



Recommender

Predicting whether you will like something is a common job for machine learning. This is how online shops recommend what you might like to buy, video sites recommend what you might like to watch, and music apps recommend what you might like to listen to.

In this project, you will investigate whether it's possible to judge a book by its cover. You will make a project in Scratch to see if a computer can learn to predict whether you would want to read a book, based only on what the cover looks like.

The screenshot shows the Scratch project interface. On the left, the script editor displays a complex script for a 'book' sprite. The script uses the 'when green flag clicked' event to initialize the machine learning model, set size to 100%, switch costume to 'unknown', go to position -140, y: 40, and hide. It then searches for 'Fiction (Science Fiction)' and adds the book cover to its costume. The script then says 'join [Title join by Author]' and checks if the predicted label matches 'like'. If so, it broadcasts 'predict like' and changes the costume to a thumbs-up icon; if not, it broadcasts 'predict dislike' and changes the costume to a thumbs-down icon. Finally, it adds training data for the current costume image and 'like' or 'dislike' respectively. The stage shows a book titled 'CHILDHOOD'S END' by Arthur C. Clarke. A speech bubble asks 'Do you like the look of this book?' and another bubble below says 'The system predicts that you will like this book'. Stage settings show the book sprite at position -140, y: 40, size 100, direction 90. Stage backdrops include a library setting.



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. Go to <https://machinelearningforkids.co.uk/> in a web browser
2. Click on “Get started”
3. Click on “Try it now”
4. Click on “Projects” on the top menu bar
5. Click the “+ Add a new project” button.
6. Name your project “recommender” and set it to learn how to recognise “images”. Click “Create”

Start a new machine learning project

Project Name *

recommender

Project Type *

recognising images

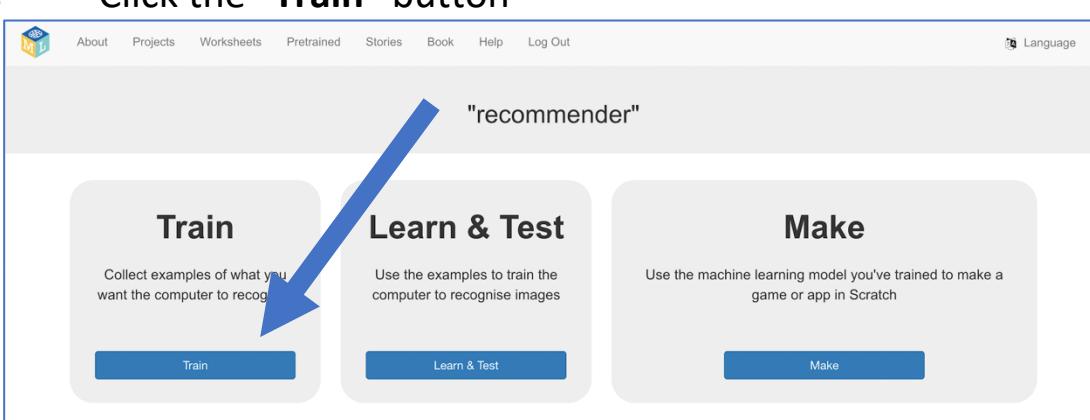
Storage *

In your web browser

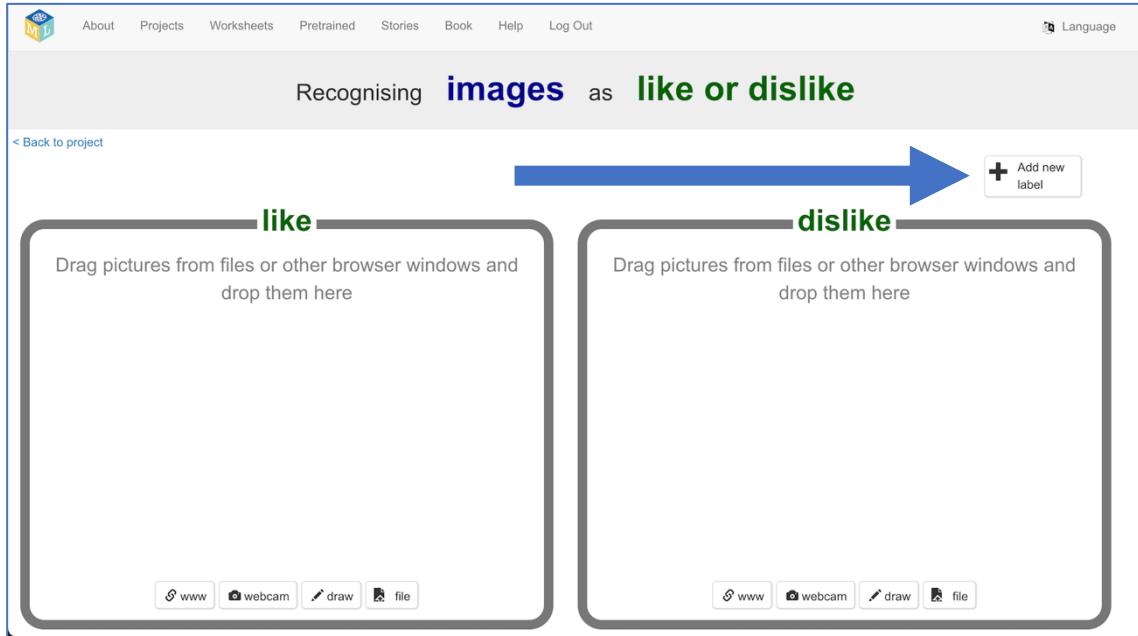
Where do you want to store this project?
Storing in your web browser removes limits on how big your project can be.
Storing in the cloud will let you access the project from any computer.
(See "What difference does it make where a project is stored?")

