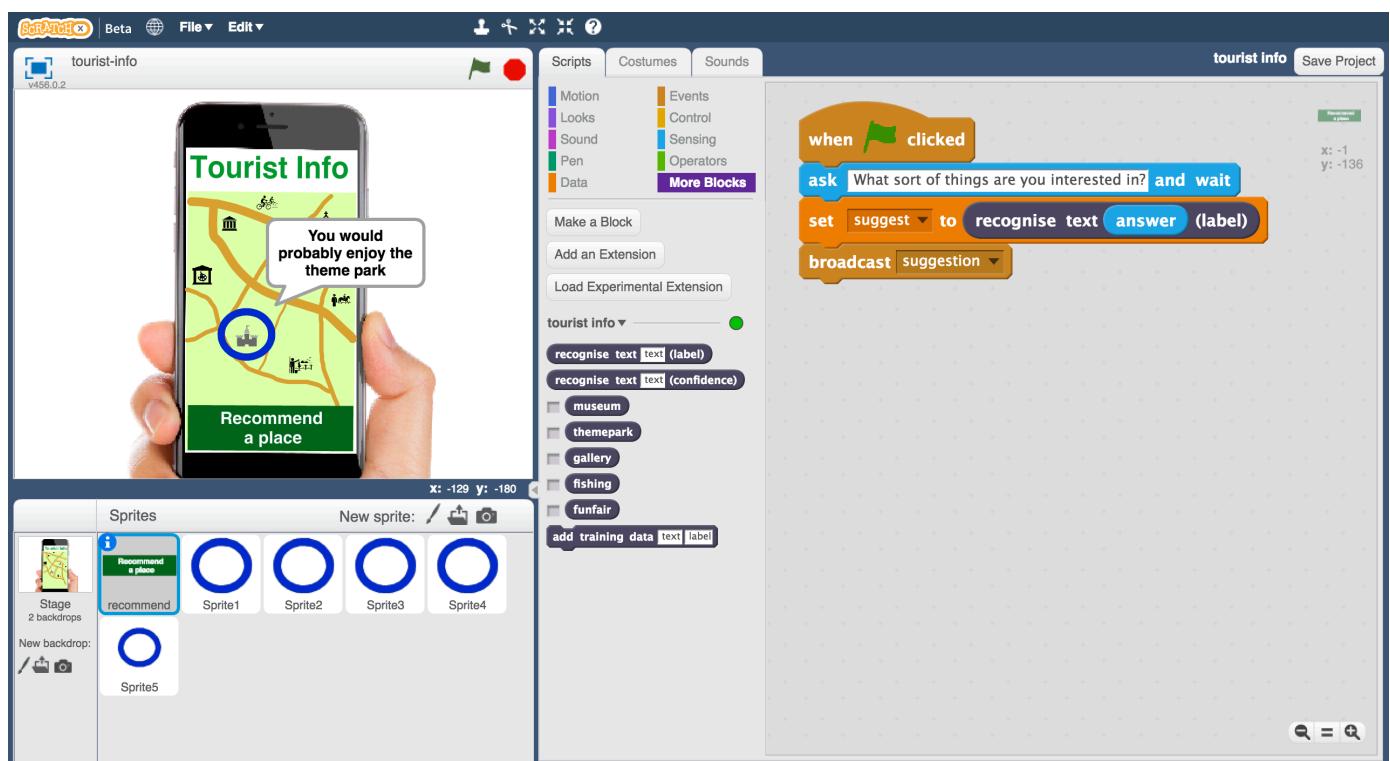


Tourist Info Bot

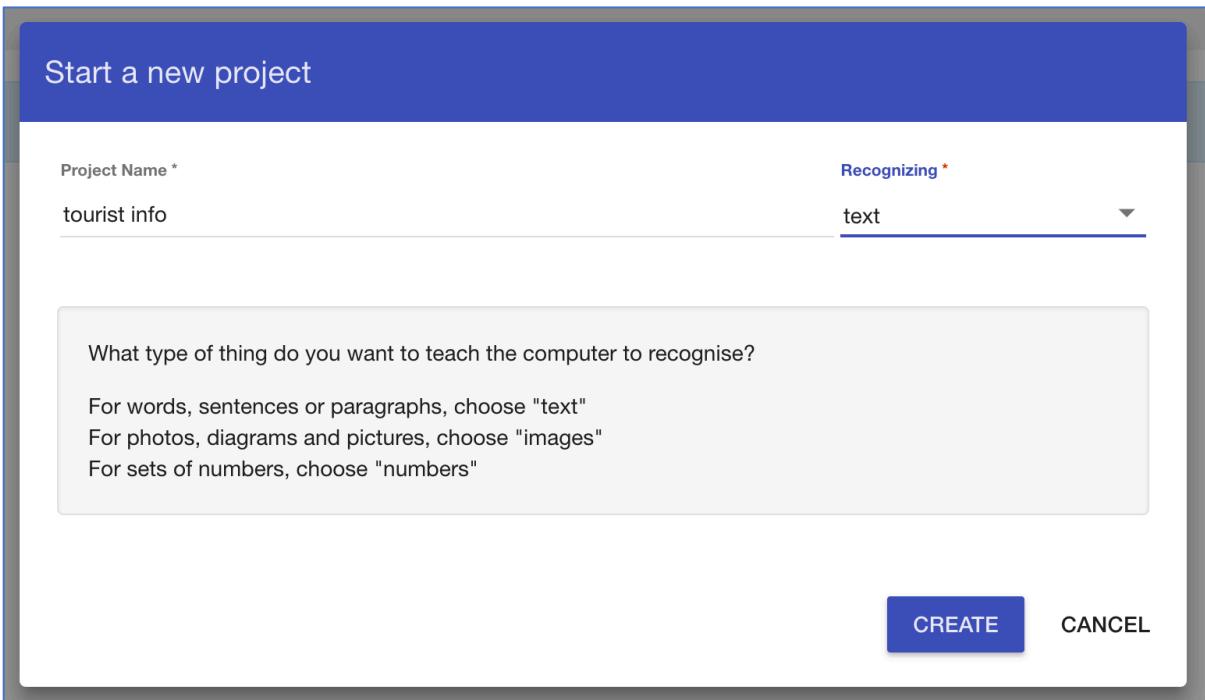
In this project you will make a mobile Tourist Information bot that makes recommendations to tourists about which attractions they should visit.

You'll train a machine learning model so that the bot can learn how to make recommendations based on what people say they're interested in.

You'll also learn about the affect of "bias" on machine learning projects, and see how this can happen.

