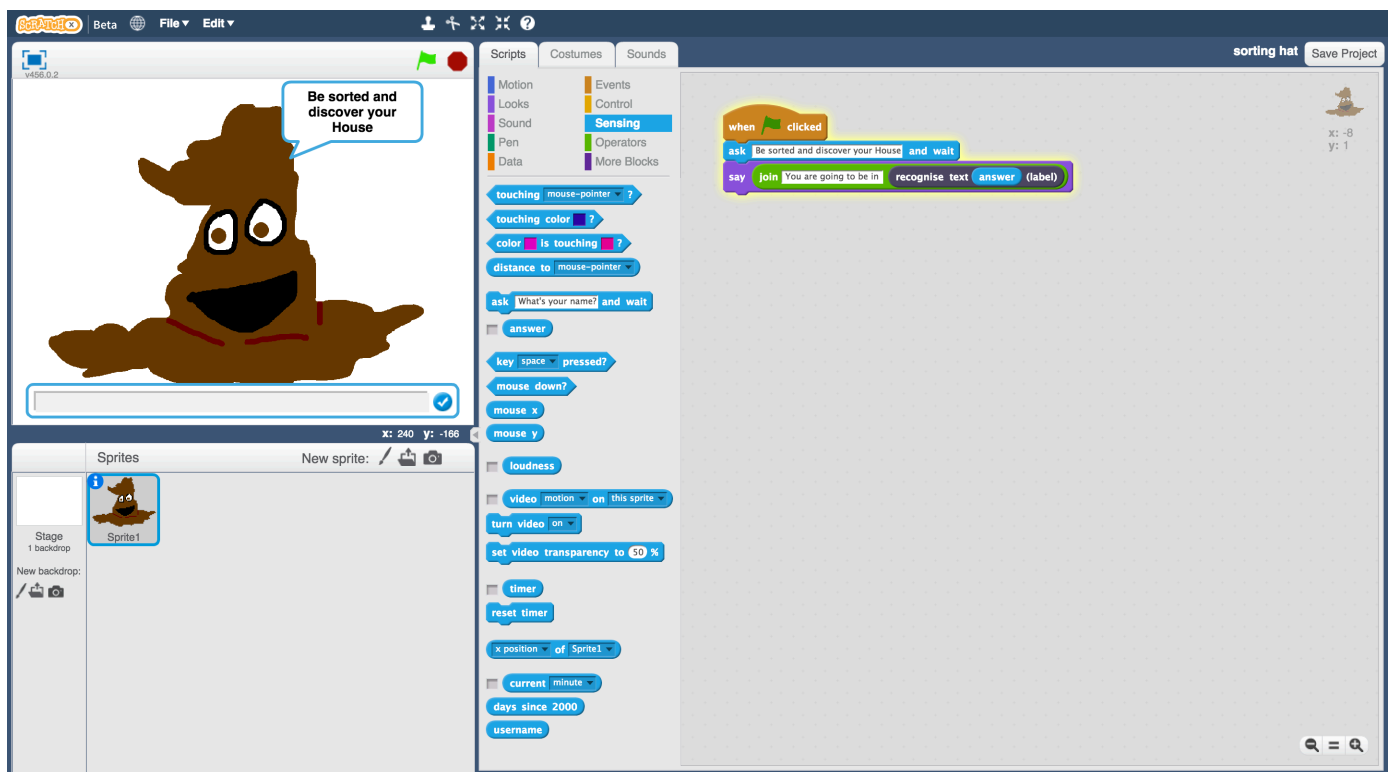# Sorting Hat

In this project you will make a Sorting Hat that will put you in one of the Hogwarts school houses based on what you say.
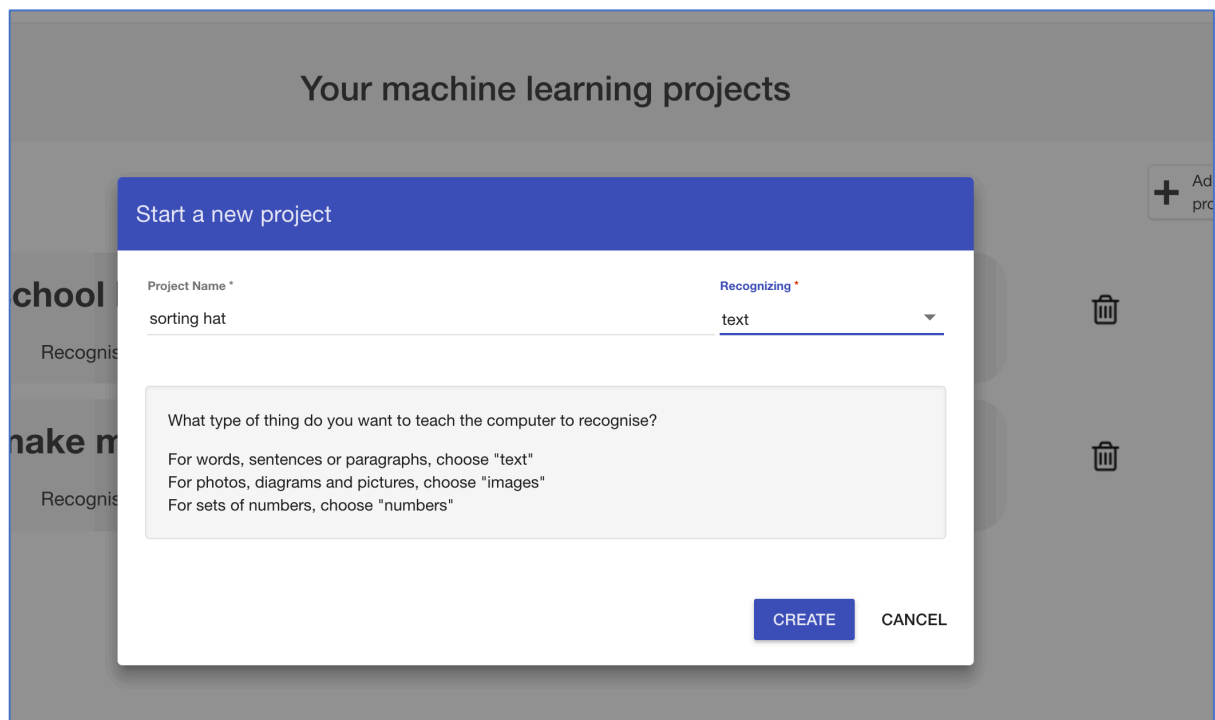
You will teach the computer to recognise how students in different houses speak by giving it examples of dialog from the books.