CREATE **CANCEL**

7. You should now see “recommender” in your projects list. Click on it.
8. Click the “Train” button

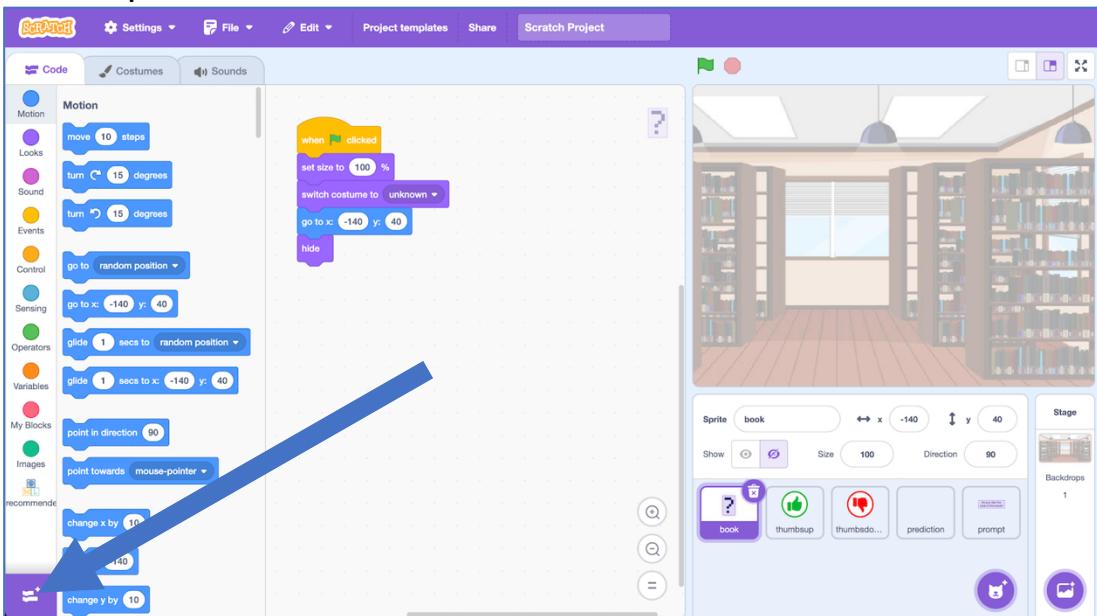


- 9.** Use the “+ Add new label” button to create two buckets
One for books with covers that you like: “like”
One for books with covers that you don’t like: “dislike”

