Machine Learning Project

Download Project File

1. Go to:

   https://selfestem.org/news_updates/latest-2024-camp-updates

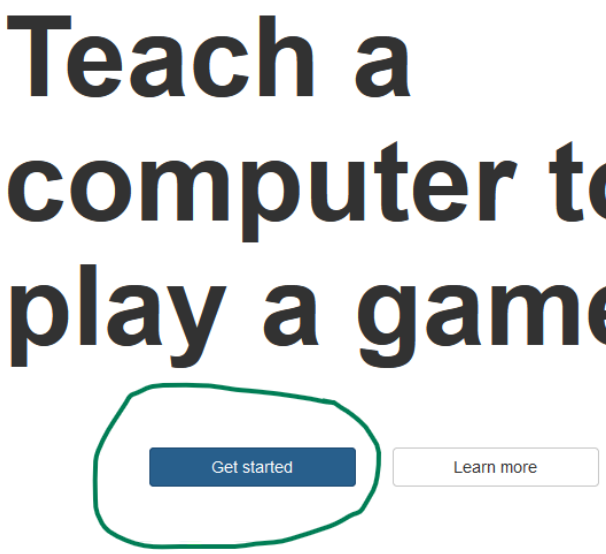
2. Download the ‘Street Signs Template’ to your computer. Save it on your desktop

Log in to Machine Learning for Kids

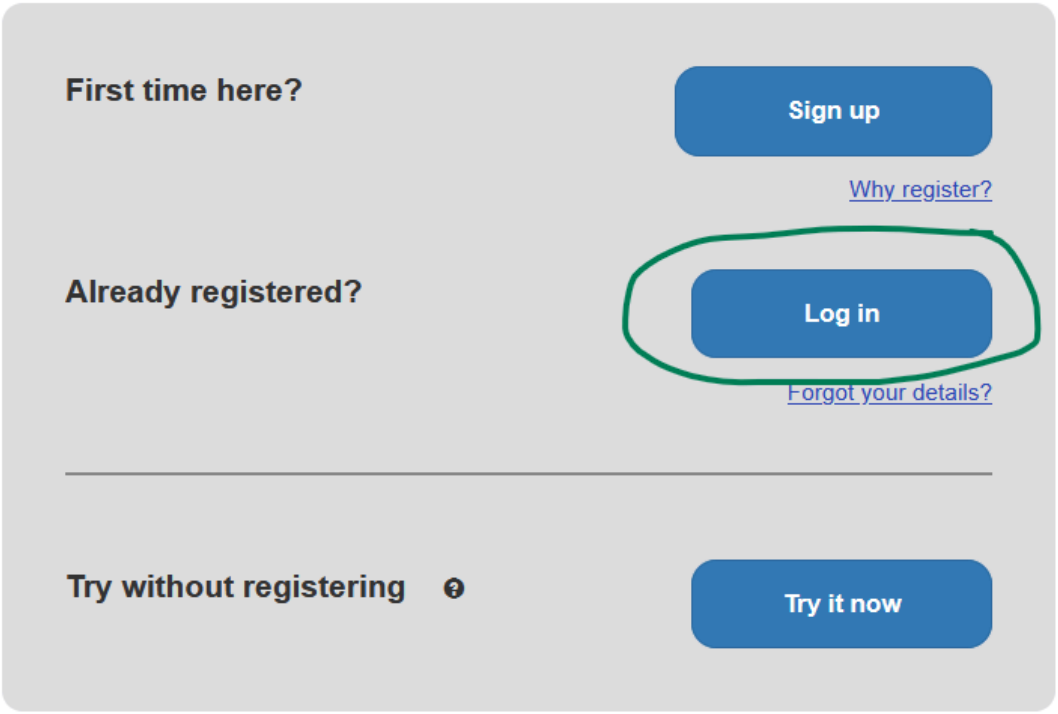
1. Go to:

   https://machinelearningforkids.co.uk

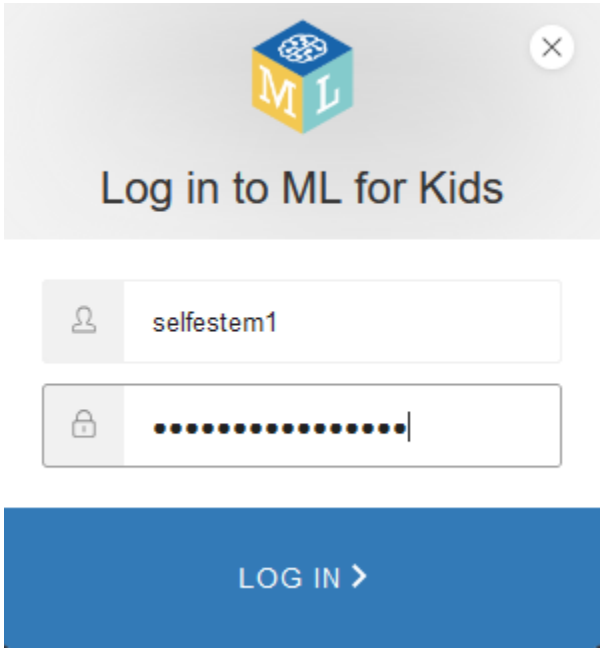
2. Click on ‘Get Started’



3. Click on the 2nd button labeled ‘Log In’



4. Enter the username and password for your group number, then click on ‘Log in’. **Passwords will be provided.**

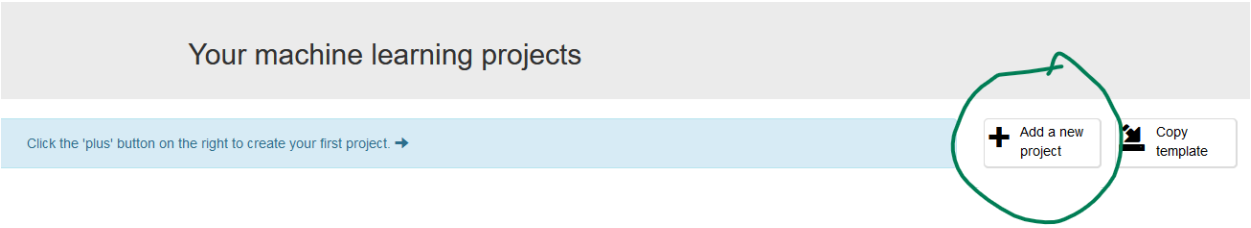


Logging in may take 1-2 minutes the first time; please be patient!

Make a Project

1. Click on ‘Go to your Projects’

2. Click on ‘Add a new project’

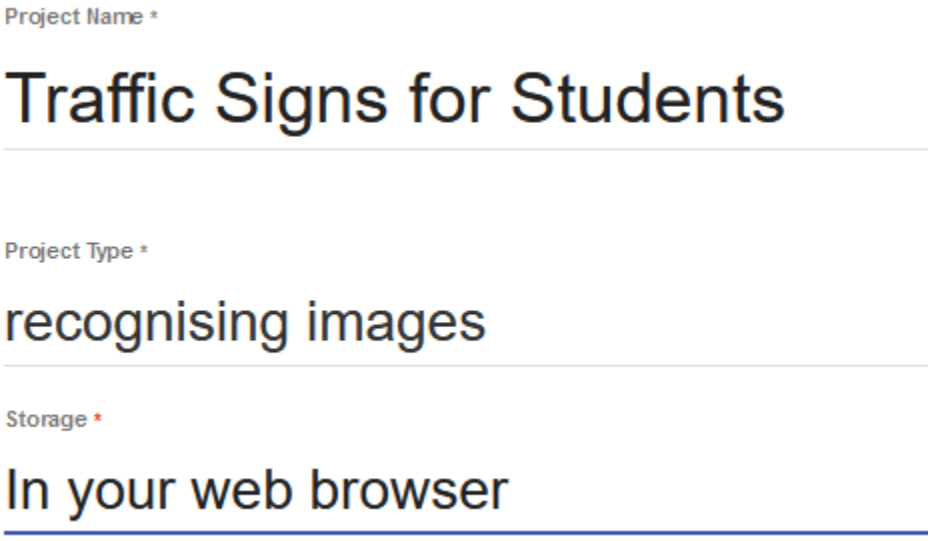


3. Enter in the following information about the project you are adding

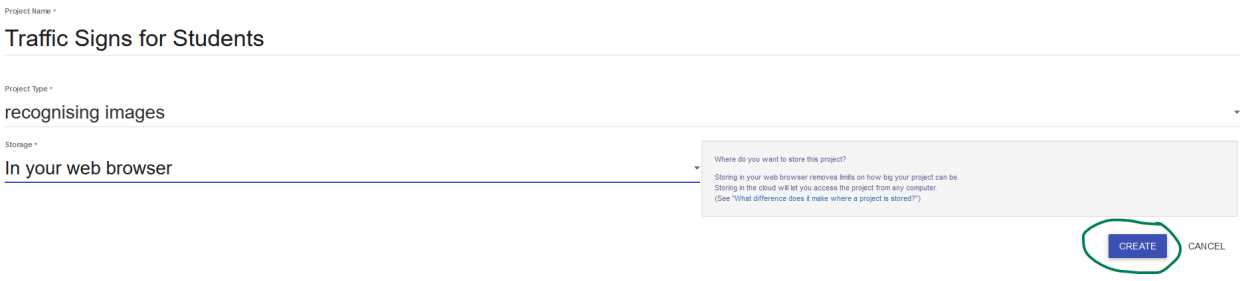
   The ‘Project Name’ should be ‘Traffic Signs for Students’

   The ‘Project Type’ should be ‘recognising images’

