



School Library

In this project you will make a school librarian character that can make reading book recommendations.

If you describe a book to it, it will try to predict who that book might be suitable for.

You will teach the computer to recognise fiction books of different reading levels by giving it examples of each.

The image shows a Scratch project titled "School Library". The stage features a female librarian sprite named "Dani". The script area contains the following code:

```
when I receive [recommend v]
  if [recognise numbers pages < number of pages & lines & number of lines > v]
    say [This book might be good for a Year R student]
  end
  if [recognise numbers pages < number of pages & lines & number of lines > v]
    say [This book could be a good read for someone in Key Stage 1]
  end
  if [recognise numbers pages < number of pages & lines & number of lines > v]
    say [This book might be better for students in Key Stage 2]
  end
```

The script palette on the left shows custom blocks for "ML" related to reading numbers, adding training data, and training a machine learning model. The costumers palette includes a "school library" costume. The stage properties show Dani's position at x: 185, y: -39, size: 100, and direction: 90.



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1. You need a collection of fiction books for this project.
Go to the school library!
2. Find examples of fiction books of different reading levels, and collect the following information about them:
 - * Number of pages in the book
 - * Number of lines in each page (*choose a typical full page of text*)
 - * Number of pictures in the book (*if the book is too long, or there are too many pictures to count, it's okay to make an estimate*)
 - * The reading level (e.g. Year R / Key Stage 1 / Key Stage 2.
Your school may have different ways to group fiction books, such as by reading level or using coloured bands. Try to limit yourself to just a few different reading levels though)

3. Do this for at least five books at each reading level.
*More books would be better if you can find them and have the time!
It's easiest to collect this on pen and paper. Try drawing out a table to make it easier.*

number of pages	number of lines	number of pictures	reading level
16	4	12	Year R
16	6	12	Year R
24	5	20	Year R

4. Go to <https://machinelearningforkids.co.uk/> in a web browser
5. Click on “Get started”
6. 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.*

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

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

9. Name your project “school library” and set it to learn how to recognise “**numbers**”

Start a new machine learning project

Project Name *

school library

Project Type *

recognising numbers

ADD A VALUE

Start to describe the values that you'll include with each example to train the computer with by clicking the 'Add a value' button.

Storage *

In your web browser

CREATE CANCEL

10. Click “**Add a value**” three times.
Set the type of all these values to “number”.

Start a new machine learning project

Project Name *

school library

Project Type *

recognising numbers

Value 1 * number	Value 2 * number	Value 3 * number
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ADD ANOTHER VALUE

Storage *

In your web browser

CREATE CANCEL

11. Name the three fields “pages”, “lines” and “pictures”

We will use these for:

pages – the number of pages in a book

lines – the number of lines on a page

pictures – the number of pictures in the book

Start a new machine learning project

Project Name *

school library

Project Type *

recognising numbers

Value 1 * Value 2 * Value 3 *

pages	number	lines	number	pictures	number
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ADD ANOTHER VALUE

Storage *

In your web browser

CREATE CANCEL

12. Click “Create”

“school library” should now be in your projects list. Click on it.

Your machine learning projects

+ Add a new project Copy template

school library

Recognising numbers

trash bin icon

13. We'll start by collecting examples of books to train the computer with. Click the Train button.

"school library"