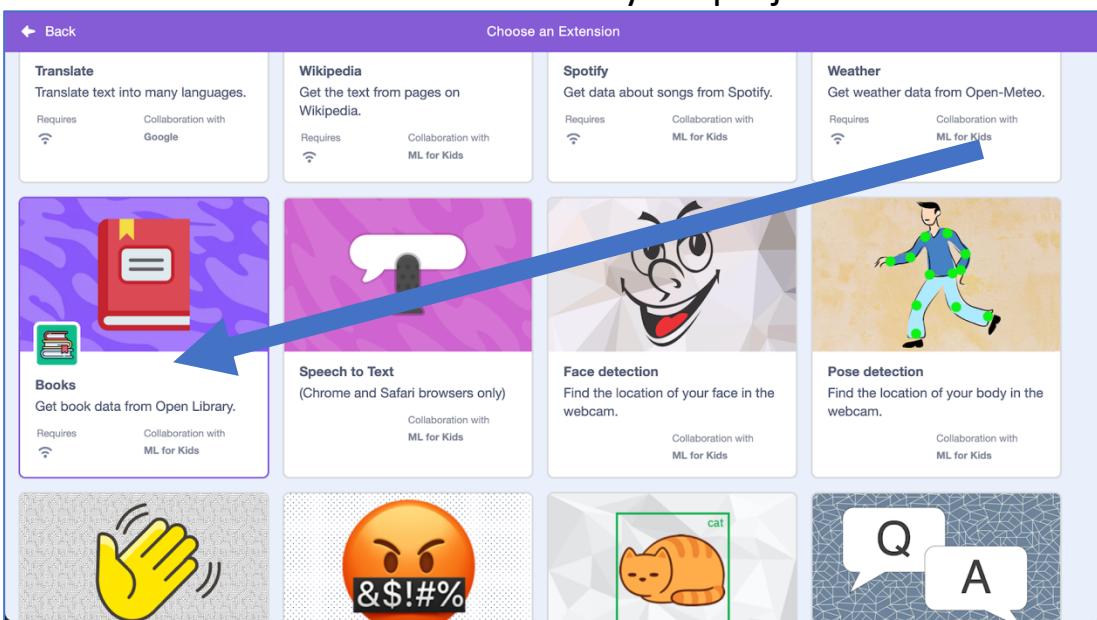


- 10.** Click the “< Back to project” link.
- 11.** Click the “Make” button
- 12.** Click the “Scratch 3” then click “straight into Scratch”
The page will warn you that you haven’t trained a machine learning model yet. That is okay, as you will be using Scratch to collect training images.
- 13.** In the Scratch window, click on “Project templates”
-
- A screenshot of the Scratch 3 interface. At the top, there is a purple menu bar with tabs for "Code", "Costumes", "Sounds", "Project templates", and "Scratch Project". A blue arrow points from the text in step 13 towards the "Project templates" tab. The main workspace shows a stage with a yellow cat sprite. On the left, there is a script editor with some blocks for the cat sprite.

15. Open the extensions list



16. Add the “Books” extension to your project

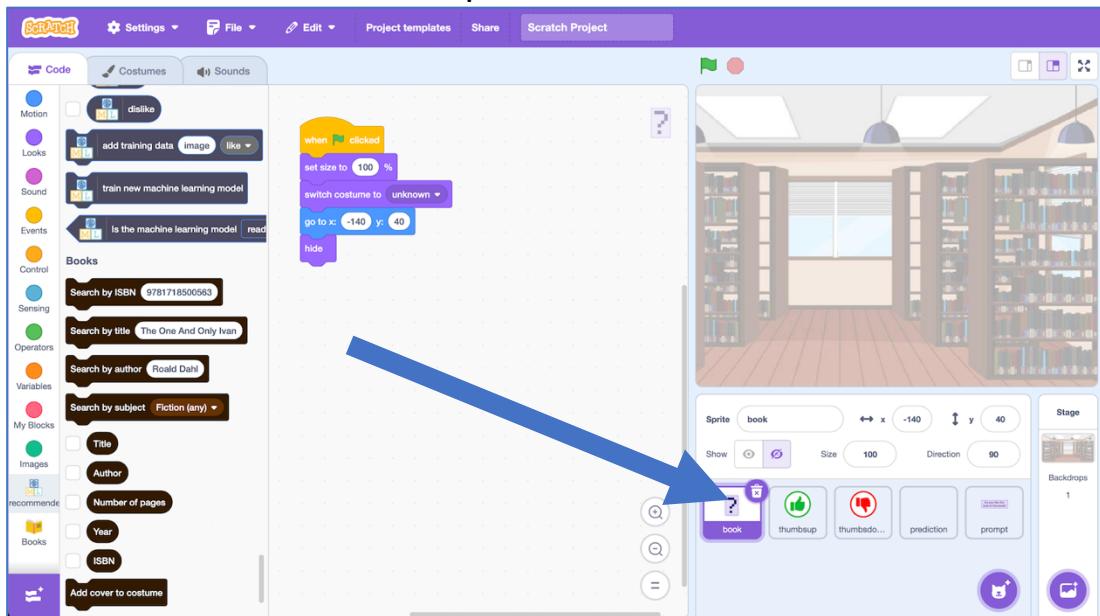


17. Choose a book subject to use for this project

In this project, you will be shown covers from random books, and asked to choose whether you would want to read it.