The idea for this project came from Ryan Anderson, who made a real-life sorting hat with his daughter!
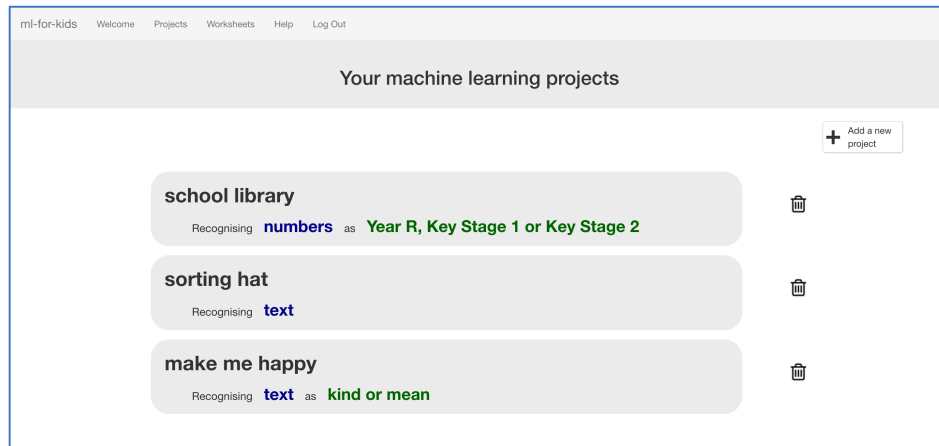
https://www.ibm.com/blogs/think/2016/06/watson-sorting-hat/

1. You will need some Harry Potter books for this project.
Go to the school library!

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.