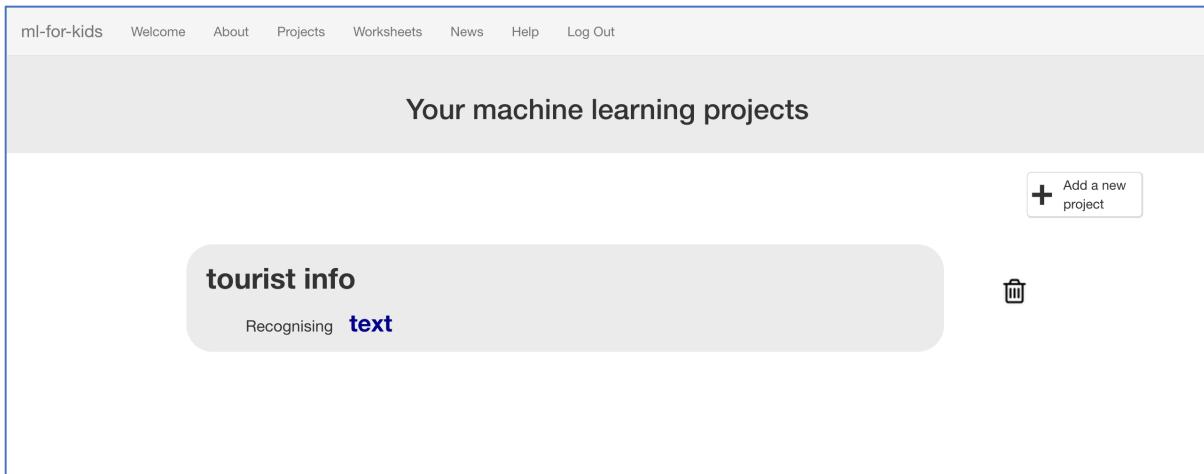


1. You'll need the **tourist-info.sbx** starter file for this project.
If you haven't got this, ask your teacher or group leader.
2. Go to <https://machinelearningforkids.co.uk/> in a web browser
3. Click on “**Get started**”
4. Click on “**Log In**” and type in your username and password
If you don't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



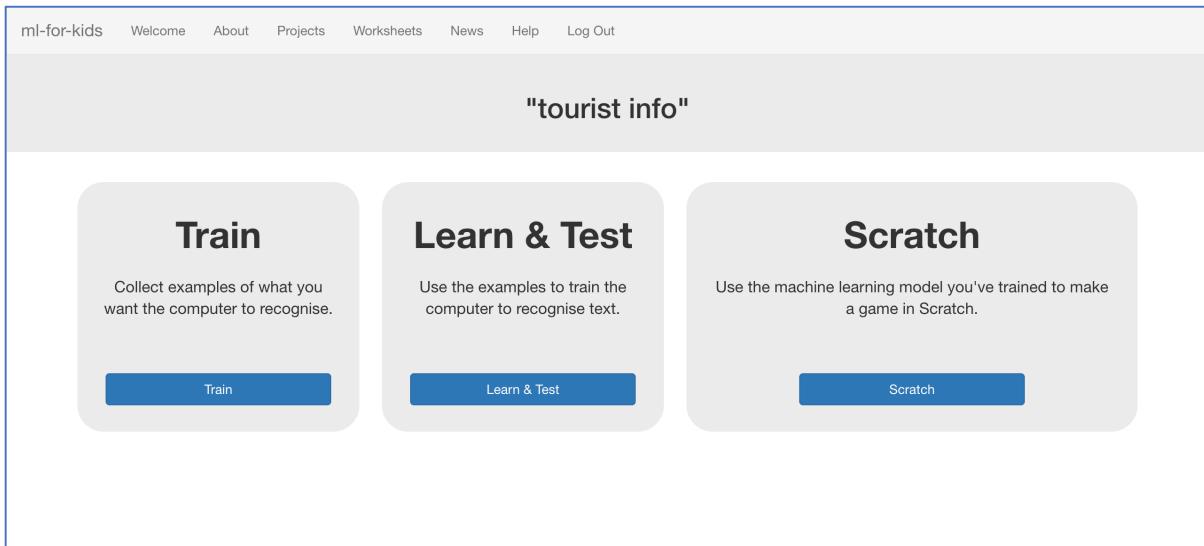
The screenshot shows a 'Start a new project' dialog box. At the top, it says 'Start a new project'. Below that, there's a 'Project Name *' field containing 'tourist info'. To the right of the field is a 'Recognizing *' dropdown menu set to 'text'. A tooltip below the dropdown explains: 'What type of thing do you want to teach the computer to recognise? For words, sentences or paragraphs, choose "text". For photos, diagrams and pictures, choose "images". For sets of numbers, choose "numbers".' At the bottom right of the dialog are 'CREATE' and 'CANCEL' buttons.

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



- 9.** We'll start by getting a project ready in Scratch. Click on the **Scratch** button.

*The next page will warn you that you haven't done any machine learning yet, but clicking on **Scratch by itself** will launch Scratch.*

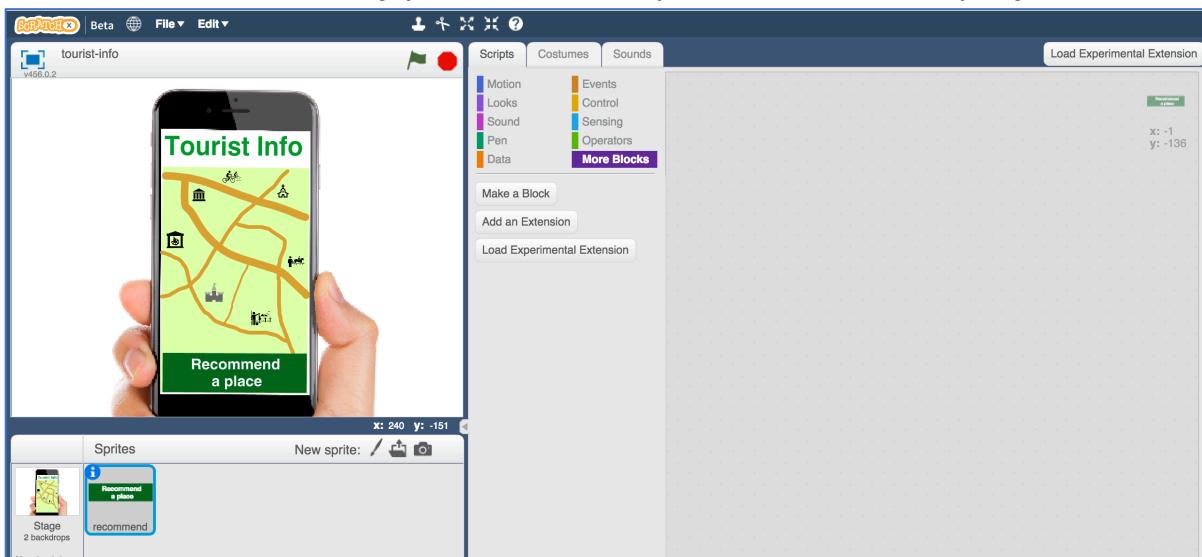


- 10.** The next page will warn you that you haven't done any machine learning yet. That's okay. Click on **Scratch by itself** to launch Scratch anyway.