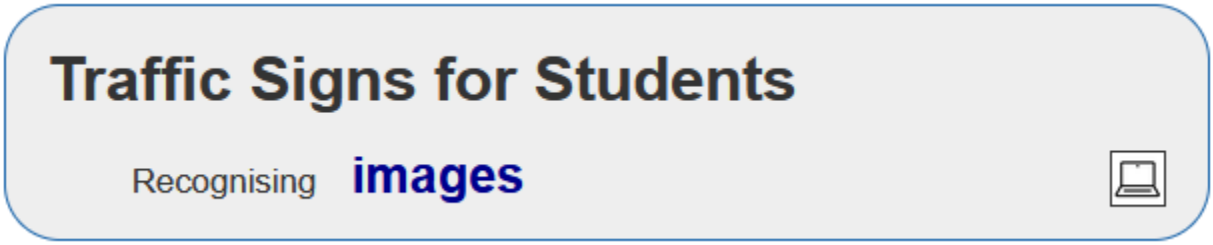
   ‘Storage’ should be ‘In your web browser’

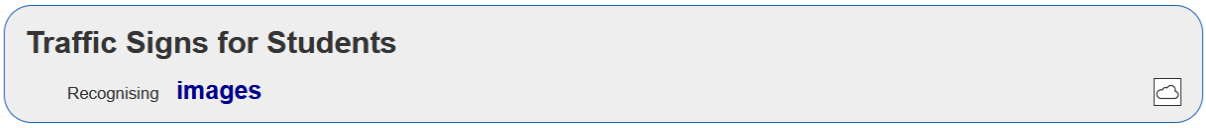


4. Click ‘Create’

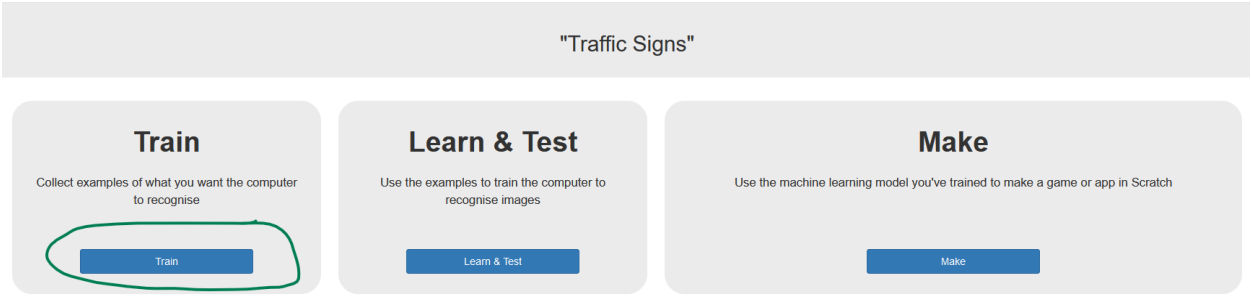


5. Click on the grey box with your project name

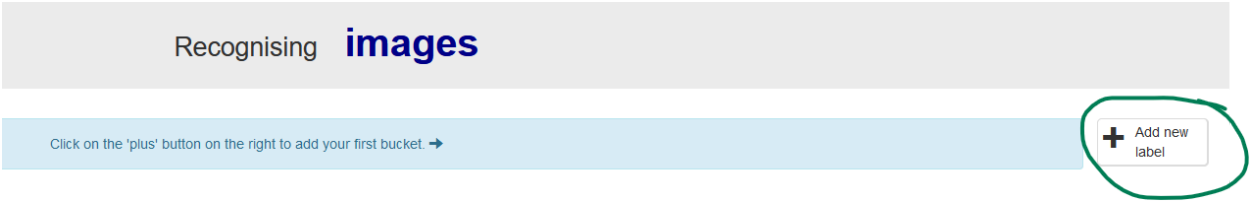




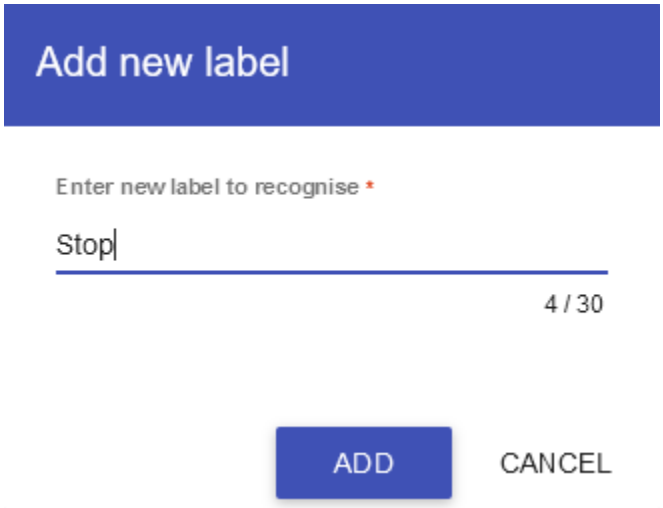
6. Click on the blue ‘Train’ button



7. Click the ‘Add a new label’ button



8. Name the label ‘Stop’ and click ‘Add’

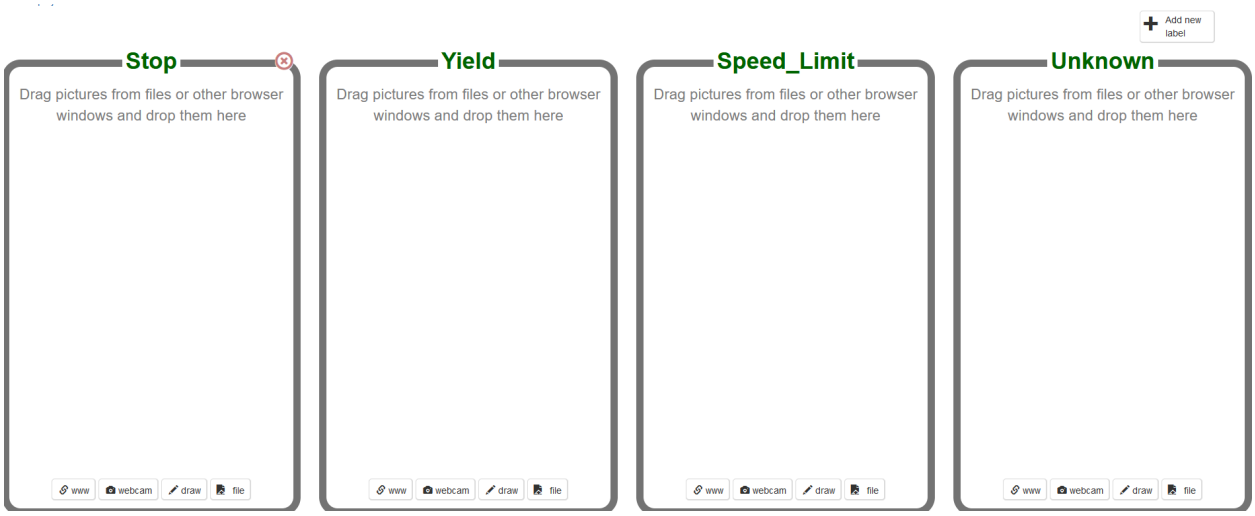


9. Repeat the previous two steps to add 3 more labels:

   Yield

   Speed Limit

   Unknown

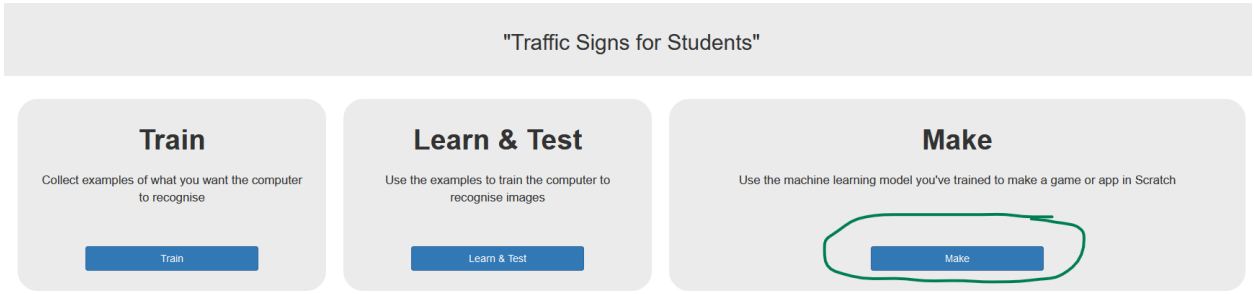


You will be training your machine learning model to recognize 3 different types of street signs: stop signs, yield signs, and speed limit signs. All other signs will be categorized as ‘Unknown’

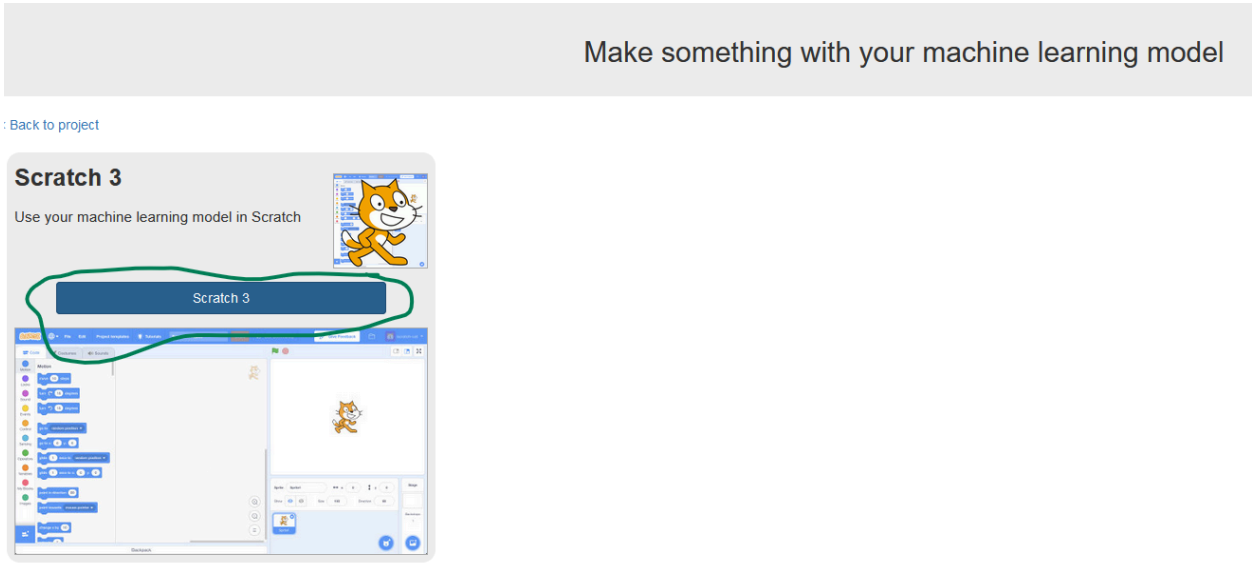
10. Click on ‘Back to Project’