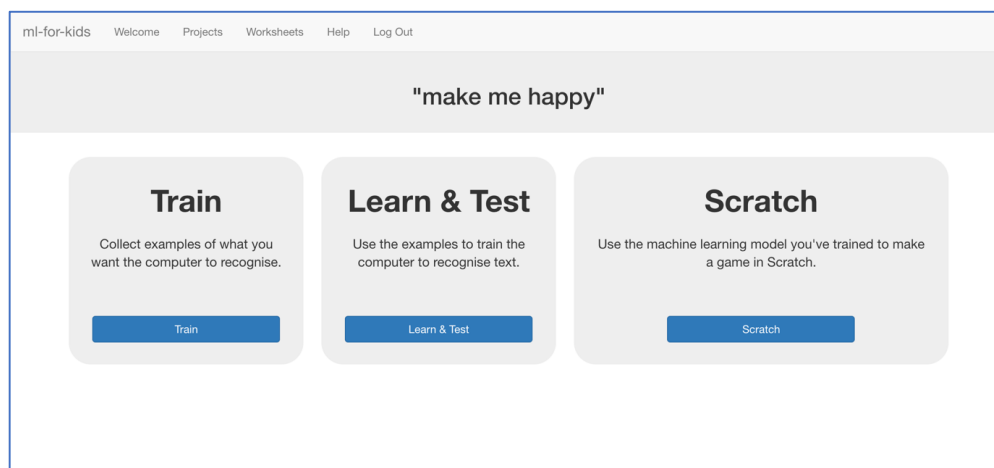**7.** Name your project "sorting hat" and set it to learn how to recognise "**text**"
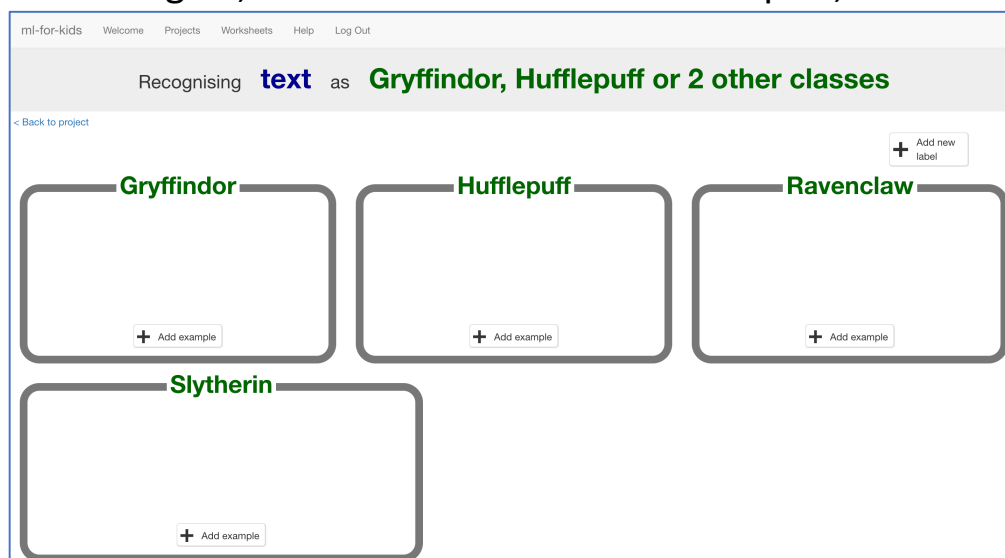
8. "sorting hat" should now show up in your projects list. Click on it.