11. Open the tourist-info.sbx template project

Click on **File -> Load Project**

Click **OK** when it asks if you want to replace the current project



12. Create a new variable called "suggest" for all sprites.

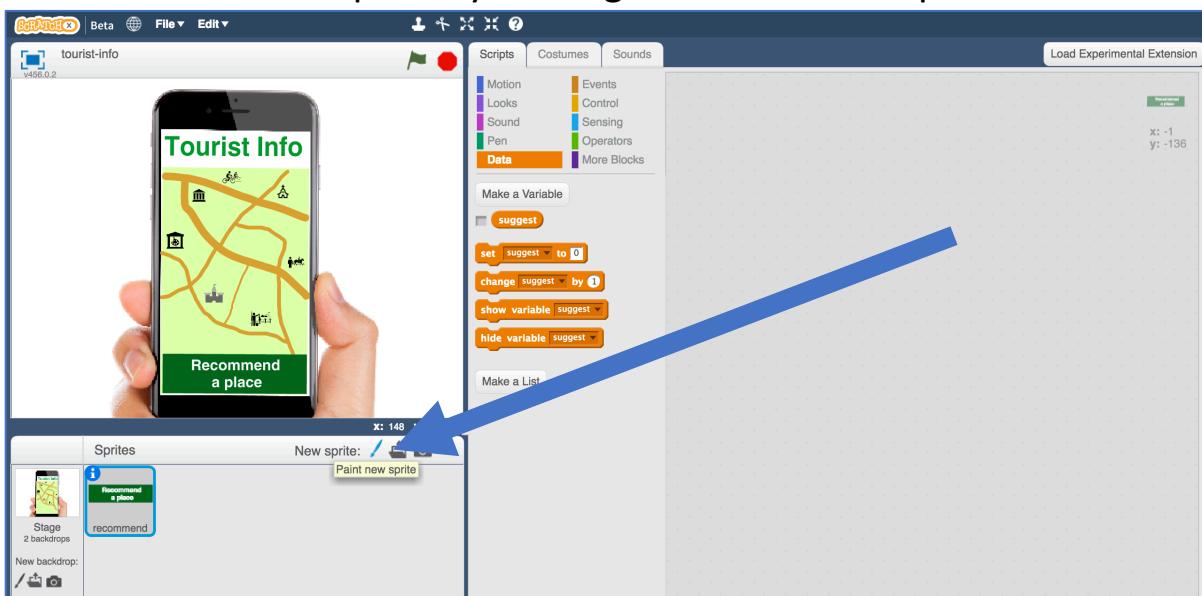
Click on **Data**

Click on **Make a variable**

Name it "suggest" and leave "For all sprites" selected

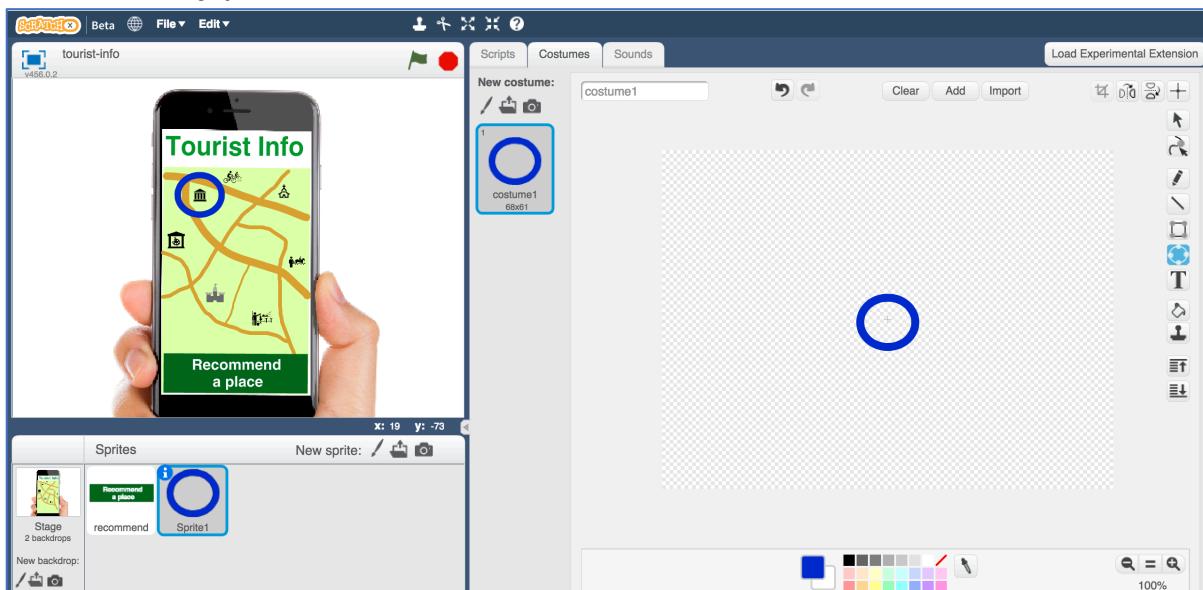
Untick the "suggest" checkbox so it's not displayed on the stage

13. Create a new sprite by clicking the “Paint new sprite” brush button.



14. Draw a circle and put it around the museum icon on the map

Tip: If you click “Convert to vector” first it makes it easier to resize your circle later if you need to.