Train

Collect examples of what you want the computer to recognise

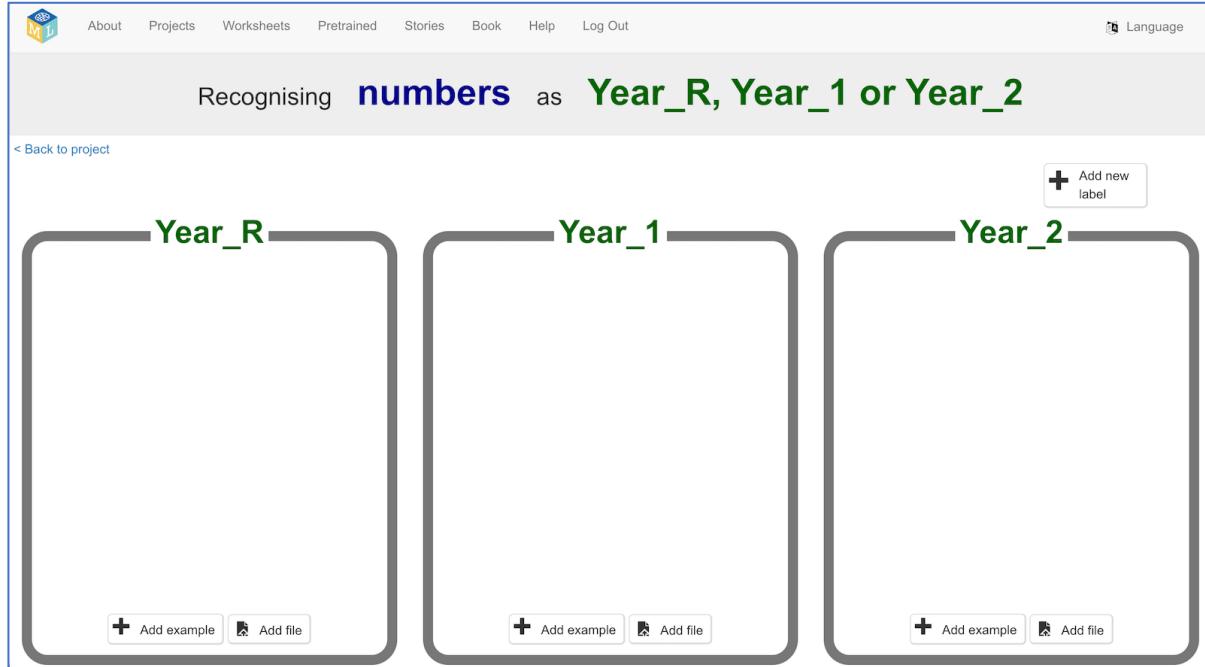
Learn & Test

Use the examples to train the computer to recognise numbers

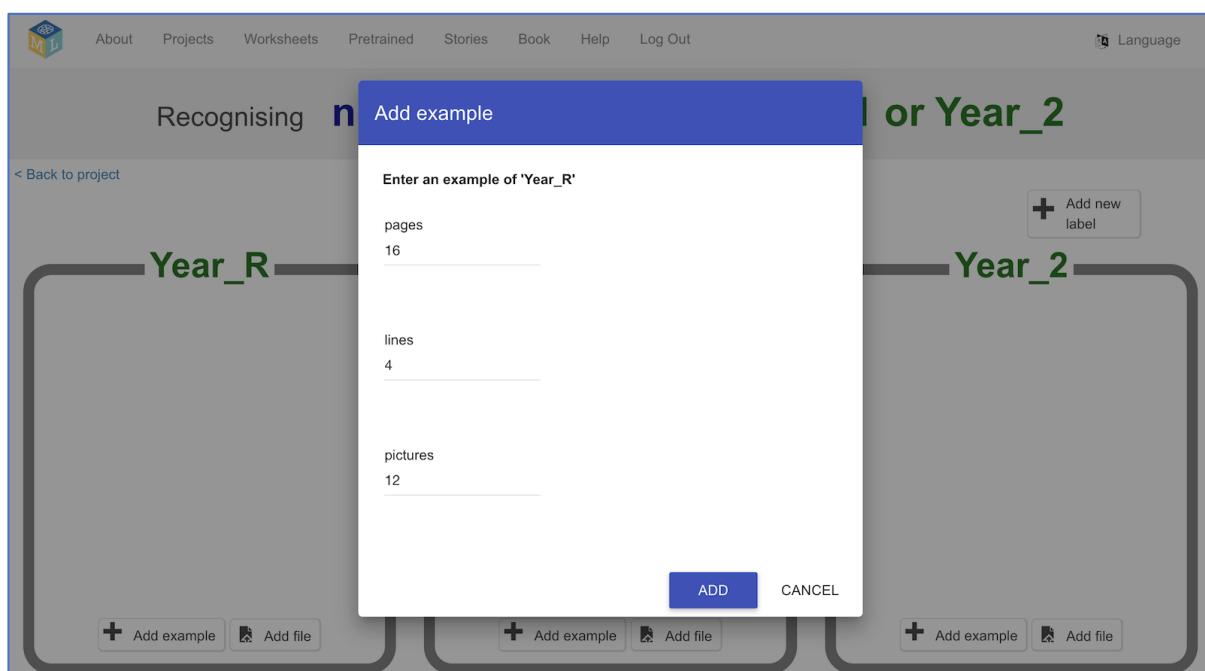
Make

Use the machine learning model you've trained to make a game or app, in Scratch or Python

- 14.** Click on “+ Add new label” and call it “Year R”.
Do that again, and create a second bucket called “Key Stage 1”.
Do that again, and create a third bucket called “Key Stage 2”.
If you used different names for reading levels, use those instead.