9. We'll start by collecting examples of quotes to train the computer with. Click the **Train** button.

10. Click on "**+ Add new label**" and call it "Gryffindor".
Do that again, and create buckets for Hufflepuff, Ravenclaw & Slytherin

11. Click on the "**Add example**" button in the "Gryffindor" bucket. Find a quote by Harry Potter and type it into the box. Click "**Add**"

ml-for-kids   Welcome   Projects   Worksheets   Help   Log Out

Recognising **text** as **Gryffindor, Hufflepuff or 2 other classes**

< Back to project

+ Add new label

Gryffindor   **Hufflepuff**   **Ravenclaw**

Add new example

Enter an example of 'Gryffindor' *

Not to be rude or anything, but this isn't really a great time for me to have a House Elf in my bedroom.

104 / 1000

ADD   CANCEL

+ Add example   + Add example

Slytherin

+ Add example

12. Find another quote from another character in Gryffindor. Click the "**Add example**" button in the Gryffindor bucket and type it in.

ml-for-kids   Welcome   Projects   Worksheets   Help   Log Out

Recognising **text** as **Gryffindor, Hufflepuff or 2 other classes**

< Back to project

+ Add new label

Gryffindor   **Hufflepuff**   **Ravenclaw**

Not to be rude or anything, but this isn't really…

Add new example

Enter an example of 'Gryffindor' *

You sort of start thinking anything's possible if you've got enough nerve

73 / 1000

ADD   CANCEL

+ Add example   + Add example

Slytherin

+ Add example

13. Keep going, collecting examples of quotes for each of the houses. *If your computer screen is big enough, you can press Ctrl and – (the dash/minus key) at the same time to fit more on the screen.*

14. When you've collected enough, click on the **"< Back to project"** link.

15. Next, you need to use all of the examples that you've collected to train the computer. Click on "**Learn & Test**"

16. Click on the "**Train new machine learning model**" button at the bottom of the page.

17. Wait for the training to complete. This can take a few minutes.
While you're waiting, try to complete the multi-choice quiz at the bottom of the page to test your machine learning knowledge.

Machine learning models

< Back to project

What have you done?

You've started training a machine learning model using the examples of text that you collected.

It's been training since Saturday, July 1, 2017 6:39 PM.

This normally takes a few minutes, but can take a little longer if the training server is very busy.

What's next?

You could wait for the machine learning model to finish being trained.

Or, you could try the machine learning quiz below, to check what you've learned.

Or you could go to Scratch and work on your project. You don't need to wait for the model to be trained before you get the rest of your project ready.

Info from training server:

Model was trained at:	Saturday, July 1, 2017 6:39 PM
Current model status:	Training
Detail:	The classifier instance is in its training phase, not yet ready to accept classify requests

Cancel training

18. Once the training has completed, a Test box will be displayed. Try testing your machine learning model to see what the computer has learned.
Test it with example quotes that you haven't shown the computer before. If you're not happy with how the computer recognises text, go back to step 13, and add some more examples.
Make sure you repeat step 16 to train again with any new examples.

< Back to project

What have you done?

You've trained a machine learning model to recognise when text is Gryffindor, Hufflepuff or 2 other classes.

You created the model on Saturday, July 1, 2017 6:39 PM.

You've collected:
- 10 examples of Gryffindor,
- 10 examples of Hufflepuff,
- 10 examples of Ravenclaw,
- 10 examples of Slytherin

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!

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

You'll soon find out some wizarding families are much better than others, Potter. You don't want to go making friends with the wrong sort.   Test

Recognised as **Slytherin**
with 68% confidence

What have we done so far?

You've started to train a computer to recognise the use of language by different characters in the Harry Potter books.

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, such as the choice of words, and the way that sentences are structured.

These will be used to be able to make predictions about people not in the book, just like the Sorting Hat does.

Don't worry if your model seems to get a lot wrong. With only a handfuls of examples of each house, the computer won't have had very much to learn from yet. If you were doing this for real, you'd be collecting dozens or hundreds of examples for the computer to train on.

19.   Click on the **"< Back to project**" link, then click on the "**Scratch**" 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 on how to use them.

Tips

More examples!

The more examples you give it, the better the computer should get at recognising what the different school houses have in common.