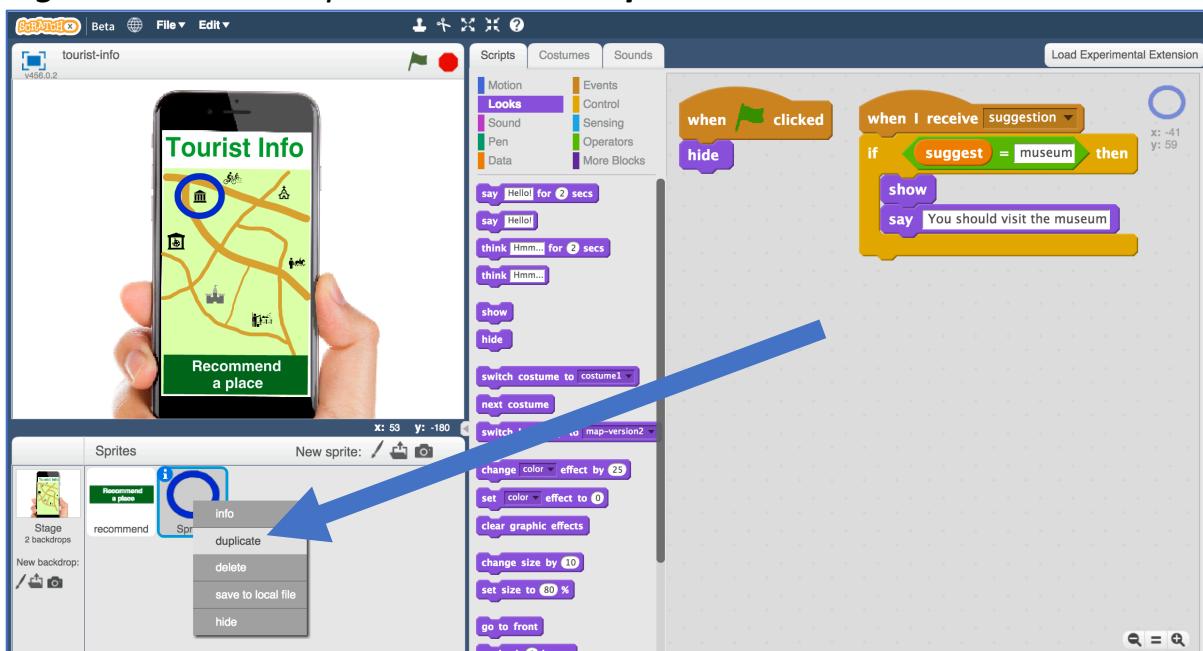


15. Click on the “Scripts” tab, and enter the following script.



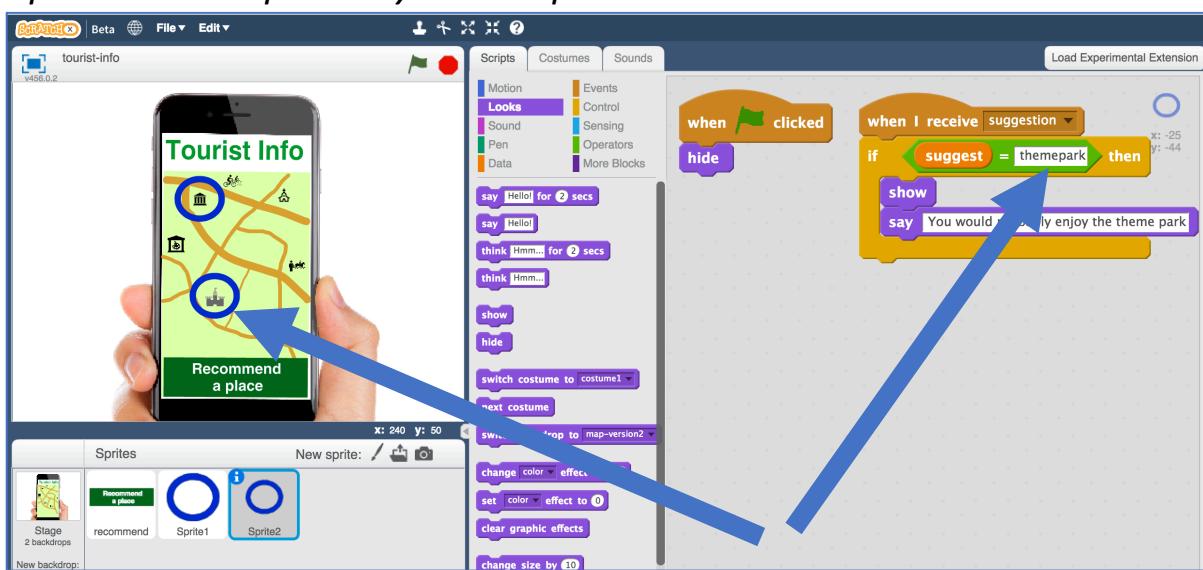
16. Make a copy of the circle sprite

Right-click on the sprite and click Duplicate



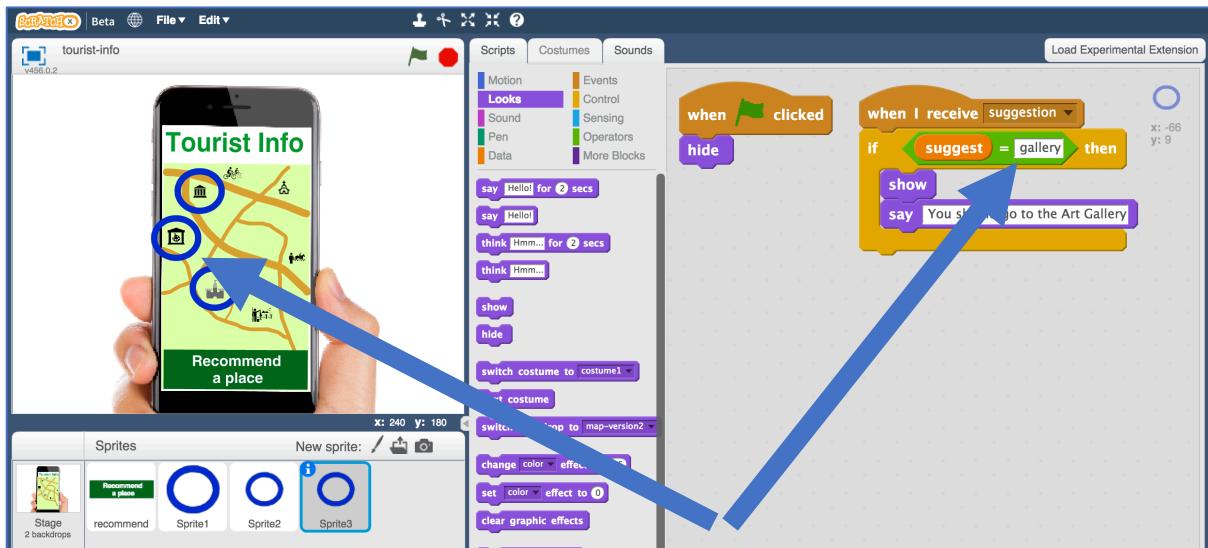
17. Modify the new Sprite2 to recommend the Theme Park

*Move the circle to be over the theme park icon
Update the script to say “themepark” where it said “museum”*



18. Duplicate the sprite again – this time for the Art Gallery.

*The circle should be over the gallery icon (far left).
The script should be updated to say gallery*



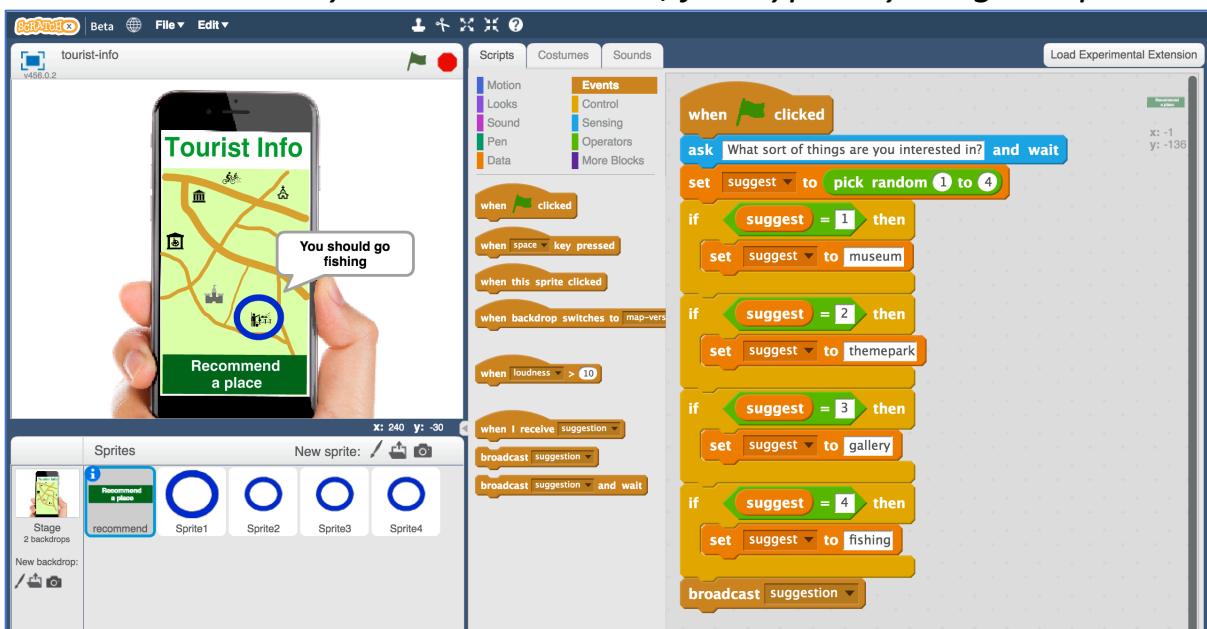
- 19.** Duplicate again for a fourth circle – this time for fishing
Move the circle to the fishing icon (at the bottom)
Update the script to say “fishing” and give it a suitable message

- 20.** Click the **recommend** sprite and enter the following script



21. Click the green flag to test your project

When it asks what you're interested in, just type anything and press Enter.