Open Scratch

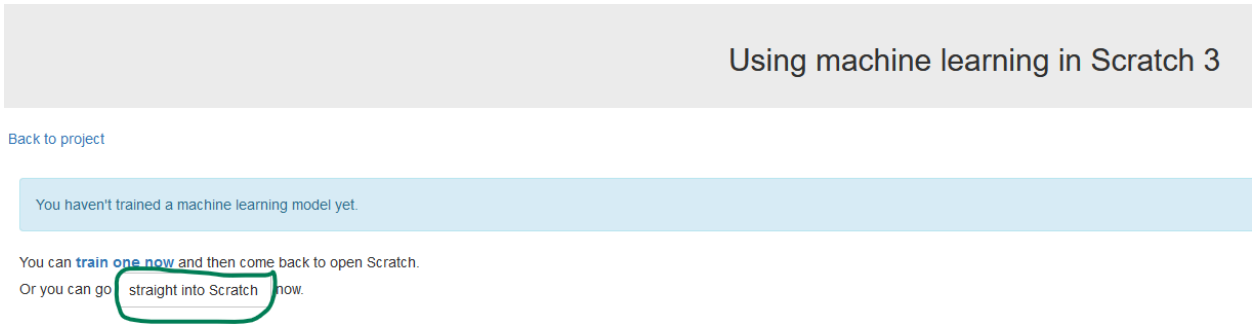
1. Click on the blue ‘Make’ button



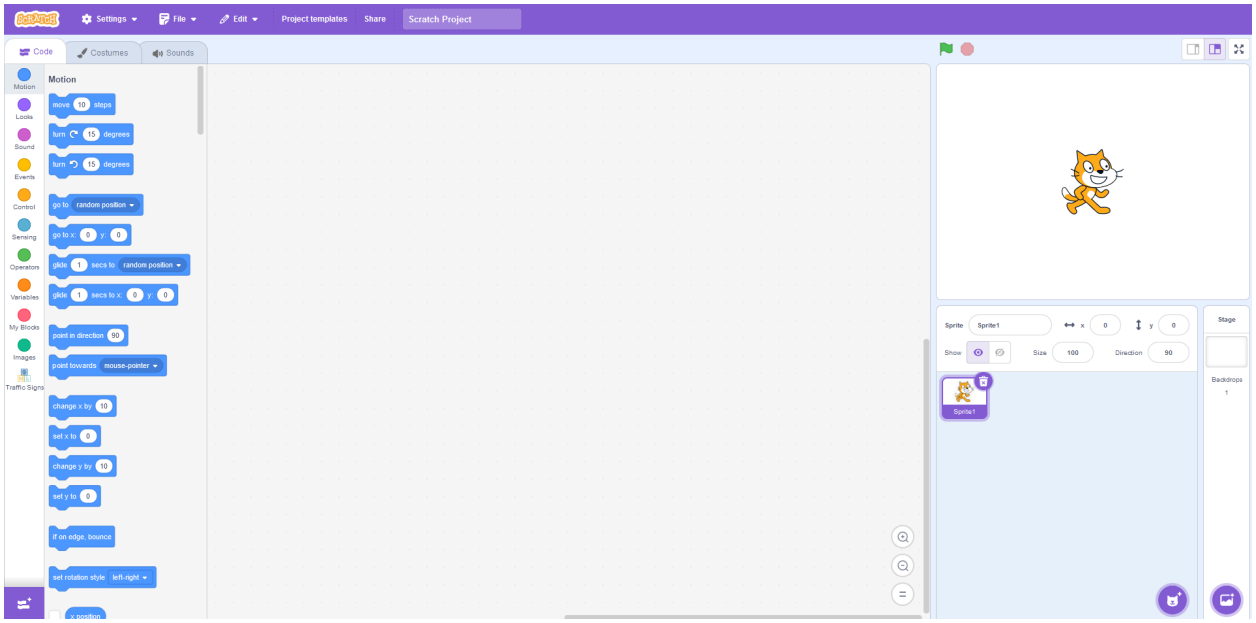
2. Click on the blue ‘Scratch 3’ button



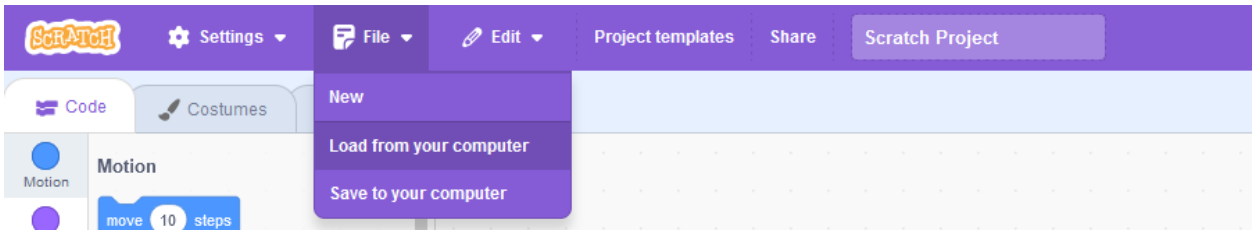
3. Click on the ‘straight into Scratch’ button



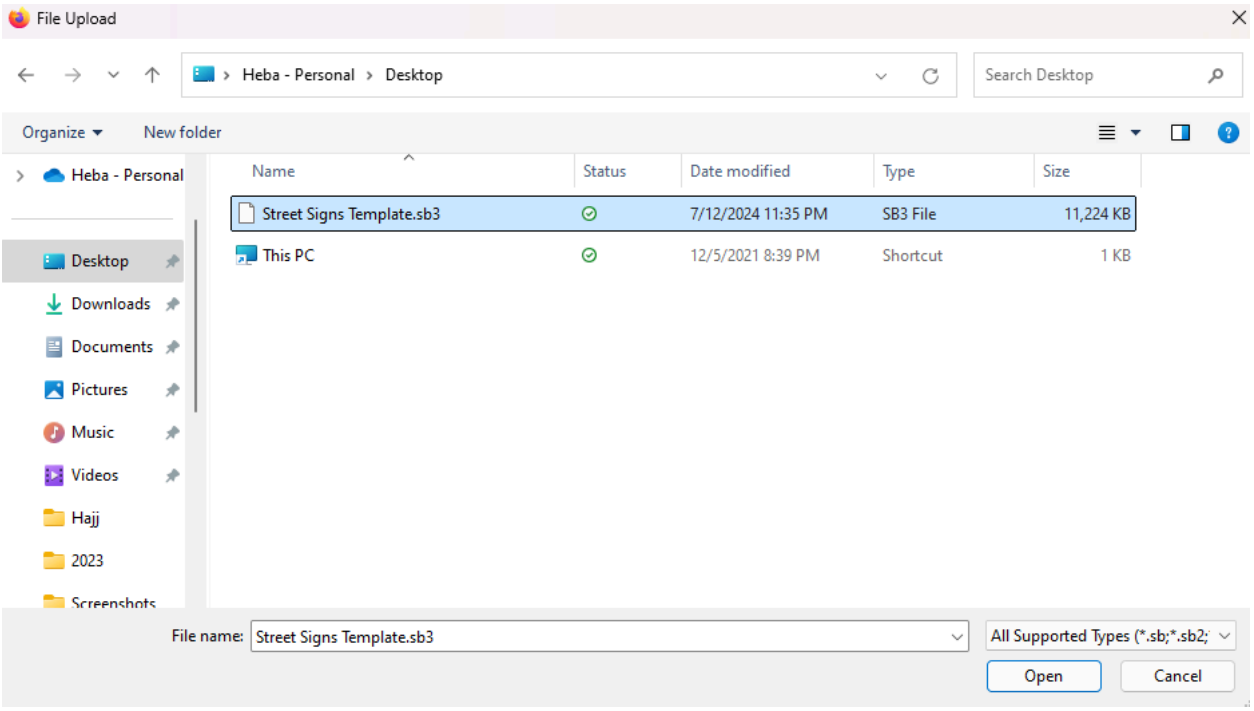
4. A new window should pop up that looks like this:



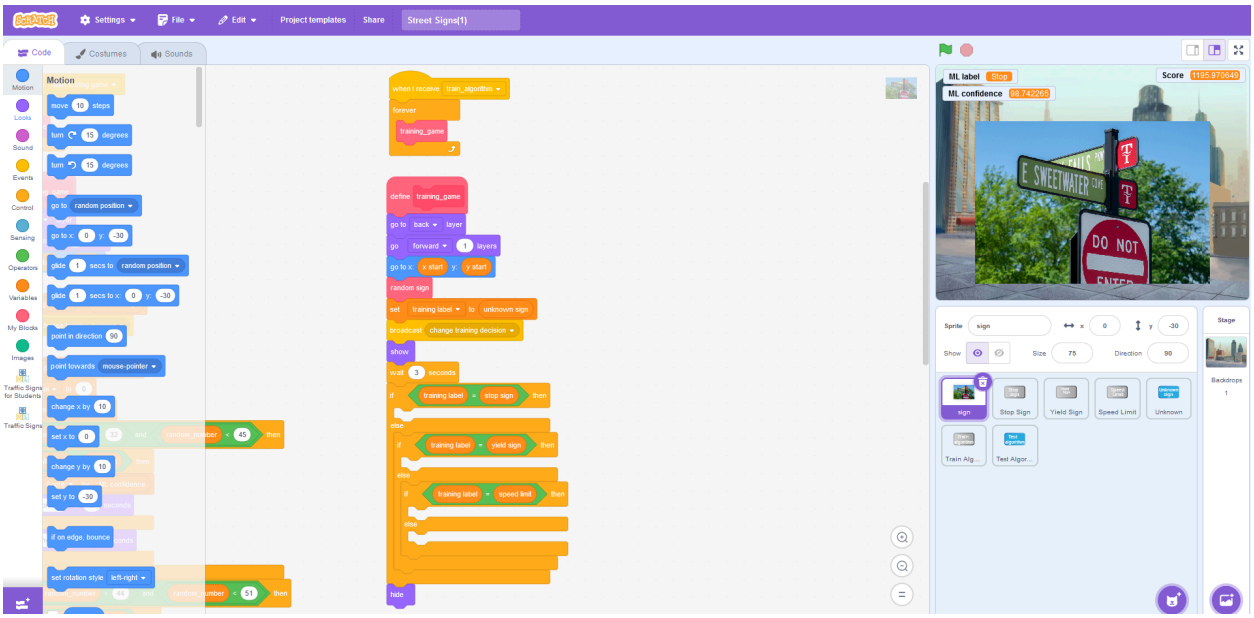
5. In the top purple bar, select ‘File’ -> ‘Load from your computer’



6. Navigate to the ‘Street Signs Template.sb3’ file you downloaded to your desktop, and Open it

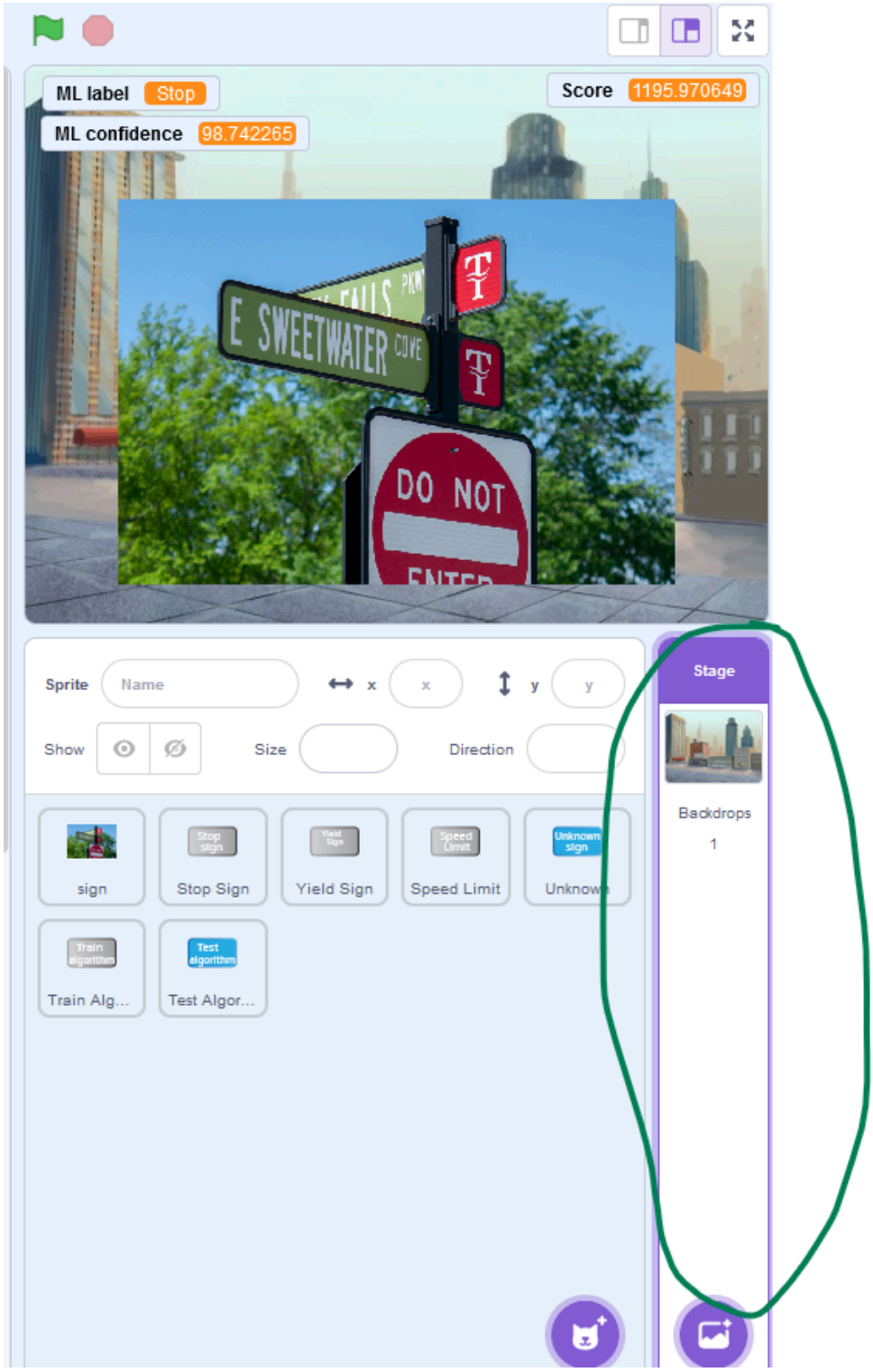


7. The project should be loaded, and the screen should look like this:



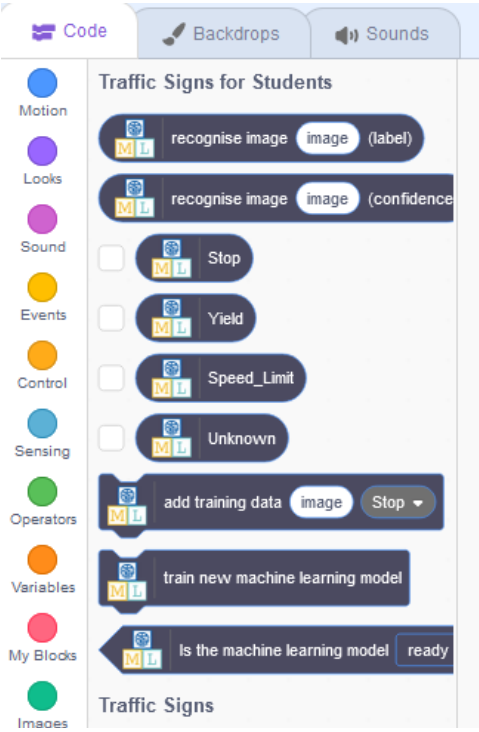
Configure Your Scratch Project

1. Click on ‘Stage’ on the bottom right of the screen

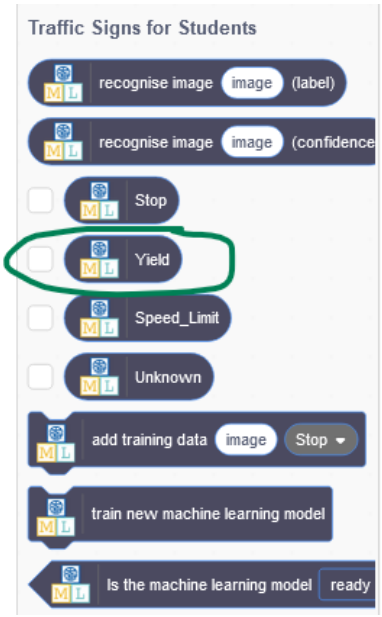


2. In the middle section of the screen, find the pink code block called ‘define prepare training labels’

3. In the right section of the screen, click on ‘Code’ then ‘Traffic Signs for Students’



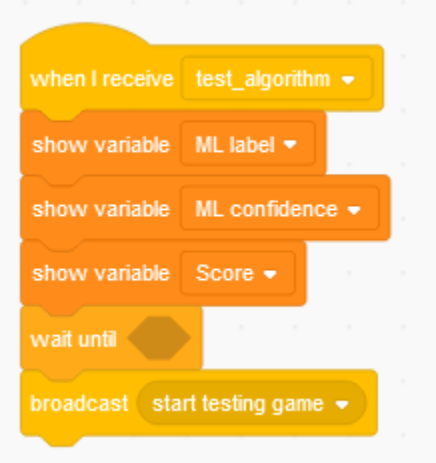
4. In the left section, find the bubble that says ‘Yield’ in the section labeled ‘Traffic Signs for Students’



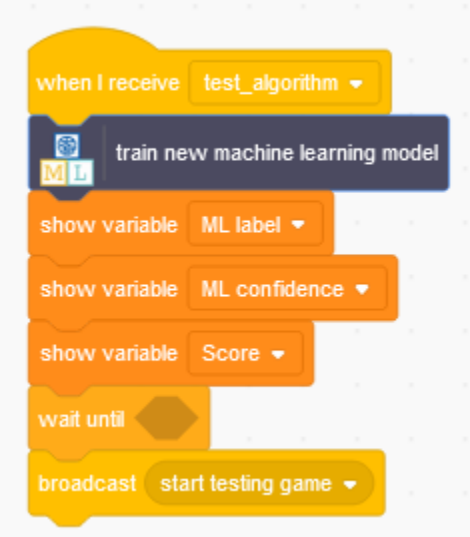
Drag the ‘Yield’ bubble to the ‘set yield sign to yield’ block so it looks like this:

5. Repeat the previous step where you drag:
   ‘Stop’ to ‘set stop sign to stop’
   ‘Speed_Limit’ to ‘set speed limit to speed limit’
   ‘Unknown’ to ‘set unknown sign to unknown’. It should look like this

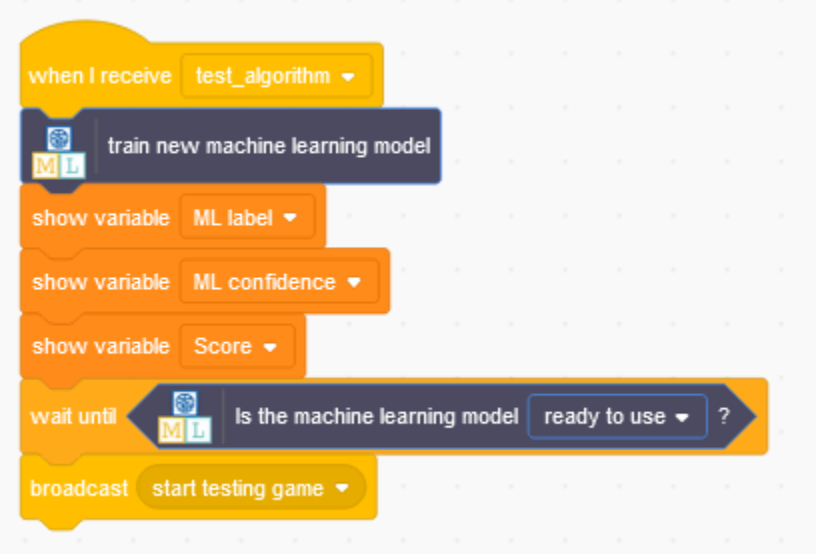
6. In the middle section, find the yellow code block labeled, ‘when I receive test_algorithm’



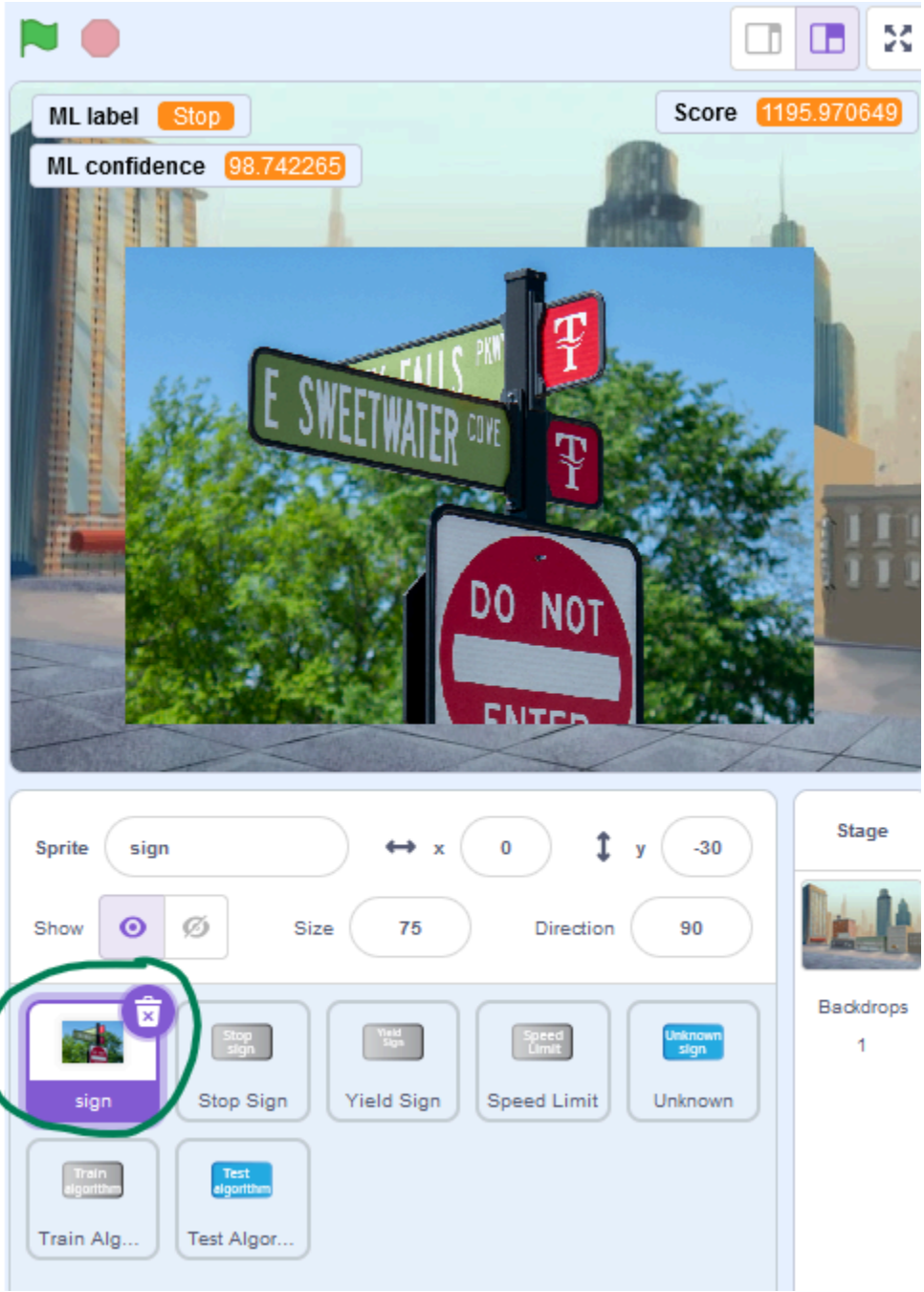
7. On the left side of the screen under ‘Traffic Signs for Students’ drag the ‘train new machine learning model’ between the first and second block of the code. It should look like this:



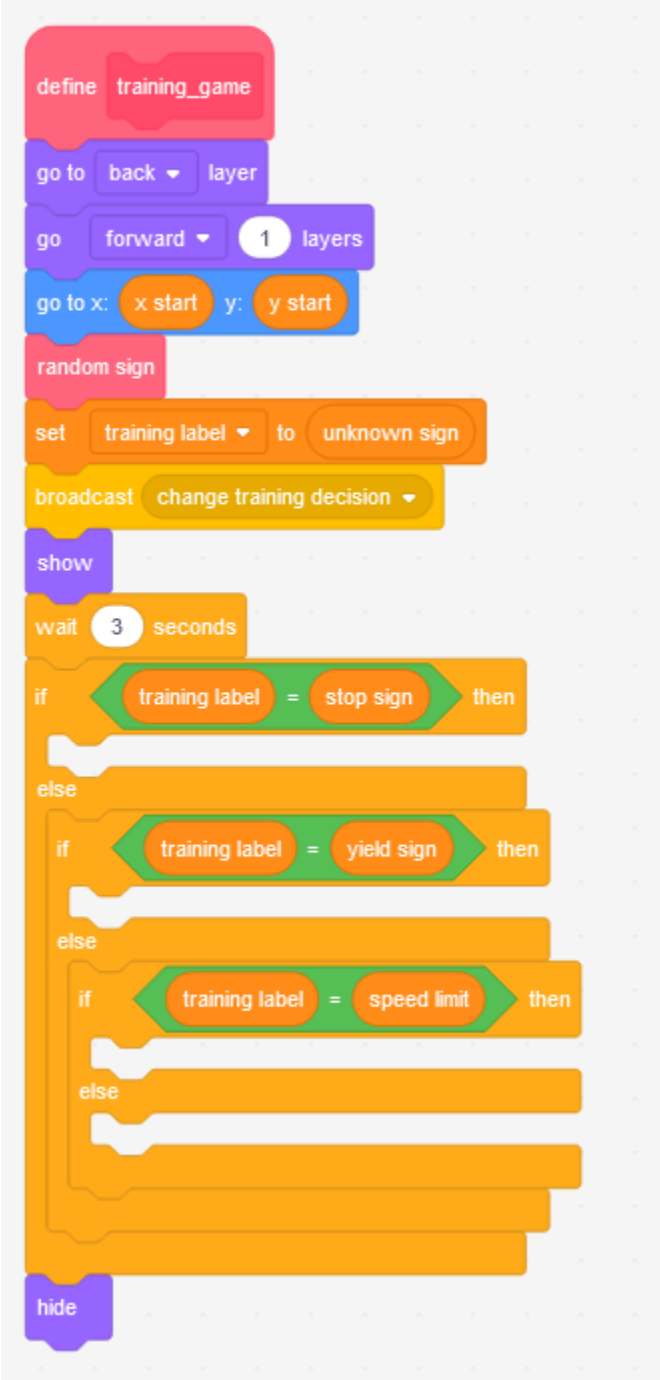
8. On the left side of the screen under ‘Traffic Signs for Students’ drag the ‘is the machine learning model ‘ready’ to the empty spot next to ‘wait until’. It should look like this:



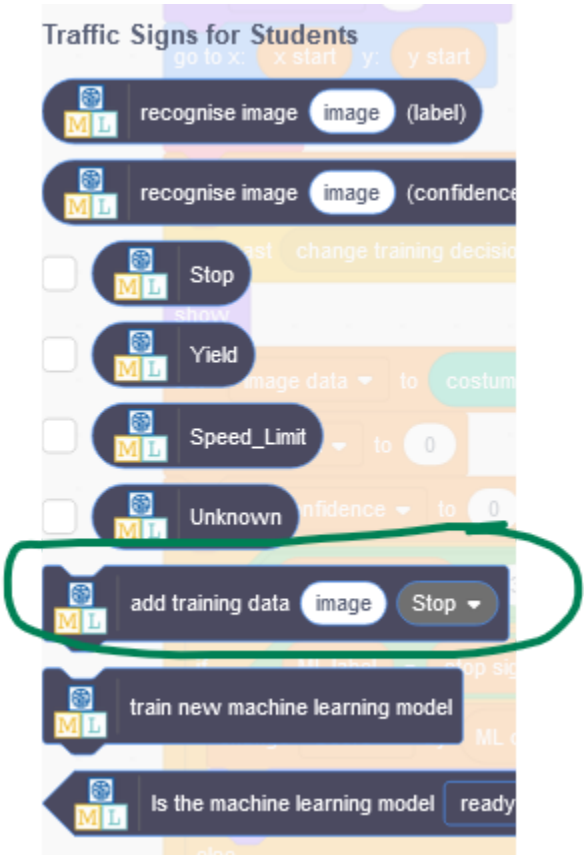
9. On the right side of the screen, click on the button that signs ‘sign’



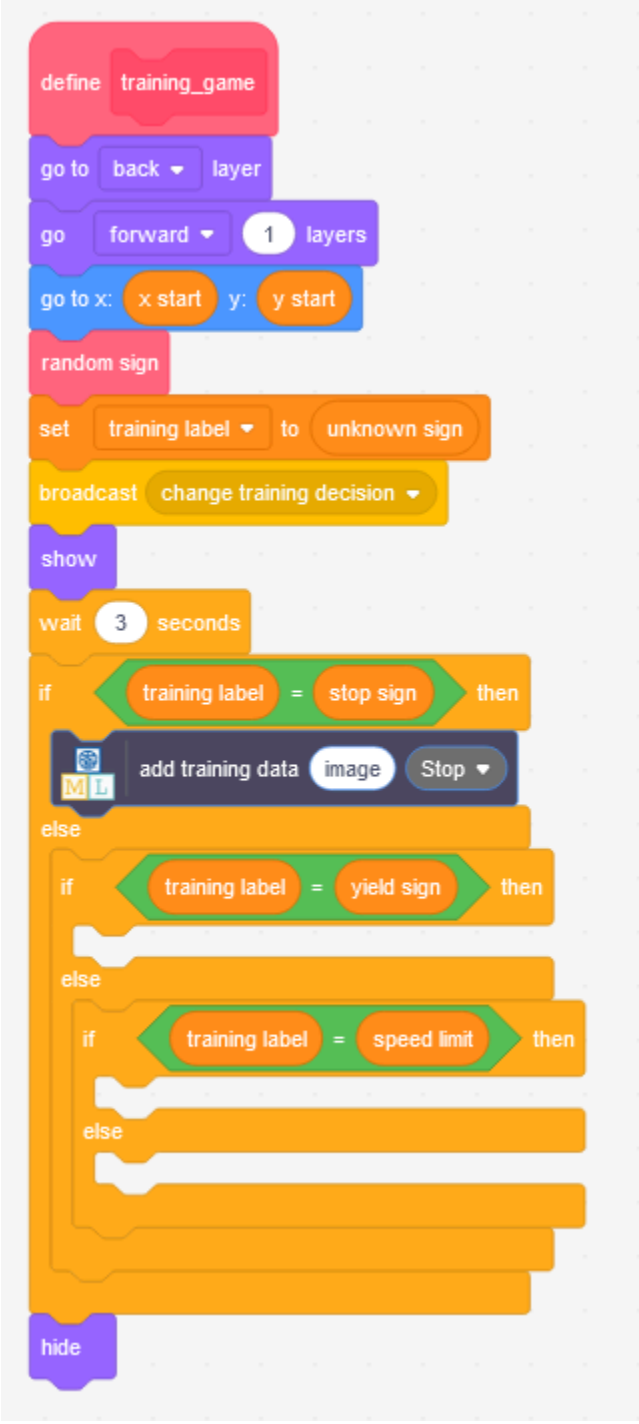
10. Find the pink code block labeled ‘define training_game’



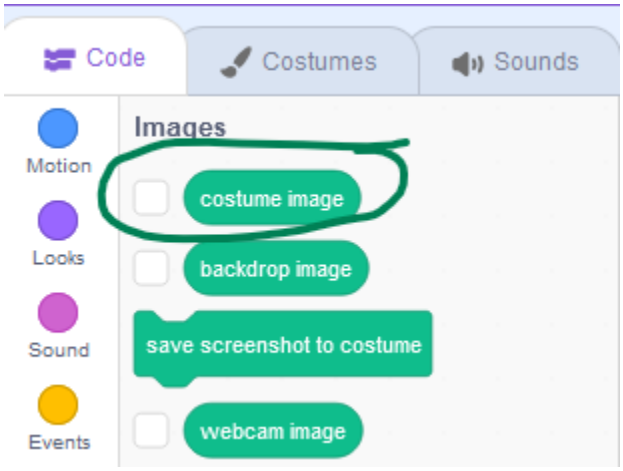
11. On the left side of the screen under ‘Traffic Signs for Students’, find the ‘add training data image Stop’ button.



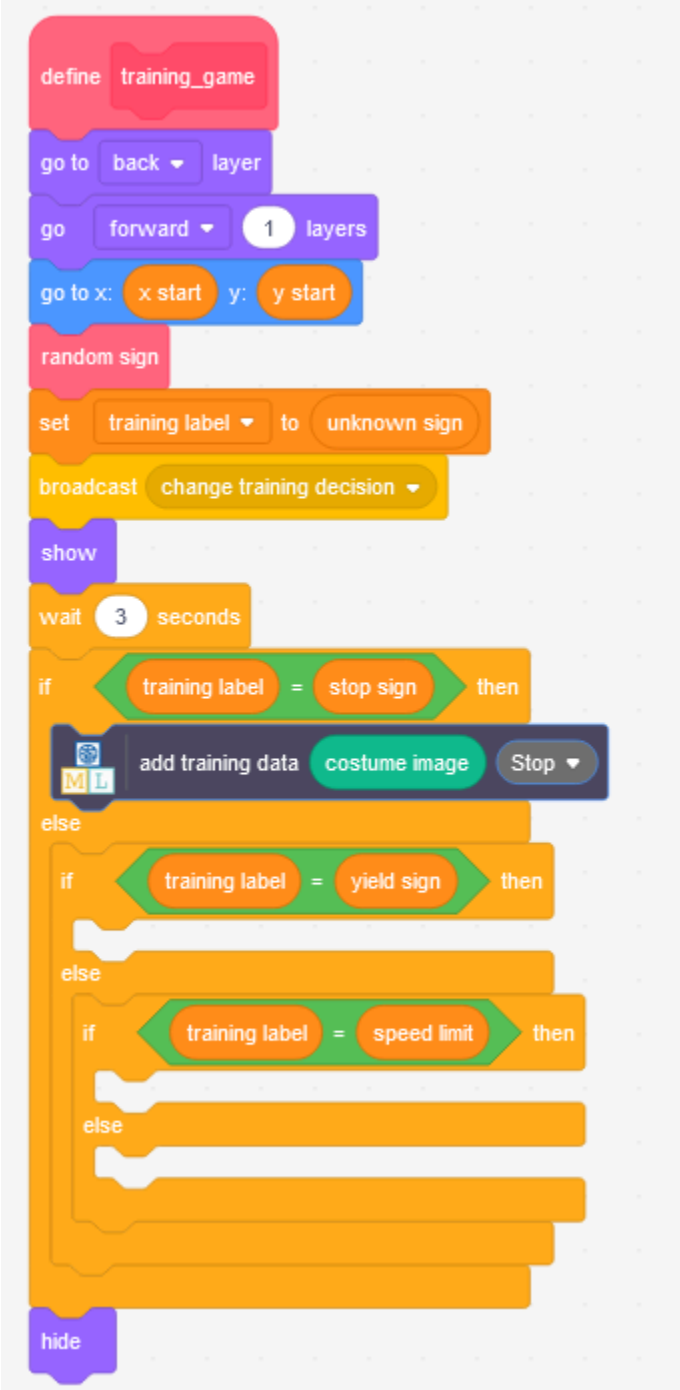
12. Drag the ‘add training data image to Stop’ button to the open area under ‘if training label = stop sign then’



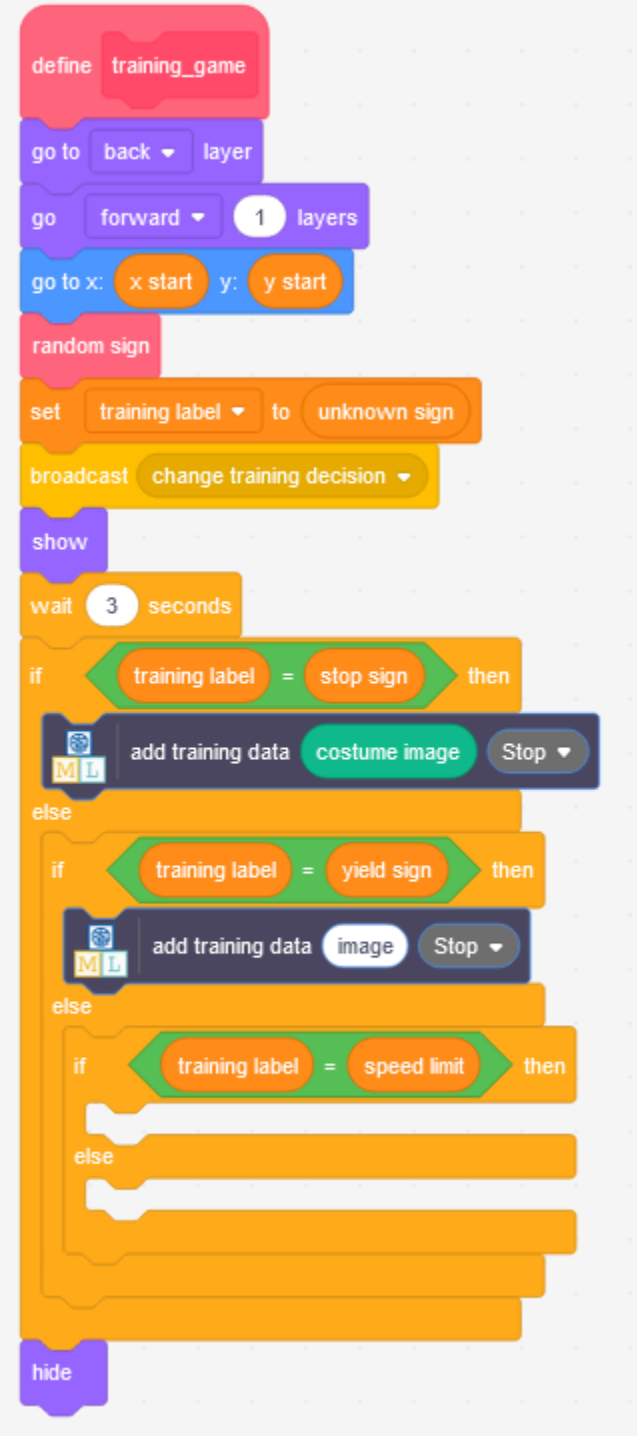
13. On the left side of the screen under ‘Images’ find the button labeled ‘costume images’