Try and be even

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

This can be difficult – particularly for Hufflepuff! But try not to focus only on Gryffindor and Slytherin.

If you have a lot of examples for some houses, and not the others, the computer might learn that being in those houses is more likely than the others. That would probably affect the predictions that it makes.
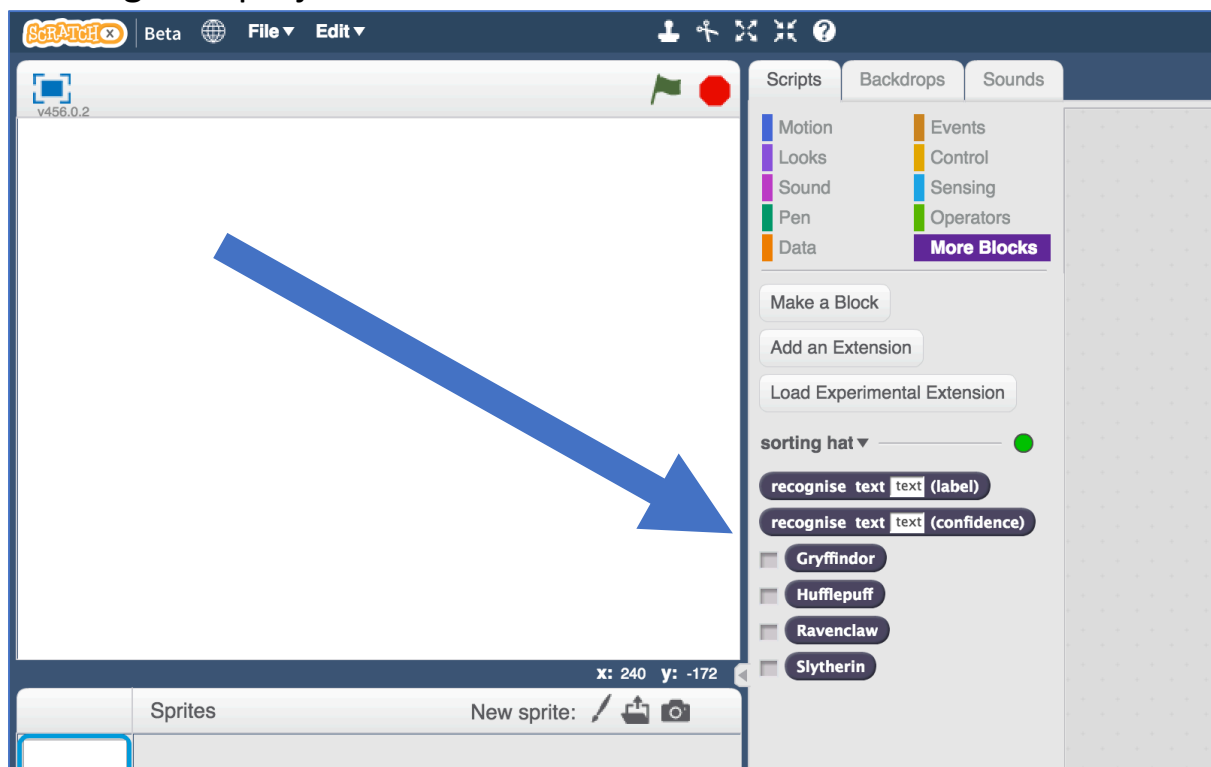
Quotes online

If you're struggling, or you don't have a copy of a Harry Potter book available, try searching for quotes of your favourite characters online.