- 15.** Click the “Add example” button in the “Year R” bucket, and type in the values from your first Year R book.
Click “Add”



16. Do this for the values of all the books you collected.

The screenshot shows a web application interface for collecting data examples. At the top, there's a navigation bar with links for About, Projects, Worksheets, Pretrained, Stories, Book, Help, Log Out, and Language. Below the navigation is a title: "Recognising numbers as Year_R, Year_1 or Year_2". A "Back to project" link is located above the main content area. On the right side, there's a button labeled "+ Add new label". The main area contains three sections: "Year_R", "Year_1", and "Year_2", each showing a grid of four data examples. Each example includes fields for pages, lines, and pictures. Below each section are buttons for "+ Add example", "Add file", and "Download". The number "6" is circled in green at the bottom center of each section, indicating the count of examples. The "Year_R" section has examples with values like (16, 4, 12), (12, 1, 10), (15, 3, 12), and (10, 2, 8). The "Year_1" section has examples with values like (20, 5, 13), (24, 5, 20), (16, 8, 9), and (23, 4, 20). The "Year_2" section has examples with values like (73, 15, 26), (87, 20, 22), (112, 20, 0), and (294, 25, 0).

17. Click the “< Back to project” link once you’ve finished to go back to the Project menu, then click on the “Learn & Test” button.

18. Click the “Train new machine learning model” button at the bottom of the page.

The screenshot shows a page titled "Machine learning models". At the top, there's a navigation bar with links for About, Projects, Worksheets, Pretrained, Stories, Book, Help, Log Out, and Language. A "Back to project" link is present. The main content area is divided into two sections: "What have you done?" and "What's next?".
What have you done?
Text: You have collected examples of numbers for a computer to use to recognise when numbers are Year_R, Year_1 or Year_2.
Text: You've collected:

- 6 examples of Year_R,
- 6 examples of Year_1,
- 6 examples of Year_2

What's next?
Text: Ready to start the computer's training?
Text: 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.)

At the bottom, there's a box labeled "Info from training computer:" containing a "Train new machine learning model" button.

19. Use the Test form to try out the model you've trained.

Test it with a book that you haven't shown the computer before. In other words, not one that you've used in your examples in Training.

If you're not happy with how the computer predicts the reading level, go back to step 15, and add some more examples.

Make sure you repeat step 18 to train with the new examples though!

You have trained a machine learning model to recognise when numbers are Year_R, Year_1 or Year_2.

You created the model on Saturday, September 20, 2025 6:21 PM.

You have collected:

- 6 examples of Year_R,
- 6 examples of Year_1,
- 6 examples of Year_2

Try testing the machine learning model below. Enter an example of numbers below, that you didn't include in the examples you used to train it. It will tell you what it recognises it as, and how confident it is in that.

If the computer seems to have learned to recognise things correctly, then you can go to Scratch and use what the computer has learned to make a game!

If the computer is getting too many things wrong, you might want to go back to the [Train](#) page and collect some more examples

Once you've done that, click on the button below to train a new machine learning model and see what difference the extra examples will make!

Try putting in some numbers to see how it is recognised based on your training.

pages	10
lines	2
pictures	8

[Test](#) [Describe your model!](#)

Recognised as **Year_R**
with 100% confidence

What have we done so far?

You've started to train a computer to predict the reading level for a fiction book. You've done this by training it recognise sets of numbers as being "Year R", "Key Stage 1", or "Key Stage 2".

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 examples you've given it. These will be used to be able to make predictions for numbers about new books.

- 20.** Click the “< Back to project” link
- 21.** Click the “Make” button
- 22.** Click the “Scratch 3” button
This page has instructions on how to use the new blocks in Scratch from your project. Keep the page open if you need to check how to use them.
- 23.** Click on “Open in Scratch 3”

Your project will add these blocks to Scratch.

recognise numbers distance 0 (label)
 Put numbers in the input for this, and it will return the label that your machine learning model recognises it as.