22. Save your project

File -> Save project

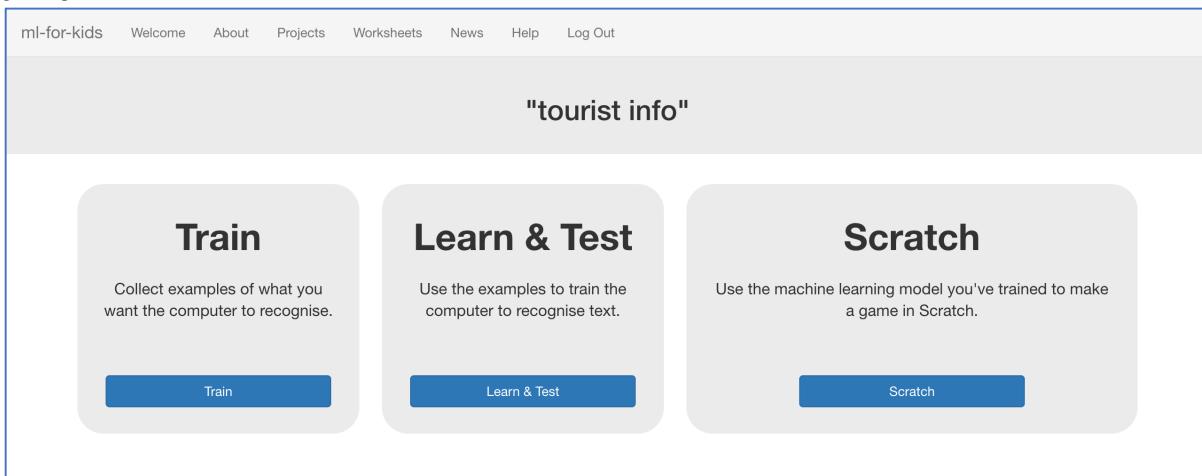
23. Close the Scratch window

What have we done so far?

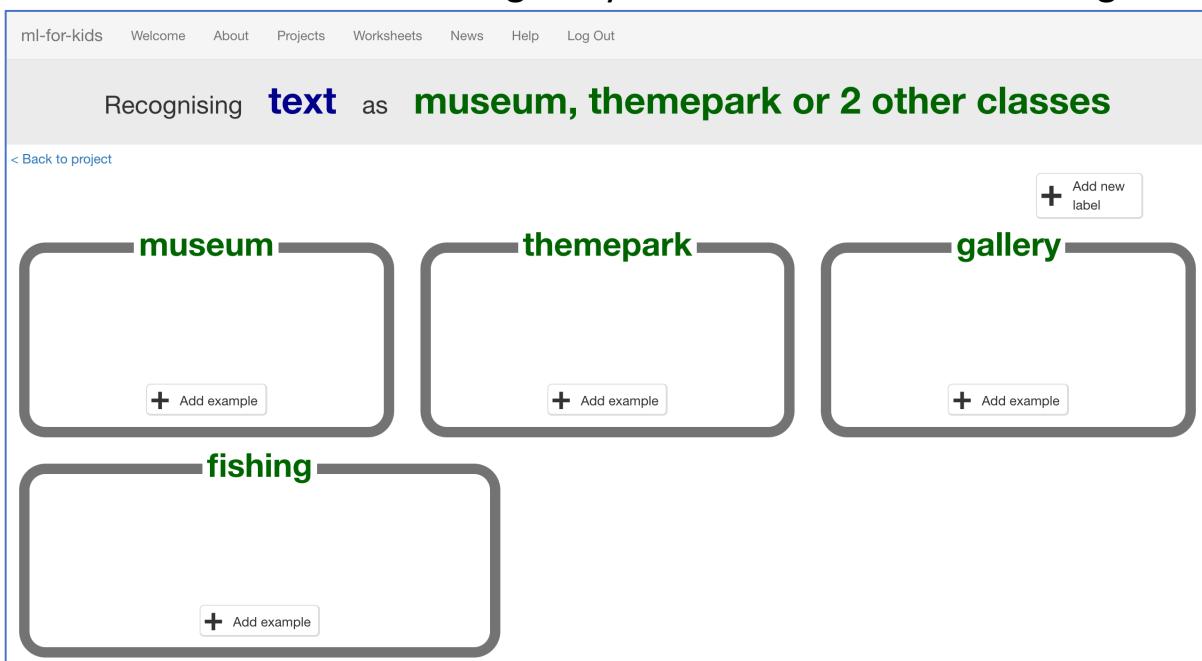
You've created a mobile Tourist Information bot that will make recommendations to visitors to your town. It will ask them what they're interested in, so it can make the best recommendation. But for now, it has to choose something at random to recommend.

Next, we'll start to train it to be able to make recommendations so we can use machine learning in your bot.

24. We need examples to train the computer. Click the “[< Back to project](#)” link. Then click the **Train** button.



25. Click on “[+ Add new label](#)” and call it “museum”. Do that again, and create a second bucket called “themepark”. Create a third bucket called “gallery” and a fourth called “fishing”.



26. Click the “[Add example](#)” button in the “museum” bucket, and type in something a tourist who would like a museum might say.
For example: “I like to learn about history while I’m on holiday!”

27. Click the “**Add example**” button in the “themepark” bucket, and type in something a tourist who would like theme parks might say.
For example: “I want to do something exciting that gets my heart going”

28. Click the “**Add example**” button in the “gallery” bucket, and type in something a tourist who would like galleries might say.
For example: “I want to do something cultural and I enjoy art”

29. Click the “**Add example**” button in the “fishing” bucket, and type in something a tourist who would like fishing might say.
For example: “I’m looking for a chance to relax and I’d like to do something quiet”

30. Repeat steps 26 – 29 until you’ve written at least **five** examples of each.

The screenshot shows a web interface for a machine learning project. At the top, there's a navigation bar with links: ml-for-kids, Welcome, About, Projects, Worksheets, News, Help, and Log Out. Below the navigation, the title "Recognising **text** as **museum, themepark or 2 other classes**" is displayed. Underneath the title, there's a link "< Back to project". On the right side, there's a button with a plus sign and the text "Add new label".

The main area contains four rounded rectangular boxes, each representing a class:

- museum**: Examples include "I like to learn about history while I...", "I want to do something educational", "I'd like to go somewhere that I co...", "I'd like to go to a museum", "Is there a museum?", and "I'm interested in learning about t...".
- themepark**: Examples include "Does this town have a theme park?", "I want something adrenaline-filled!", "I want to do something exciting t...", "I'd like to go somewhere that will ...", "I'd like to go to an adventure the...", and "Is there a theme park?".
- gallery**: Examples include "I want to do something cultural a...", "I'd like to go to a gallery", "I'd like to look at artwork, and I p...", "Is there a gallery?", "Is there an art gallery near here?", and "I love art, and am particularly inte...".
- fishing**: Examples include "I want to do something calm and ...", "I want to do something that is cal...", "I'm looking for a chance to relax ...", "Is there anywhere I could go fishi...", "Is there somewhere we could hir...", and "I like to do quiet and tranquil acti...".

At the bottom of each box, there is a button labeled "+ Add example".