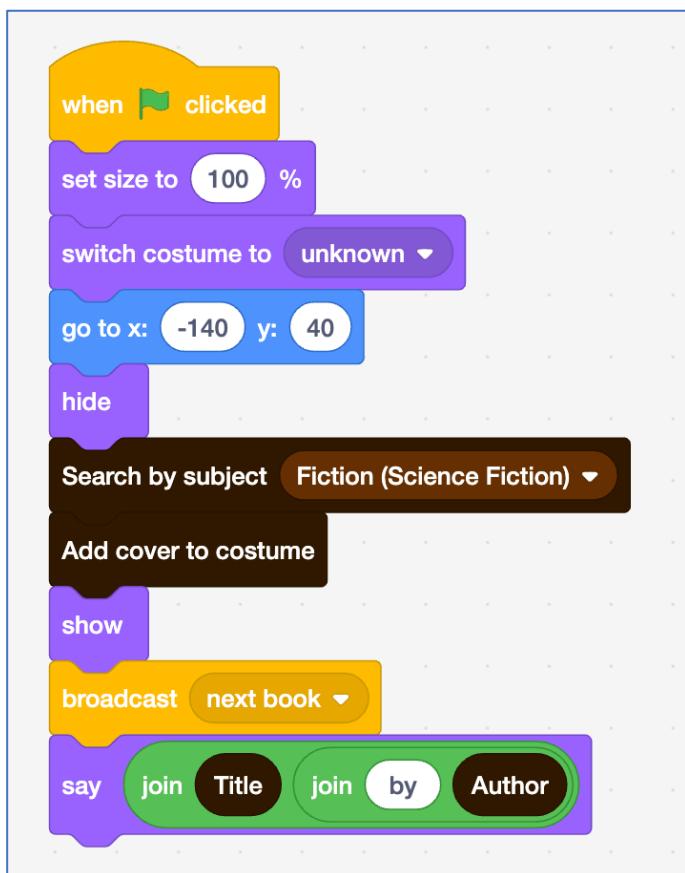
In the screenshots below, I decided to base my project on Science Fiction books, but you can choose your own subject.

18. Click on the “book” sprite



19. Update the code that is there so that it looks like this: *The first four blocks are already in the template for you.*

In the “Search by subject” block, choose a subject you would like to use.

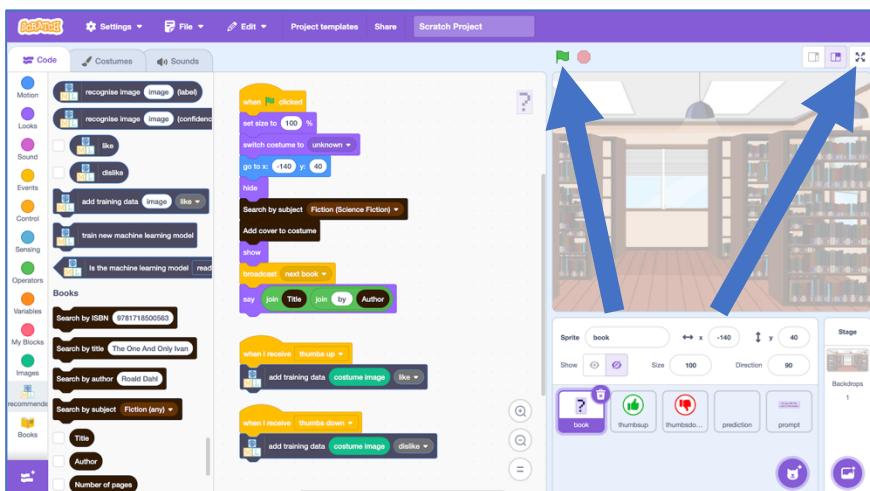


20. Add this code

You should still be in the “book” sprite



21. Click on the full-screen button then click on the Green Flag



22. You will see a random book cover.

Imagine you saw this book on a shelf. Would you give it a try?
If you like the look of it, click thumbs up. Else, click thumbs down.



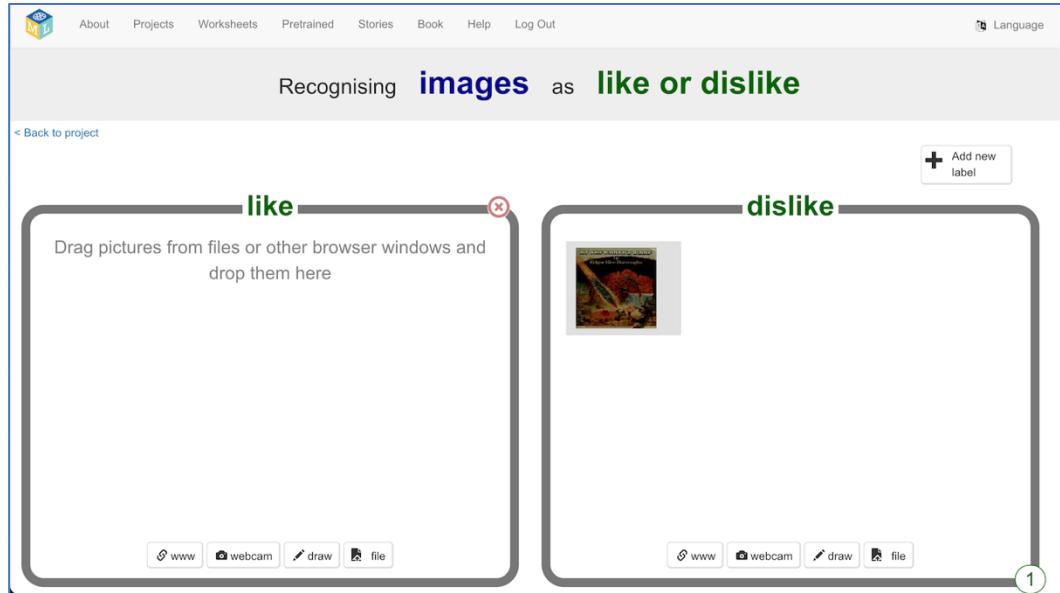
Sometimes a cover can't be found, so you will just see a question mark.