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

label
 These blocks represent the labels you've created in your project, so

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

Scratch 3 Project Preview:

- Code tab: my project
- Operators category: recognise text [text] (label)
- Variables category: recognise text [text] (confidence)
- My Blocks category: happy, sad

- 24.** You should see new blocks from your “school library” project

Code Editor:

- Categories:** Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, My Blocks, Images.
- Custom Block:** school library
 - Motion: recognise numbers pages 0 lines, recognise numbers pages 0 lines
 - Events: Year_R, Year_1, Year_2
 - Control: add training data pages 0 lines, train new machine learning model
 - Sensing: Is the machine learning model ready?

Stage Area:

- Sprite:** Sprite1 (Cat)
- Properties:** Size: 100, Direction: 90
- Backdrops:** 1

Tips

More examples!

The more examples you give it, the better the computer should get at recognising the reading level for books.

Try and be even

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

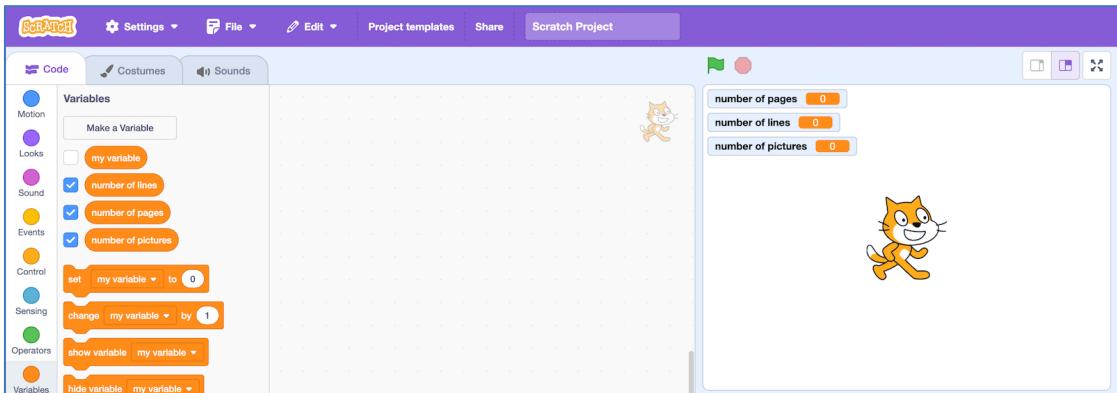
If you have a lot of examples for one reading level, and not the others, the computer might learn that reading level is more common and more likely, so you'll affect the predictions that it makes.

Mix things up with your examples

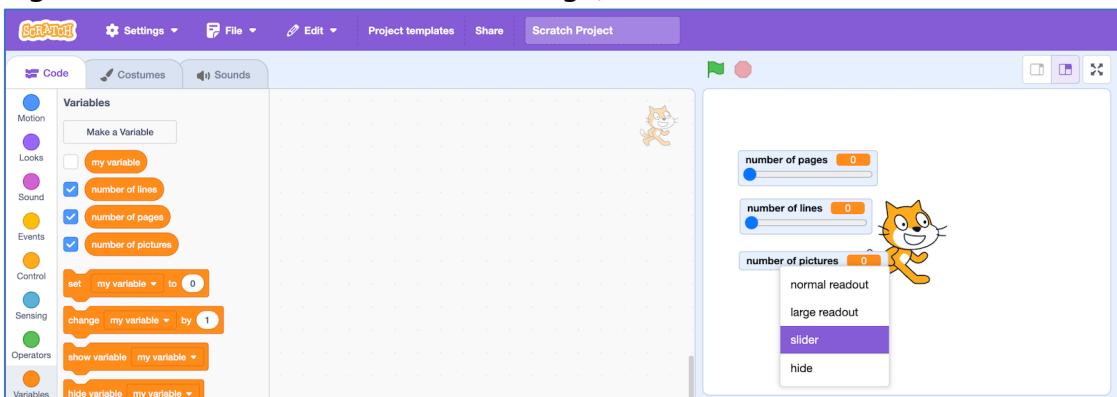
Try to come up with lots of different types of examples.

For example, don't choose lots of examples of very similar books in a set or series.