31. Click on the “< Back to project” link.
Then click on the “**Learn & Test**” button.

32. Click on the “Train new machine learning model” button.

As long as you’ve collected enough examples, the computer should start to learn how to recognise messages 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 page is divided into two main sections: 'What have you done?' and 'What's next?'. The 'What have you done?' section contains text about collecting examples of text for a computer to use to recognise when text is museum, themepark or 2 other classes. It also lists the collected examples: 6 examples of fishing, 6 examples of gallery, 6 examples of museum, and 6 examples of themepark. The 'What's next?' section contains text about being ready to start the computer's training and a button to start training a machine learning model using the examples collected so far. There is also a note that says '(Or go back to the Train page if you want to collect some more examples first.)'. At the bottom of the page, there is a section titled 'Info from training computer:' which contains a button labeled 'Train new machine learning model'.

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

While waiting, try to complete the machine-learning multi-choice quiz at the bottom of the page.

The screenshot shows the 'Machine learning models' page during the training process. The navigation bar and title are the same as the previous screenshot. The 'What have you done?' section contains text about starting training a machine learning model using the examples of text that were collected. It also states that it's been training since Monday, August 7, 2017 11:06 PM. The 'What's next?' section contains text about waiting for the machine learning model to finish being trained and trying the machine learning quiz below to check what was learned. At the bottom of the page, there is a section titled 'Info from training computer:' which displays training details: Model started training at: Monday, August 7, 2017 11:06 PM, Current model status: Training, and Model will automatically be deleted after: Tuesday, August 8, 2017 1:06 AM. There is also a button labeled 'Cancel training'.

- 34.** Once the training has completed, a Test box will be displayed. Test your machine learning model to see what the computer has learned. Type a request from an imaginary tourist and see what your bot recommends.
- Test it with examples that you haven't shown the computer before. If you're not happy with how the computer makes recommendations, go back to step 26, and add some more examples. Make sure you repeat step 32 to train with the new examples though!*

The screenshot shows the 'Machine learning models' page on the ml-for-kids website. At the top, there is a navigation bar with links to '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 page is divided into two main sections:

- What have you done?**

You've trained a machine learning model to recognise when text is museum, themepark or 2 other classes.
You created the model on Monday, August 7, 2017 11:06 PM.
You've collected:
 - 6 examples of fishing,
 - 6 examples of gallery,
 - 6 examples of museum,
 - 6 examples of themepark
- What's next?**

Try testing the machine learning model below. Enter an example of text 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 different the extra examples will make!

At the bottom of the page, there is a test input field with placeholder text 'Try putting in some text to see how it is recognised based on your training.' and a 'Test' button. Below the input field, the text 'I'd like to learn something about the local area' is shown, followed by the recognition result 'Recognised as museum with 91% confidence'.

What have we done so far?

You've started to train a computer to recognise text so you can make personalised recommendations. Instead of trying to write rules to be able to do this, you are doing it by collecting examples. These examples are being used to train a machine learning "model".

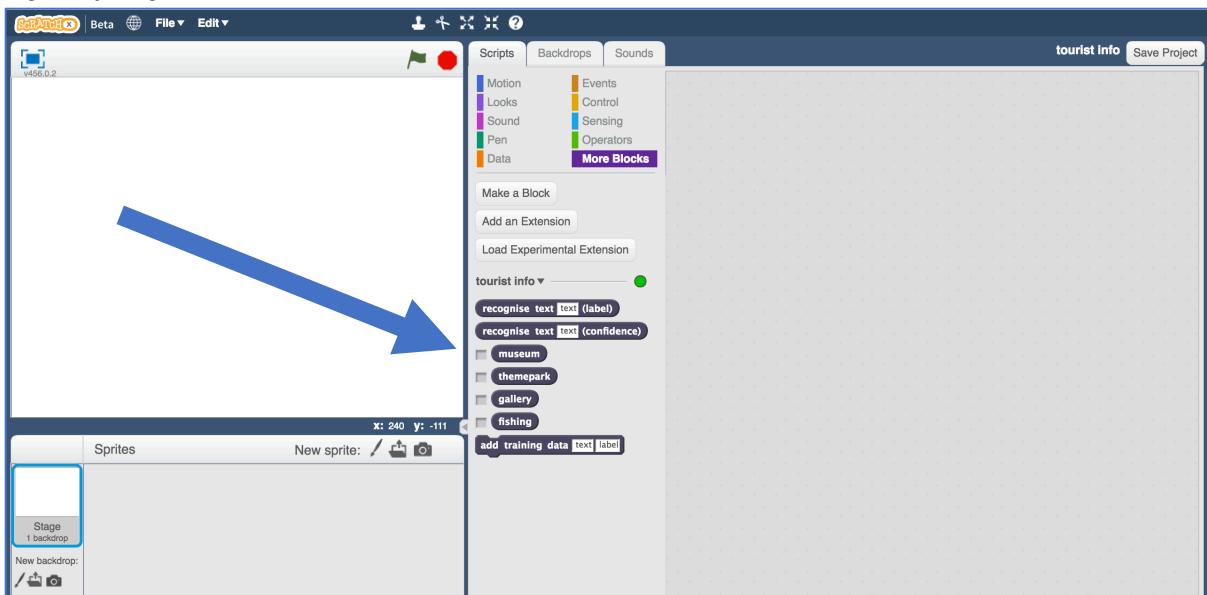
The computer will learn from patterns in the examples you've given it, such as the choice of words, and the way sentences are structured. These will be used to be able to decide which place to recommend.

- 35.** Click on the “< Back to project” link, then back to the “Scratch” button.

This page has instructions on how to use the new blocks in Scratch. Keep the page open if you need to check back on how to use them.

- 36.** Click on the “Open in Scratch” button at the bottom to launch the Scratch editor.

You should see new blocks in the “More blocks” section from your “tourist info” project.



- 37.** Load the Scratch project you saved before.

Click on File -> Load Project

Tips

More examples!

The more examples you give it, the better the computer should get at recognising patterns in what tourists who like different places would say.