If this happens, click the Green Flag again to try a new book.

23. In the training window, click on the “< Back to project” link and then go back to the “Train” screen

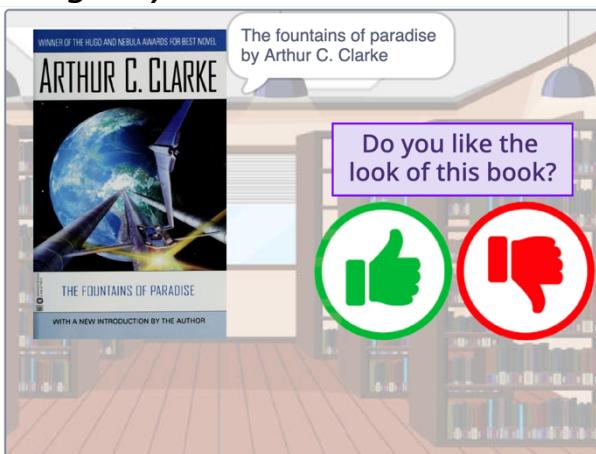
You should see the book from Scratch in one of your training buckets.

If it is not there, go back to steps 19 and 20, and check your code.



24. In the Scratch window, click the **Green Flag** to try another book.

If you see the same book again, skip it by clicking the Green Flag again. Imagine you saw this book on a shelf. Would you give it a try?

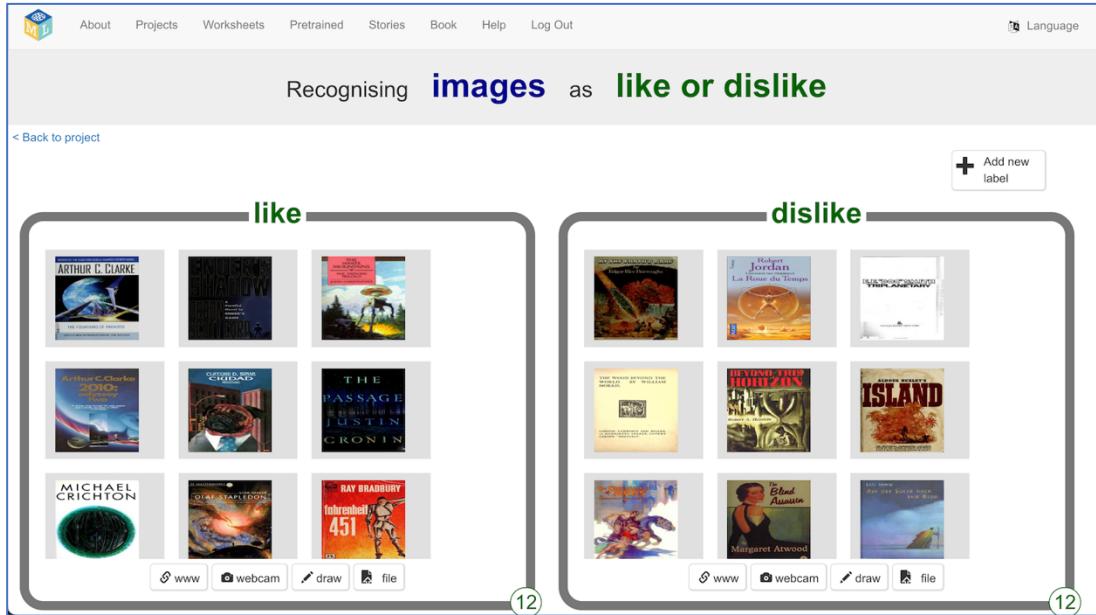


25. Keep going!

Click on the Green Flag to get the next book, then choose one of the buttons.