20. Click on the "**Open in Scratch**" button at the bottom to launch the Scratch editor.
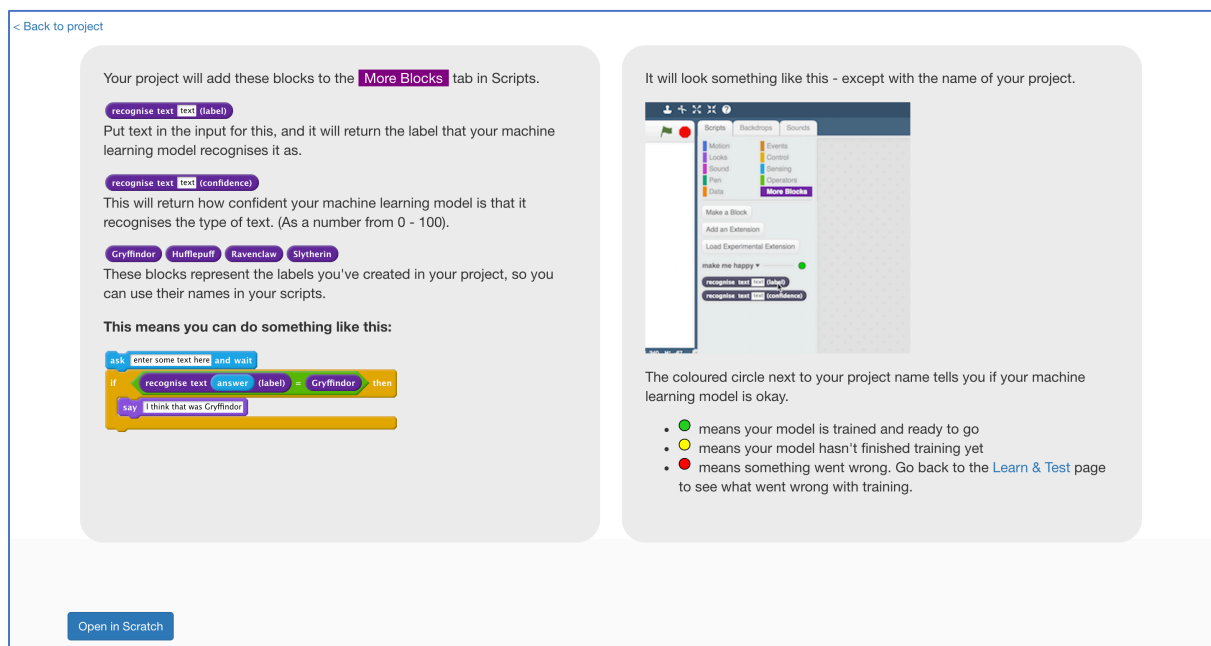
21. You should see new blocks in the "More blocks" section from your "sorting hat" project.
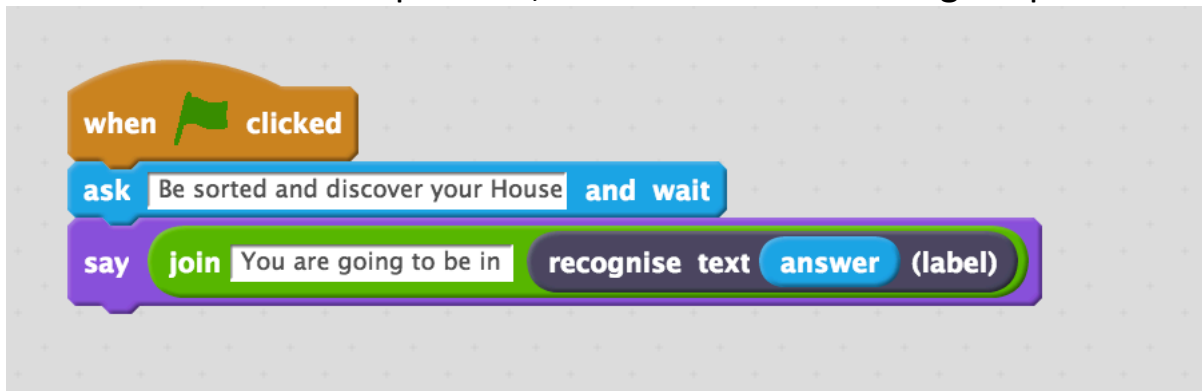

22. Create a new sprite by clicking on the paint brush icon next to "New sprite", just below the white canvas.

23. Draw a Sorting Hat

If you really don't like drawing, you could find a picture of the Sorting Hat online, and use that instead. Click on the folder icon next to the paintbrush to import a sprite from a file.