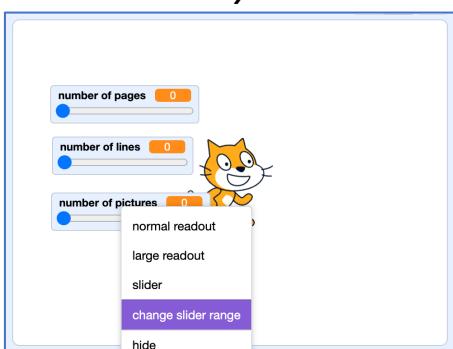
25. Create three new variables, for all sprites. Call these “number of lines”, “number of pages”, and “number of pictures”.
Leave them ticked, so they stay visible on the stage.



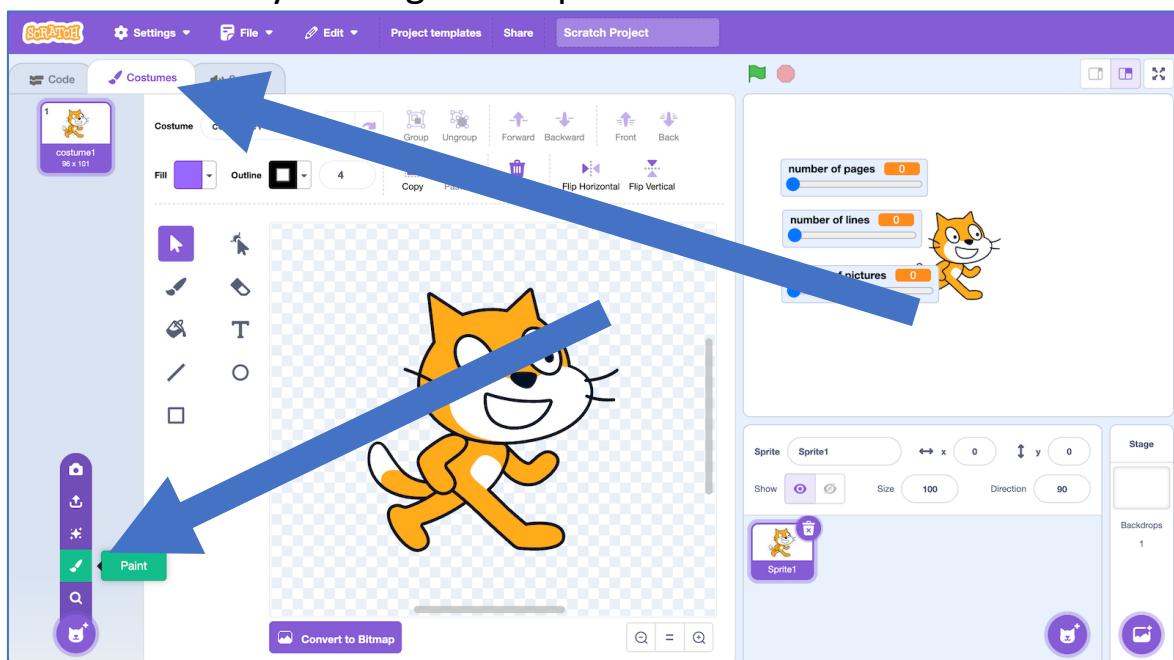
26. Set all of the variables so that they are displayed on the stage as “sliders”. Spread them out a bit so you have space.
Right click on the variables on the stage, and choose “slider”.