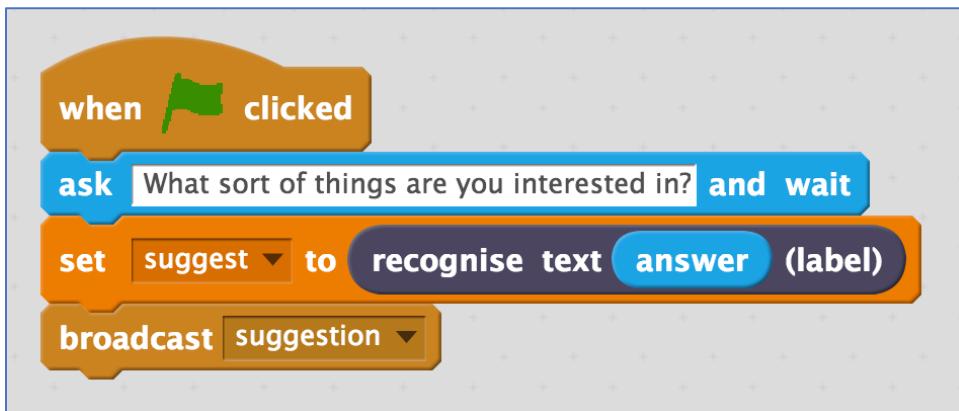
Mix things up with your examples

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

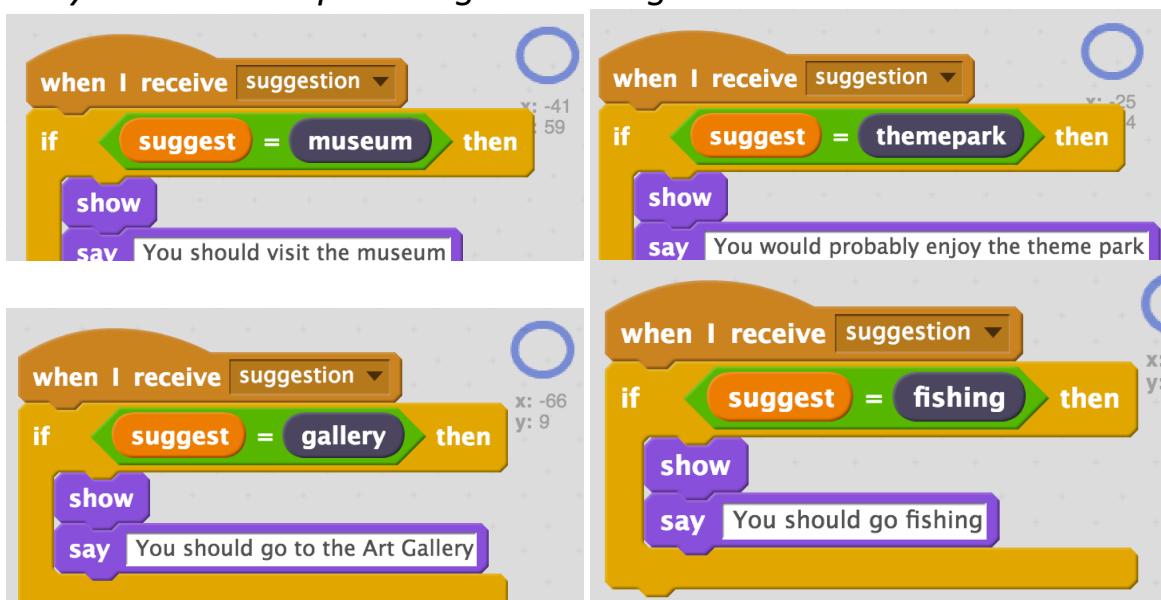
For example, make sure that you include some long examples and some very short ones.

- 38.** Click on the “Scripts” tab for the “recommend” button sprite, and update the script to use your machine learning model instead of the random choice you used before.

The “recognise text ... (label)” block is a new block added by your project.



- 39.** Click on the “Scripts” tab for each of the circle sprites, and update the **if** script block for each to use one of your new blocks
They should end up looking something like this

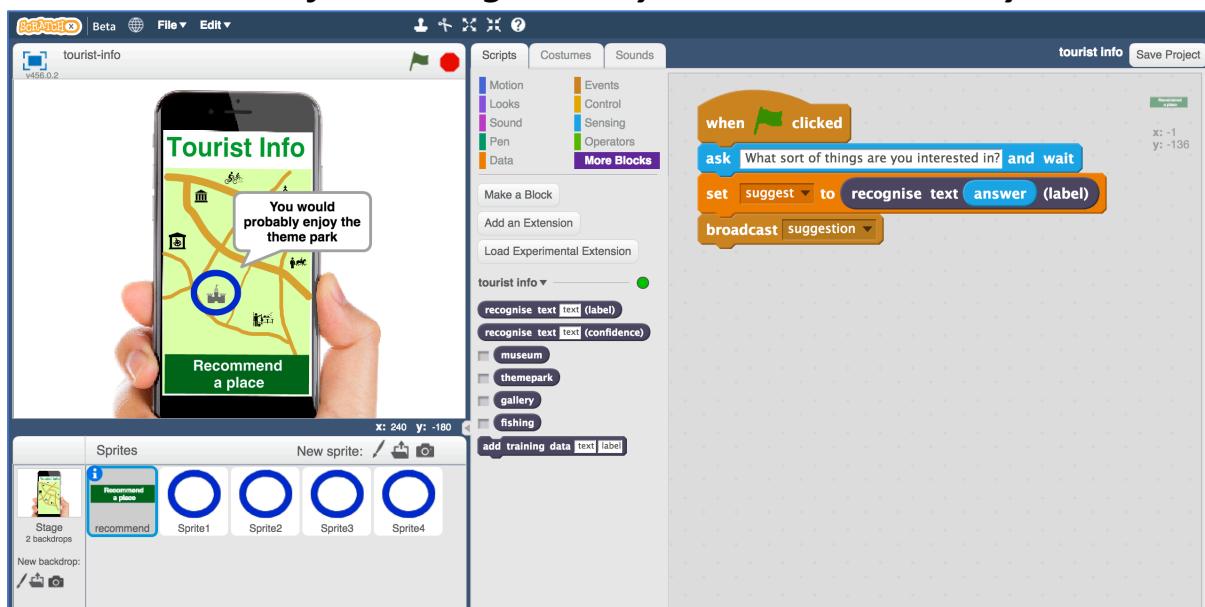


40. Test your project by clicking the Green Flag

Type a request from an imaginary tourist and press enter

It should recommend somewhere appropriate for them to visit

This should work for messages that you didn't include in your training.



41. Save your project.

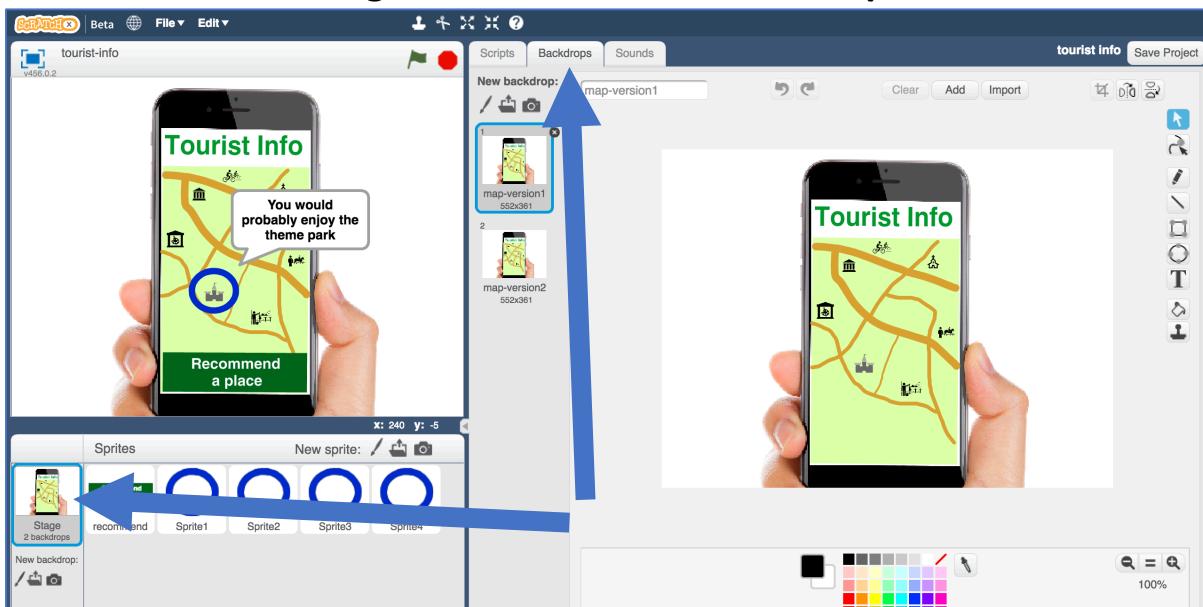
What have we done so far?