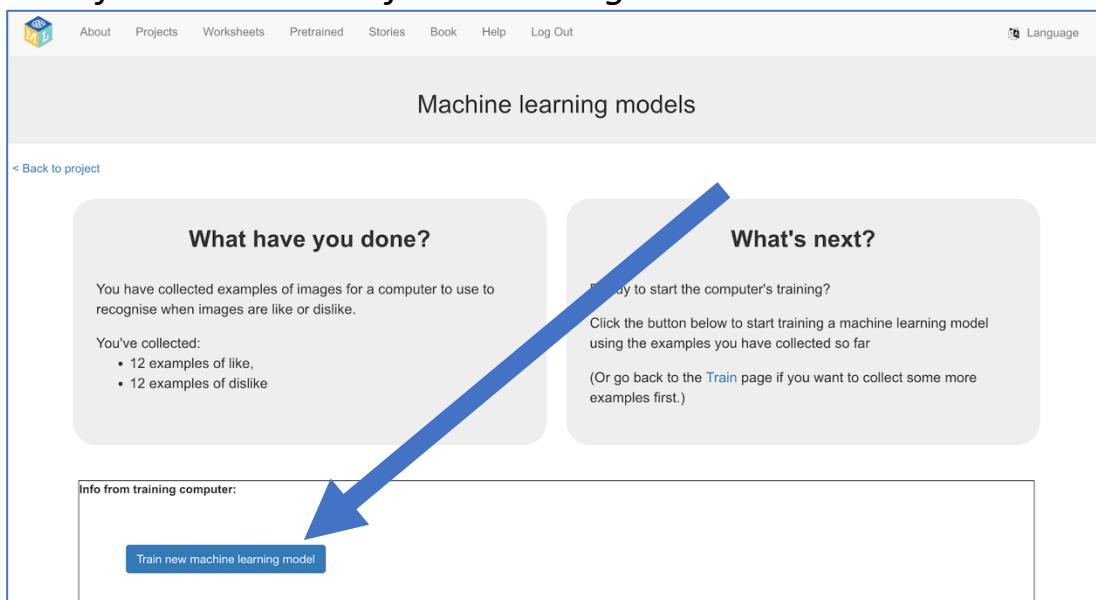
You want to collect a variety of examples of books that you would try reading, and a variety of examples of books that you don't like the look of. Try to avoid duplicates when you see books you remember seeing before.

- 26.** Use the training tool to keep track of how many examples you have
Once you have at least ten examples for both like and dislike, you can continue to the next step.



The screenshot shows a web-based application for training a machine learning model. At the top, there's a navigation bar with links for 'About', 'Projects', 'Worksheets', 'Pretrained', 'Stories', 'Book', 'Help', 'Log Out', and 'Language'. The main title is 'Recognising images as like or dislike'. Below the title, there are two sections: 'like' on the left and 'dislike' on the right, each containing 12 small images of book covers. At the bottom of each section are four buttons: 'www', 'webcam', 'draw', and 'file'. A green arrow points from the 'like' section to the 'dislike' section.

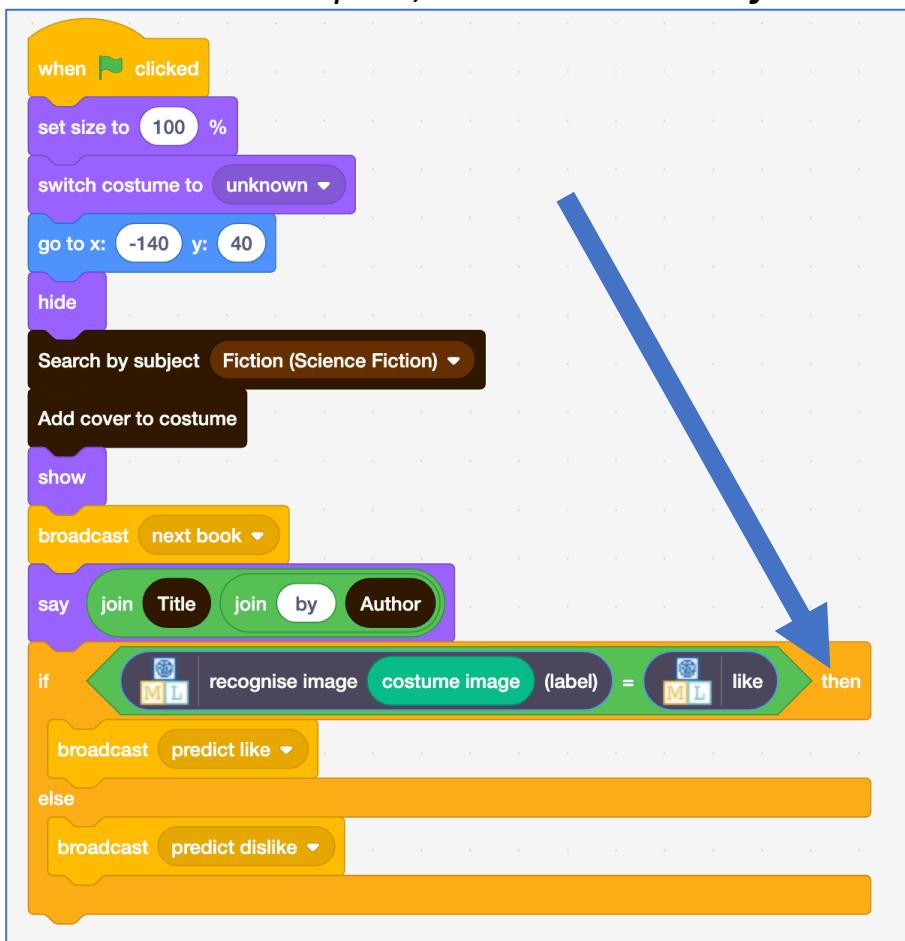
- 27.** Click on the “< Back to project” link.
28. Click on the “Learn & Test” button
29. Click on the “Train new machine learning model” button
The button will not be there if you don't have enough training examples. Wait for the model to finish training.



