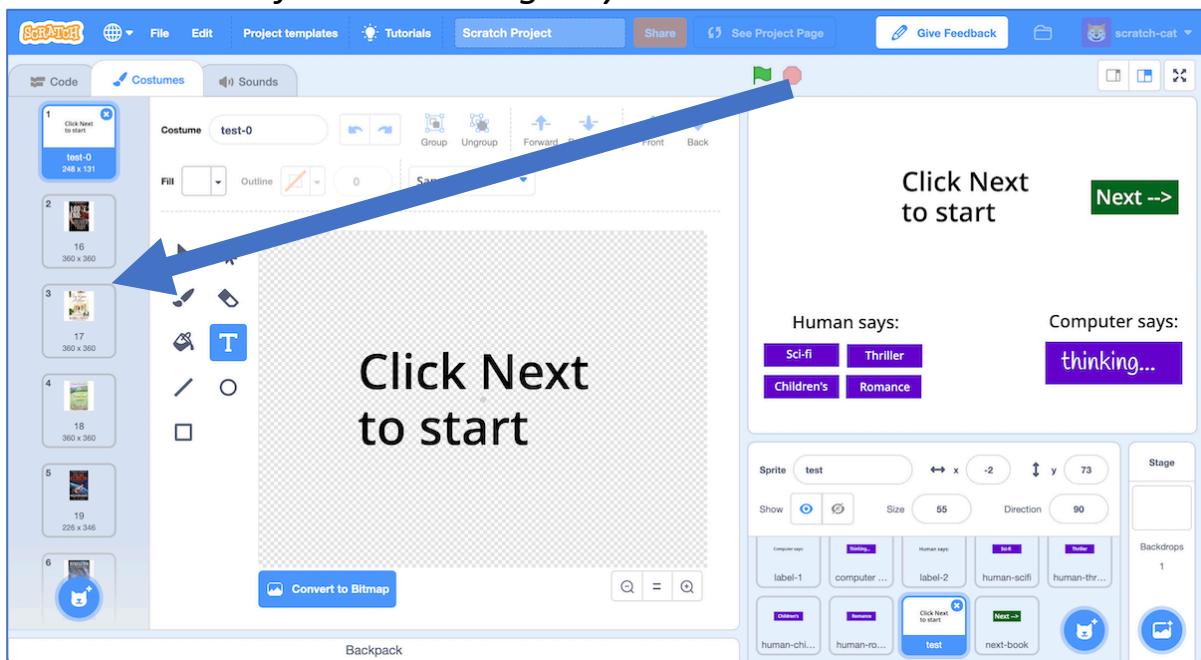
27. Add the “recognise image (label)” and “costume image” blocks



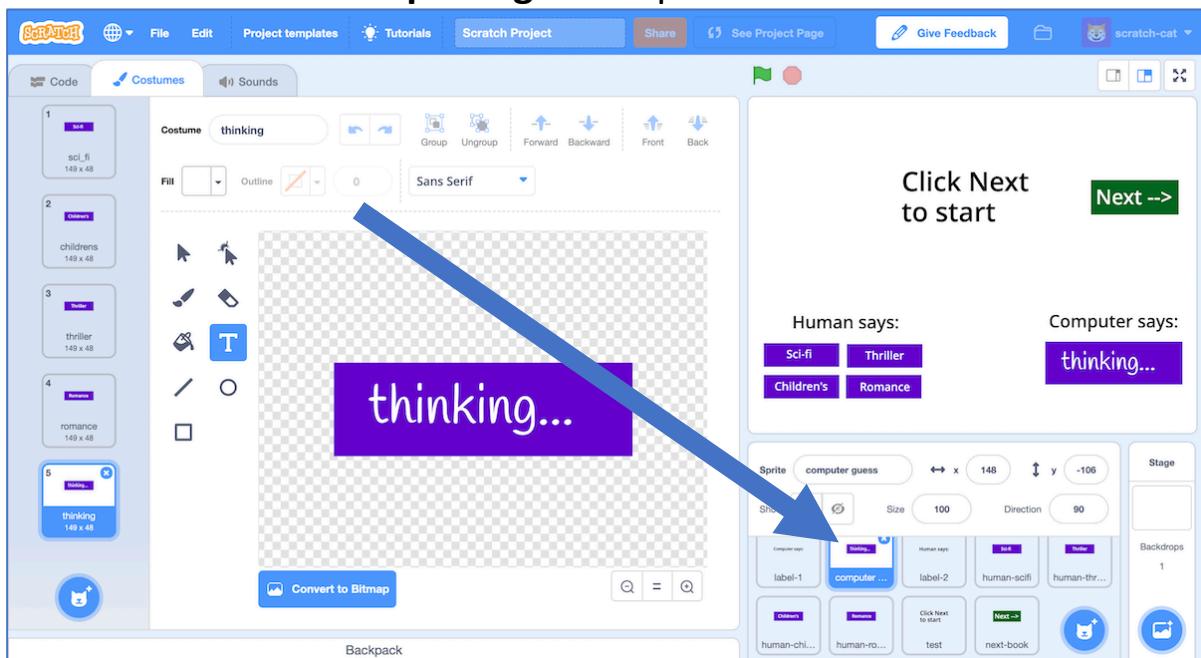
28. Click the “Costumes” tab and then click “Upload Costume”