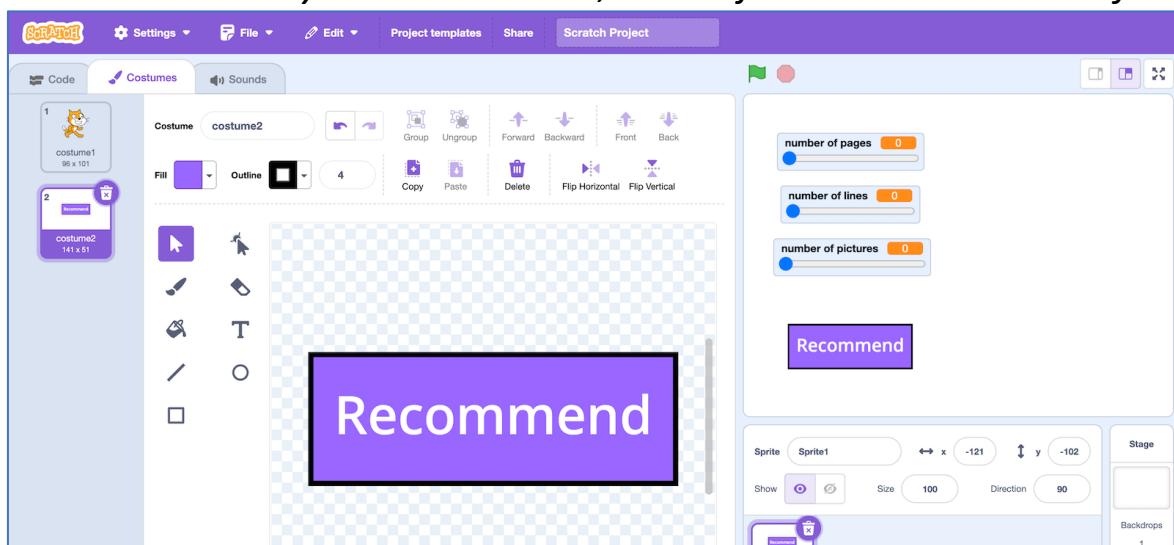
27. Update the minimum and maximum for each of the sliders so that the range is more sensible.
*For example, you could use minimum of 0 and maximum of 300 for pages.
You could use 0 – 40 for number of lines.
You could use 0 – 50 for pictures.
Choose what you think makes sense based on your books.*



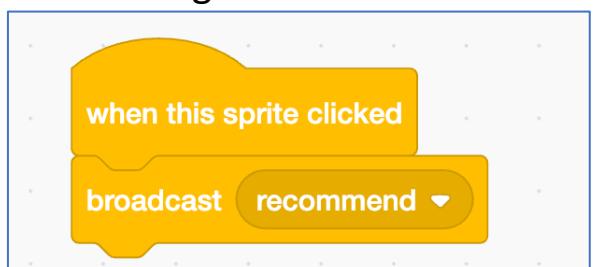
- 28.** Edit the sprite by clicking on the **Costumes** tab and then create a new costume by clicking on the paint brush



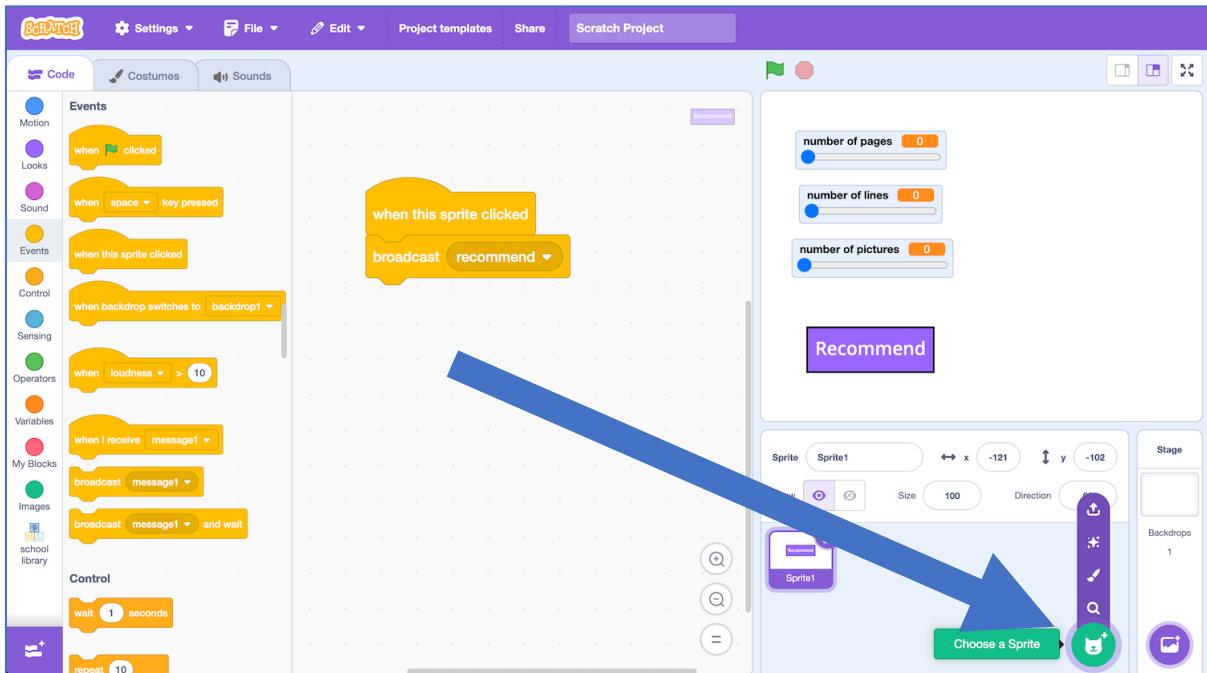
- 29.** Draw a button and give it a label like “Recommend”.
Move it to under your three sliders, and adjust the size so that it fits.