The screenshot shows a 'Machine learning models' page. At the top, there's a navigation bar with links for 'About', 'Projects', 'Worksheets', 'Pretrained', 'Stories', 'Book', 'Help', 'Log Out', and 'Language'. The main title is 'Machine learning models'. Below the title, there are two sections: 'What have you done?' on the left and 'What's next?' on the right. The 'What have you done?' section contains text about collecting 12 examples of like and dislike images. The 'What's next?' section contains text about starting training and a 'Train new machine learning model' button. A blue arrow points from the 'What have you done?' section to the 'Train new machine learning model' button.

30. Update your Green Flag code to look like this.

Still in the “book” sprite, the new bit is the *if ... then ... else* at the bottom.



31. Click on the full-screen button and then the Green Flag like before

Click **thumbs-up / thumbs-down** buttons like before.

Try to avoid duplicates when you see books you remember seeing before.
This time, you will also see a prediction from your machine learning model



What have you done?

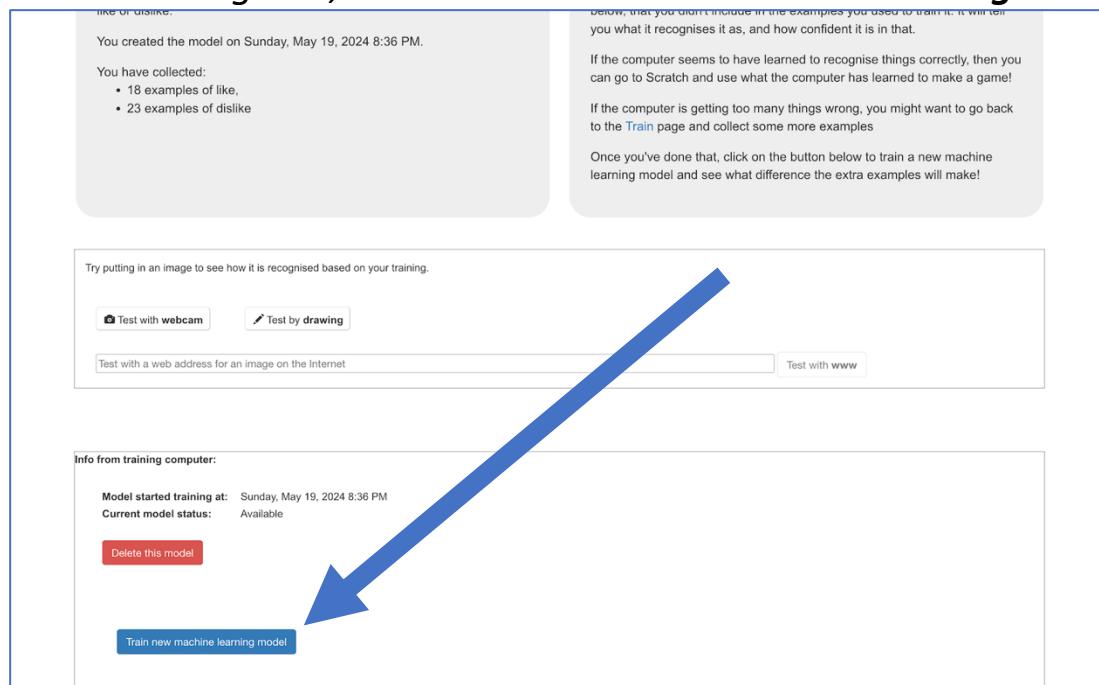
You've trained a machine learning model to classify pictures. The computer learned from patterns in the colours and shapes from each of the images you've given it. These were used to recognise new covers.

If the computer has recognised patterns in the sorts of books that you like the look, then it could be good at predicting books you might try reading.

If it hasn't identified patterns in your answers yet, then it might still be making mistakes. More examples may help it to learn what you like.