You've modified your Tourist Info bot to make recommendations using machine learning instead of your earlier random choices.

If you'd trained it with examples of requests from real tourists, instead of making them up, this is the sort of thing that would be advertised as:

“An artificial intelligence that helps answer tourists’ questions and learns how to make recommendations based on their interests”

42. Click on the Stage and then click on Backdrops



43. Switch the backdrop to use **map-version2**

Can you see what's different?

A new fun-fair has arrived in town!

A new funfair has opened in town, and the owner of the funfair wants your Tourist Info bot to send tourists to their new attraction.

They're offering to pay you a lot of money to train your bot to make sure this happens.

44. Save your Scratch project

45. Close the Scratch window

46. Go back to the “Train” page

Click the “< Back to project” link and then click the Train button

47. Add a new bucket for “funfair”

Click the “Add new label” button. Call the new label “funfair”

48. Add a lot of examples to the “funfair” bucket

Use the examples you had in the “themepark” bucket and then delete them from the themepark bucket afterwards. But leave 1 or 2 examples in the themepark bucket so it’s not empty.

Then add a lot more new examples to the funfair bucket as well, so it has at least twice as many examples as any other attraction.

The screenshot shows a web interface for managing machine learning training data. At the top, a navigation bar includes links for ml-for-kids, Welcome, About, Projects, Worksheets, News, Help, and Log Out. Below the navigation, a title reads "Recognising **text** as **museum, themepark or 3 other classes**". A "Back to project" link is present. The main area displays five buckets, each with a label and a list of text examples:

- museum**: Examples include "I like to learn about history whil...", "I want to do something educati...", "I'd like to go somewhere that I ...", "I'd like to go to a museum", "I'm interested in learning about...", and "Is there a museum?".
- themepark**: Examples include "I want to do something exciting..." and "Is there a theme park?".
- gallery**: Examples include "I love art, and am particularly in...", "I want to do something cultural...", "I'd like to go to a gallery", "I'd like to look at artwork, and I ...", "Is there a gallery?", and "Is there an art gallery near here?".
- fishing**: Examples include "I like to do quiet and tranquil ac...", "I want to do something calm an...", "I want to do something that is ...", "I'm looking for a chance to rela...", "Is there anywhere I could go fis...", and "Is there somewhere we could h...".
- funfair**: Examples include "I want something adrenaline-fil...", "I want to do something exciting...", "I want to go somewhere that wi...", "I'm a thrill-seeker!", "I want to do something fun and...", "I'd like to do something that wil...", "I'm looking for adventure", "I want something scary and ex...", "I want to go on exciting rides", "Is there a funfair in town?", "I'd like to go to a funfair", and "I enjoy fast and exciting activities".

An "Add new label" button is located in the top right corner of the interface.

49. Train a new machine learning model with the new training

*Click the “< Back to project” link, then click the **Learn & Test** button.*

*Click the “**Train new machine learning model**” button*

It’ll take a minute to re-train with the new examples.

50. Go back to Scratch

Click the “*< Back to project*” link, then click the **Scratch** button.

Click the “**Open in Scratch**” button

You should see the blocks added to the Scratch palette by your project now includes a new “funfair” block.

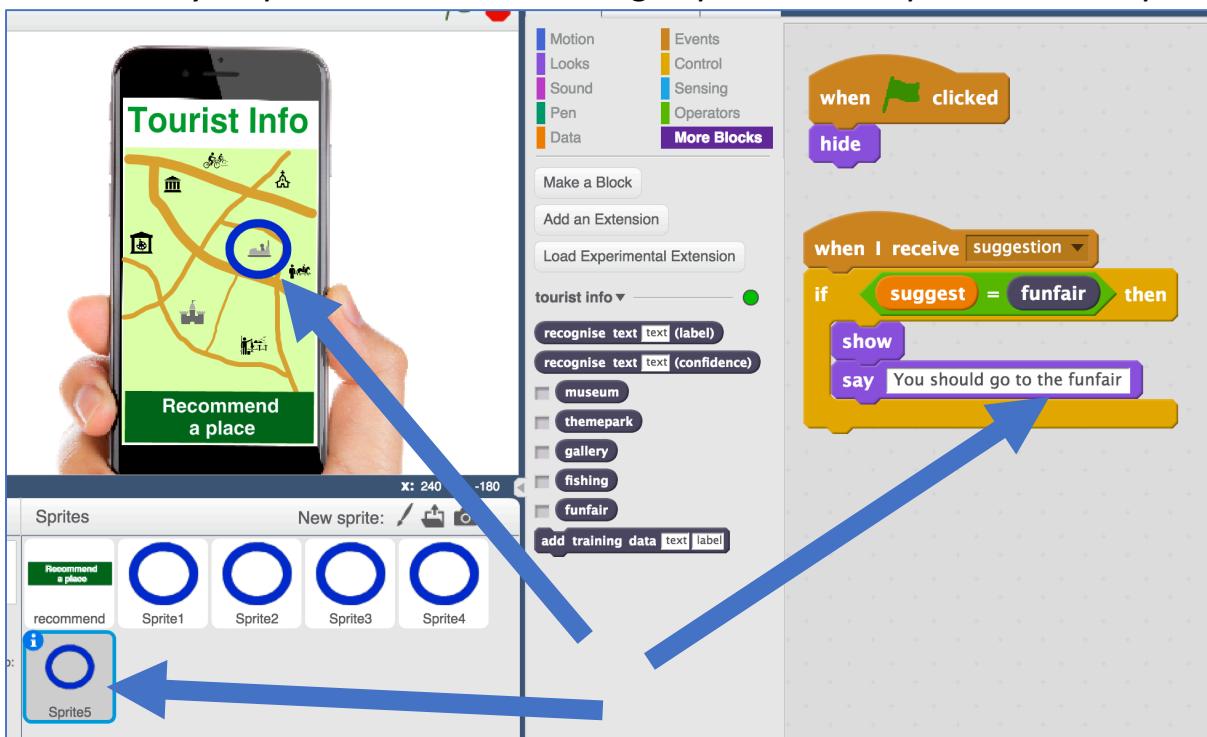
51. Open your project

Click **File -> Load Project**

52. Duplicate one of the circle sprites to make a sprite for “funfair” recommendations

If you duplicate a hidden sprite, it’s hard to know where to move it! Click on the blue *i* button, and tick “show” so you know where it is.

Make sure you put the circle in the right place, and update the script.



53. Test your project by clicking the Green Flag

Ask your Tourist bot for recommendations.

Try asking for something that would be good for a thrill-seeker who likes excitement and things that will get their heart pounding.

Does it recommend the Theme Park any more?

54. Save your project.

What have we done?

This is an example of “training bias”. You’ve made your machine learning biased in favour of the funfair.

By giving it examples of thrillseekers with recommendations for funfair and not theme park, you’re training the computer that it should make recommendations for the funfair and not the theme park.

By giving it more examples of funfair recommendations than anything else (in particular, more than the theme park), you’re training the computer to learn the right answer is more often “funfair”.

Is this fair?

Does the fact that the funfair owner paid for this bias make it more unfair?

Would it be okay if you’d done that accidentally and not intentionally – by collecting too many funfair examples without realising?

What responsibilities do you think people training machine learning models should have about bias and being fair?