- 30.** Click on the **Code** tab and create a script for this button sprite, so that clicking the button broadcasts a new “recommend” message.



31. Add another sprite – choose a sprite to be your librarian



32. Create the following code

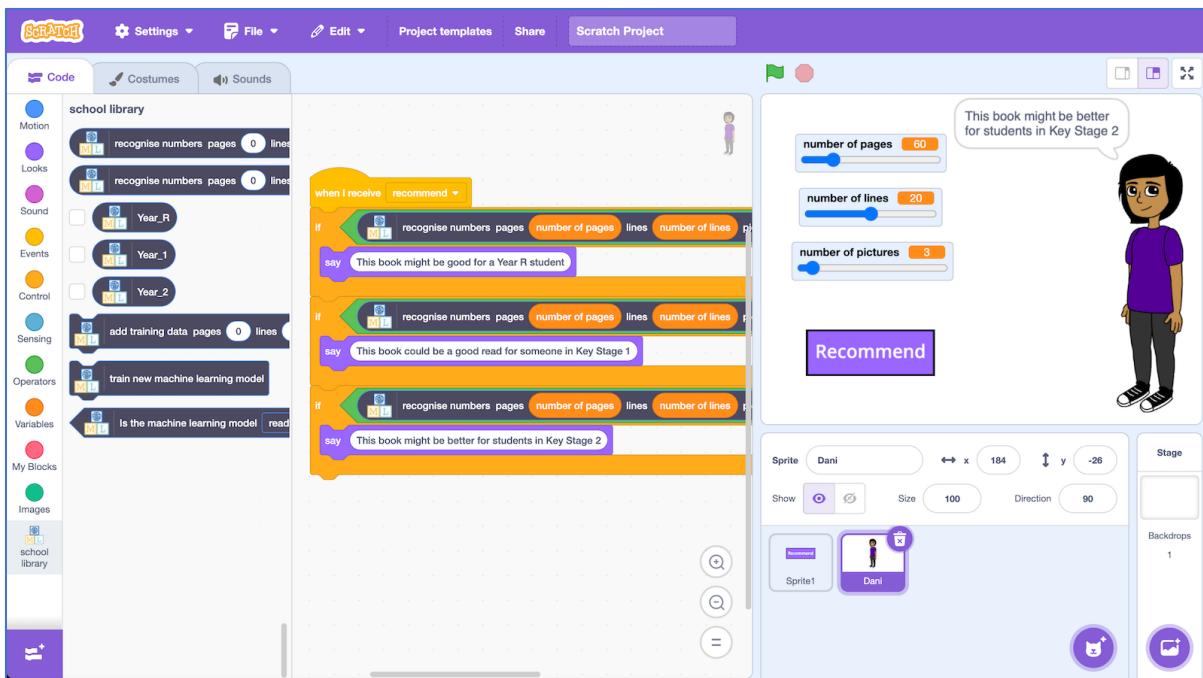
Think about how you could use “Duplicate” to make this easier.



33. Test your project!

Set the sliders to values from a new book – a book that you didn't use to train your machine learning model.

Click the recommend button to see a recommendation for who the book is suitable for.



What have we done so far?

You've created a Scratch game with a school librarian that uses machine learning.

Your character is making a prediction of who a book might be suitable for, based on the machine learning model that you've made.

You trained that machine learning model by collecting examples of books, and telling the computer what reading level each of them would be. The more examples you give it, the better it should get at recommending correctly.

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?

Choose different numbers

Instead of number of pages, number of lines, and number of pictures, what other numbers could you use?

What other numbers or measurements could you make that you think could be used to make predictions or recommendations?

The height of the book? The thickness? The size of the letters?

Try creating a new numbers project and this time use your own ideas. Compare it with your first project – is it better or worse at making recommendations?