32. When you have collected extra examples for the computer to learn from, you should train a new model.

*In the training tool, click the “**Train new machine learning model**” button.*



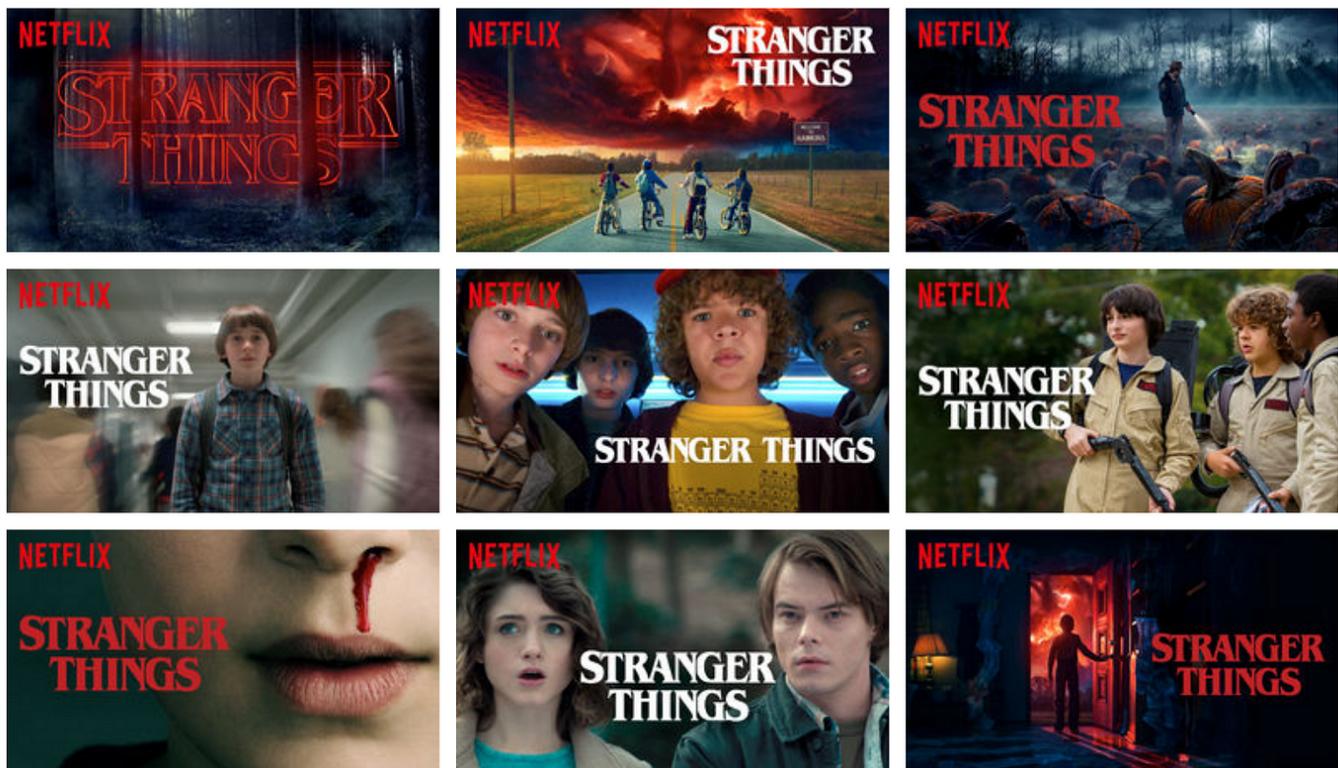
33. Go back to the Scratch window

Have the extra training examples improved the predictions that the machine learning model is making?

Did you know?

Netflix are a good example of using machine learning to predict whether a cover image will encourage you to give something a try.

They create many different thumbnails for every movie and TV show in their catalog, and use machine learning to select which of those thumbnails to show to you, based on patterns their system has learned of what you have liked in the past.



Which of these thumbnails would be most likely to get you to try watching Stranger Things?

If you would like to learn more about what they do, you can read about it in their blog post at:

<https://netflixtechblog.com/artwork-personalization-c589f074ad76>

This was also summarized by Vox in a short video at:

<https://youtu.be/axCBA3VD5dQ>

What you have done in this project is a simplified version of the same basic idea.

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?

Predict which covers you like from your favourite author

Instead of looking at books about a particular subject, you could try basing a project on books by your favourite author.

Make sure you choose an author that has written enough books to base a project on!

Replace the search by subject block with this:



Add a third category

If you think two categories isn't enough, try adding a third.

Instead of like/dislike, you could base a project on like / don't mind / dislike.

Recognise book subjects instead

If you would like to try training the model to recognise book subjects from the cover instead, try the **Judge a book** worksheet on the Machine Learning for Kids website.