29. Upload all of your test images from step 13.
You can do all of these in one go – you don’t need to do one at a time.



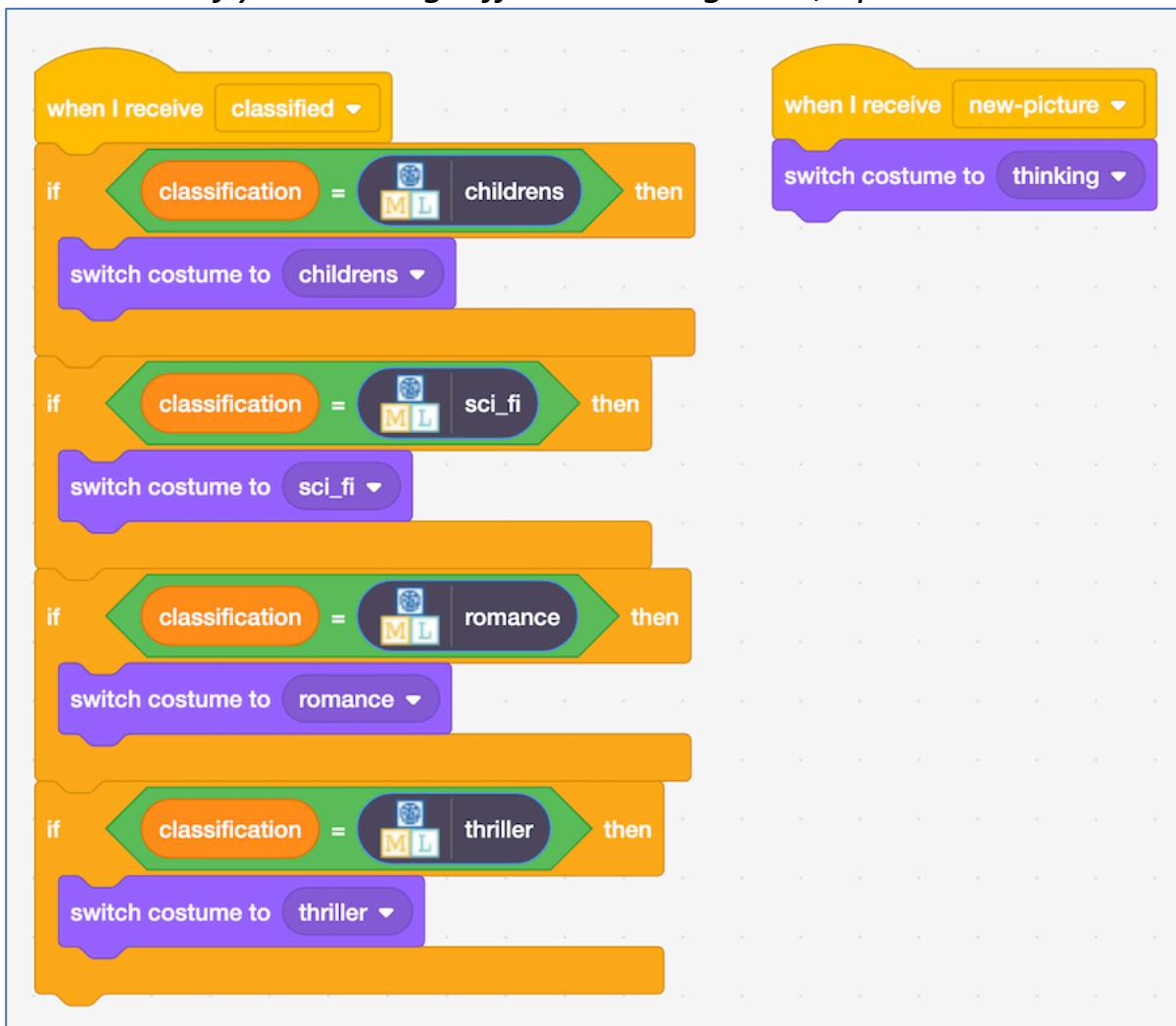
30. Click on the “computer guess” sprite



31. If you’re using your own genres, you need to edit the labels on the button costumes for this sprite as you did before.

32. Create the code shown below

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.



33. It's time to test!

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

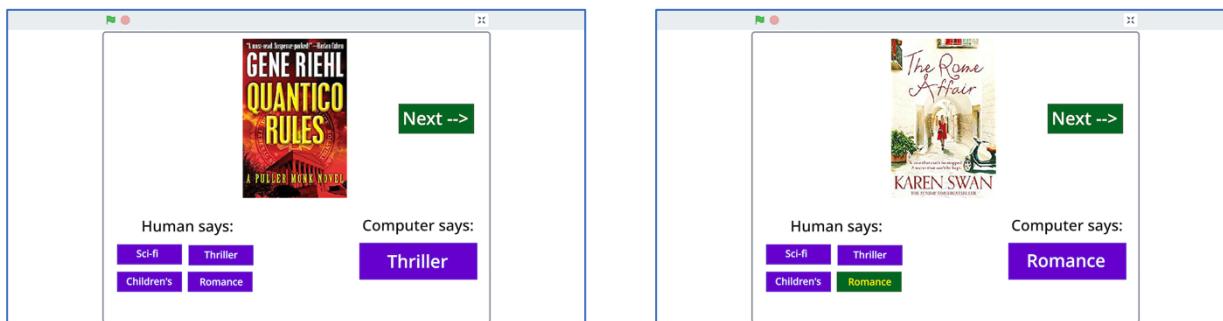
To be equal, find a friend to test this that hasn't seen your test images.
Click the fullscreen icon, and then click green flag.

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.



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. 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?

Alternative project ideas

Instead of book covers, why not try:

- album covers – train a computer to recognise the music genre of an album from a picture of the cover – do pop music albums look different from rap albums?
- movie posters – train a computer to recognise the type of movie based on a picture of the poster – do action movie posters look different from period drama movie posters?

Recognise covers that you like instead

If you would like to try training the model to recognise which types of covers you like instead, try the **Recommender** worksheet on the Machine Learning for Kids website.