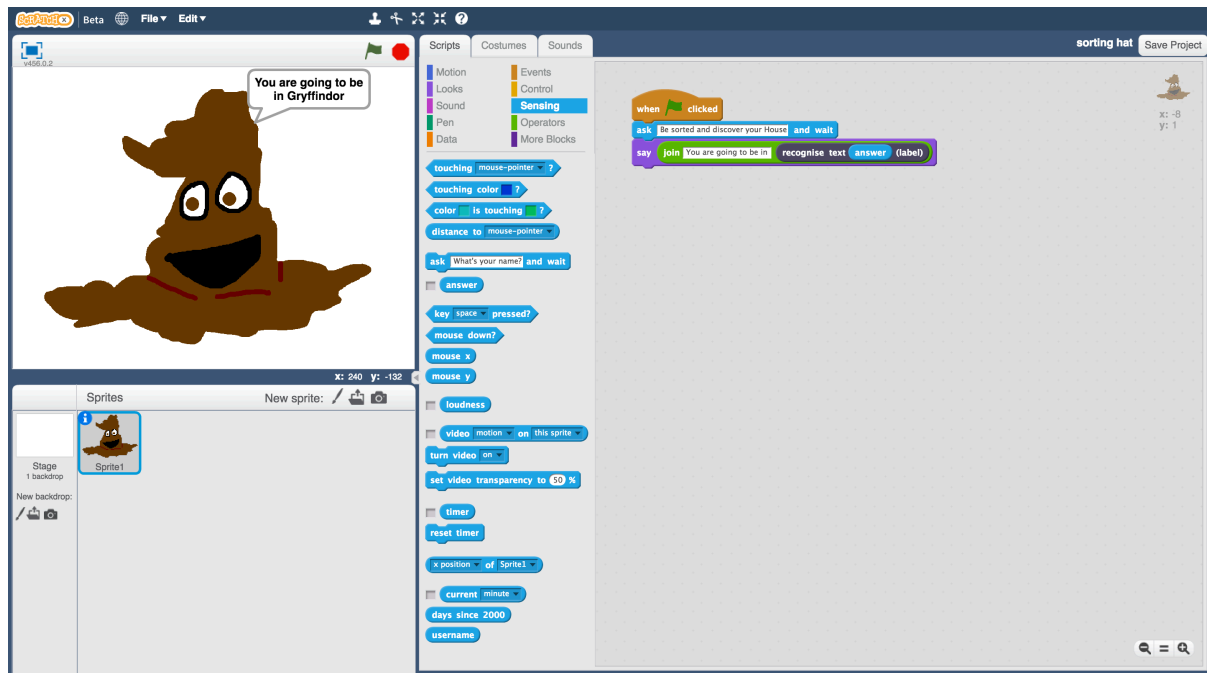**24.** Click on the "Scripts" tab, and enter the following script.

25. Test your script!

Click on the **green flag**, and type in a message.

Try typing in something that you would say, or something you have said and see which House the Sorting Hat would put you in!

Try it on your friends and see what House the Hat would put them in.

26. Save your project
Click File -> Save Project

What have we done?

You've created a Scratch game version of the Harry Potter Sorting Hat, using machine learning.

You trained that machine learning model by collecting examples of quotes from characters, and telling the computer which House they are in.

You've seen that doing this well is difficult, and needs a lot of examples.

But even with a small number of examples, it's fun to see the patterns that the computer learns, and how it tries to use that to recognise new text.

The idea for this project came from Ryan Anderson, who made a real-life sorting hat with his daughter!

Instead of typing messages to it, they also used speech-to-text so that they could actually talk to their Hat. Once they converted people's voices into text, they trained a machine learning model to be able to recognise which House that should be, in a similar way to you have.

To see what the Hat looked like in action, check out their video at

https://youtu.be/tSHoJoOOi9k