14. Drag the ‘costume image’ button to the white section labeled ‘image’ in the block you just added. It should look like this:

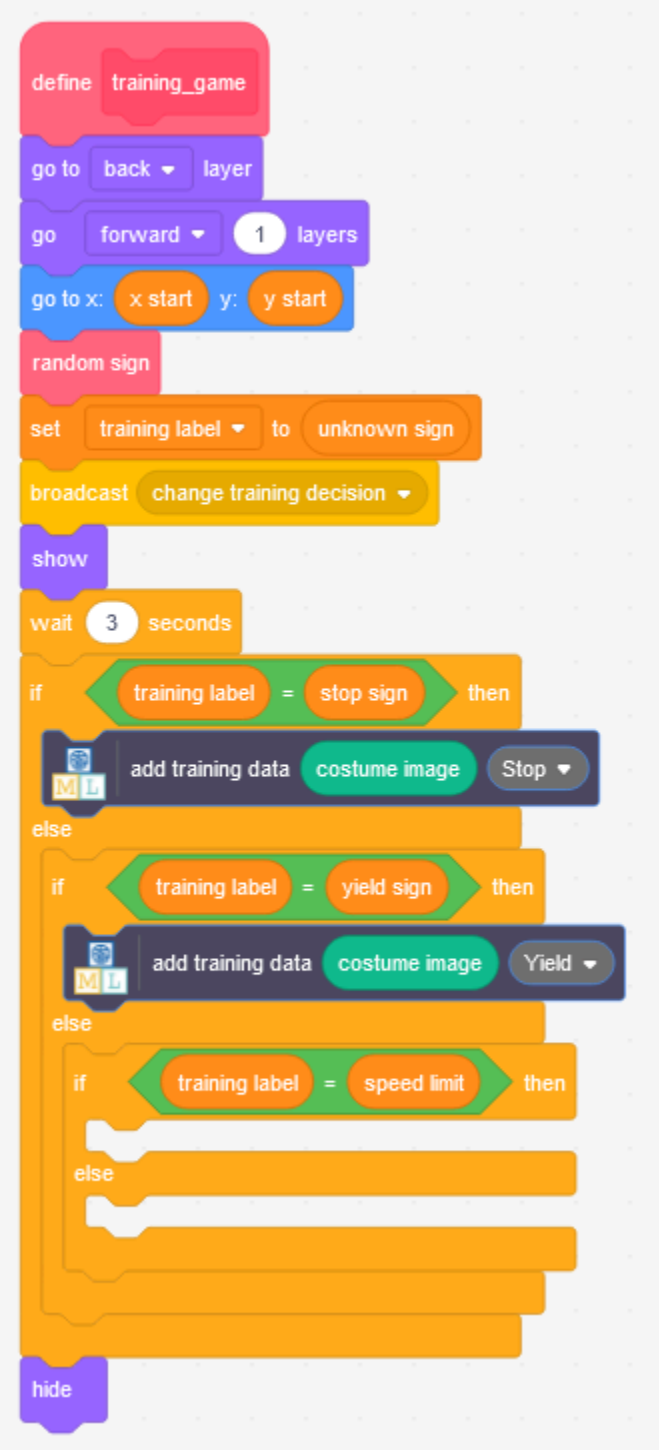


15. Drag the ‘add training data image to Stop’ button to the open area under ‘if training label = yield sign then’



16. Add a ‘costume image’ button where it says ‘image’ just as before. Click on ‘Stop’ and change it to ‘Yield’

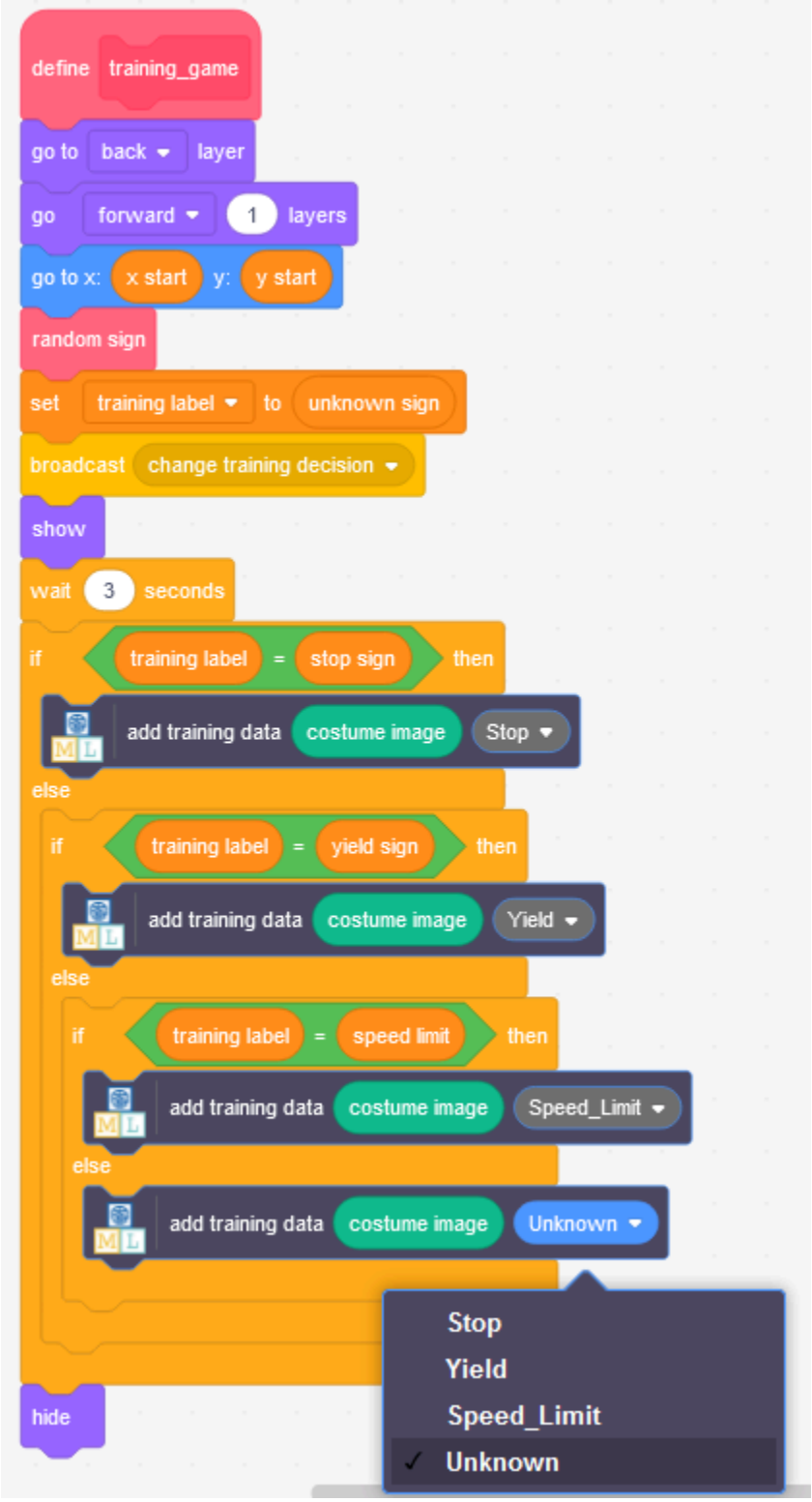
It should now look like this:



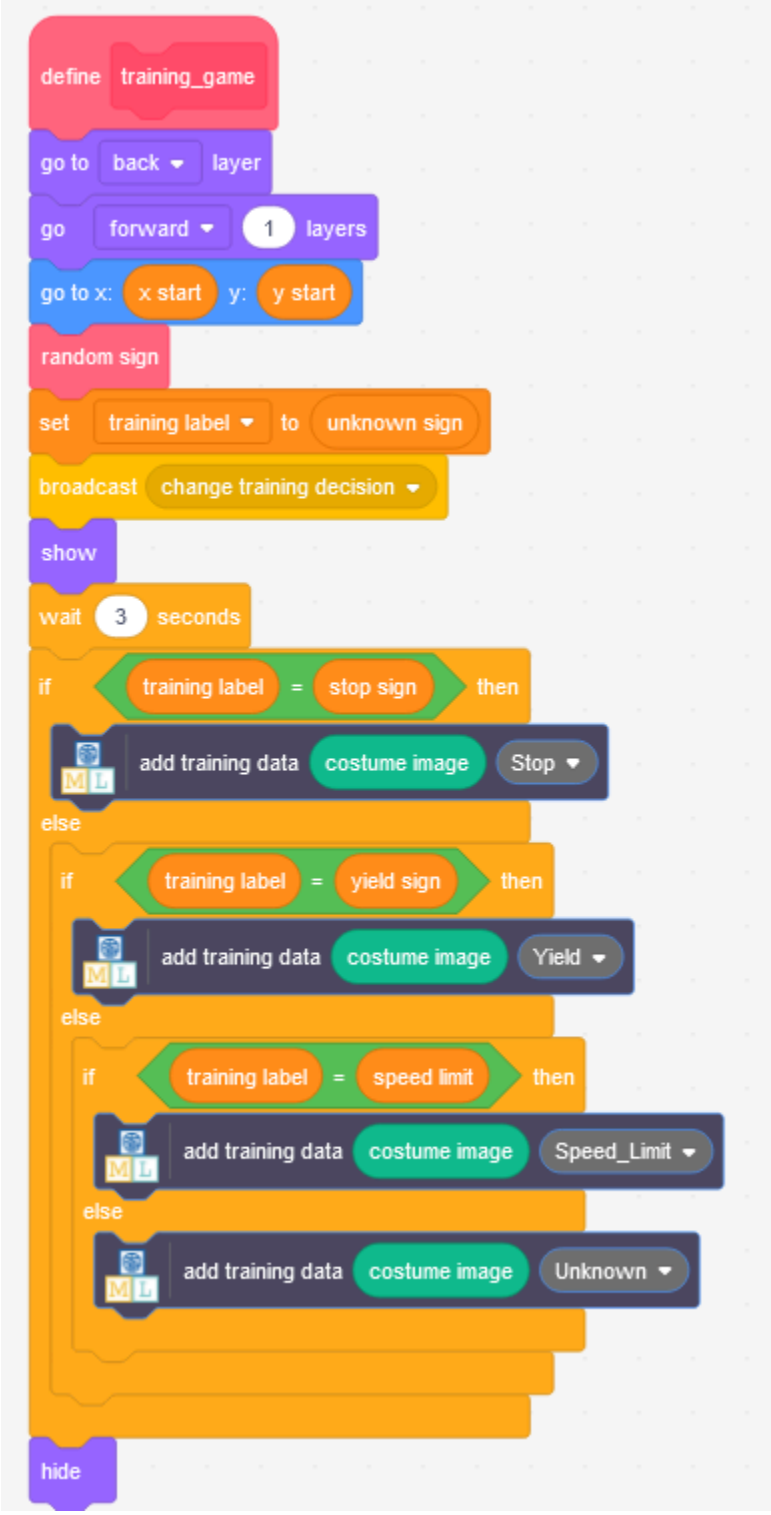
17. Repeat the previous two steps for the empty area under ‘if training label = speed limit then’, add ‘costume image’, and change ‘Stop’ to ‘Speed_Limit’ in the drop down menu

It should look like:

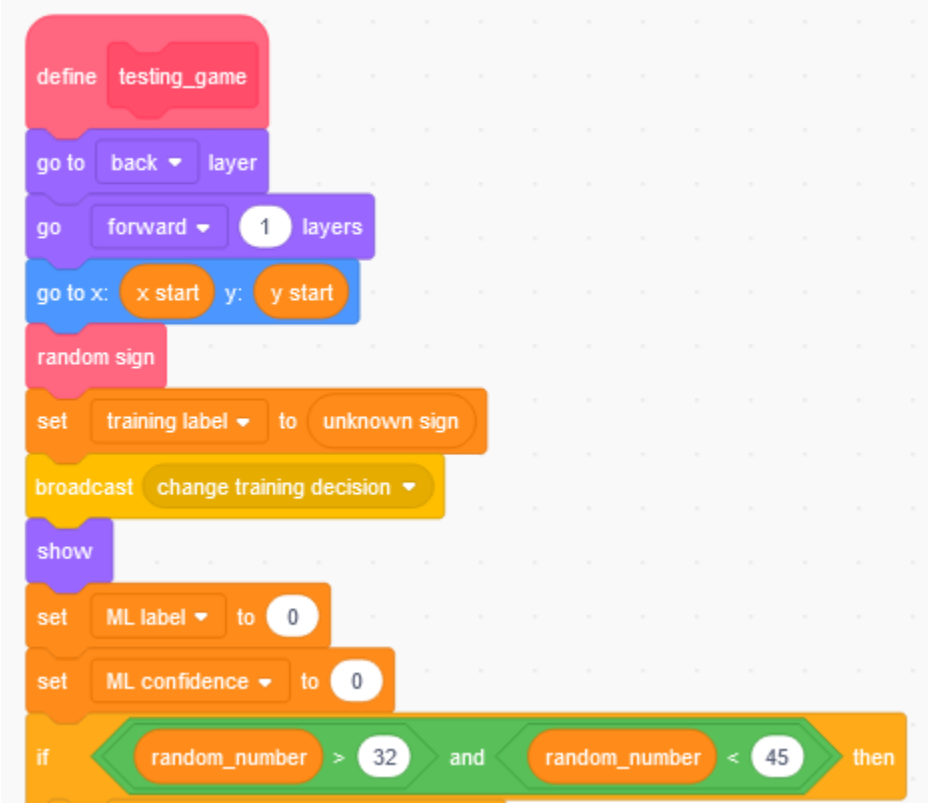
18. Drag one more ‘add training data image stop’ button from the left side of the screen to the last empty space in the middle under ‘else’, add ‘costume image’, and change the drop down to ‘Unknown’



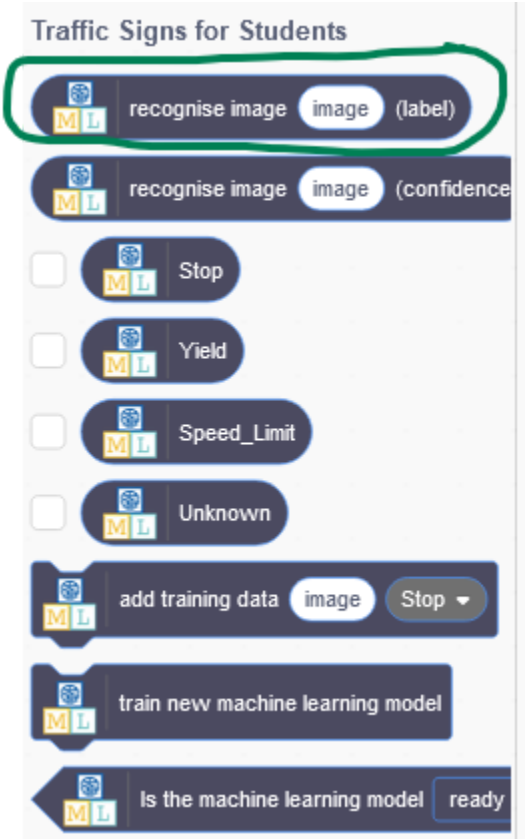
It should look like:



19. Find the pink block in the middle section of the screen labeled, ‘define testing game’

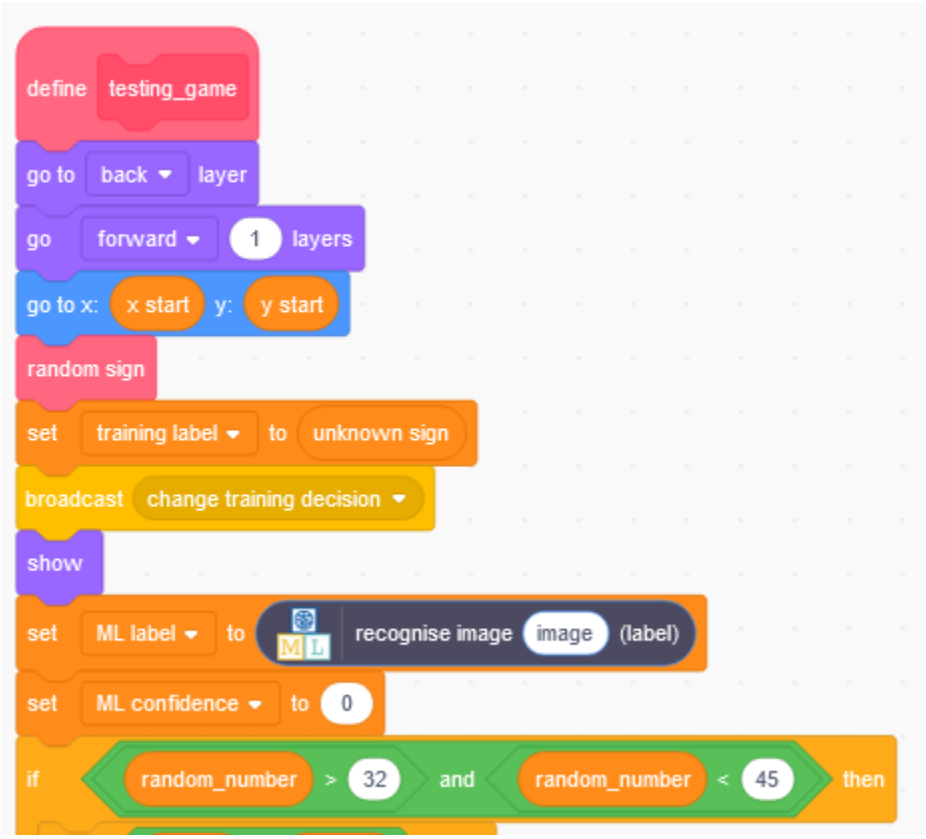


20. Find the block labeled ‘recognise image ‘image’ (label)’ under ‘Traffic Signs for Students’ in the left section.

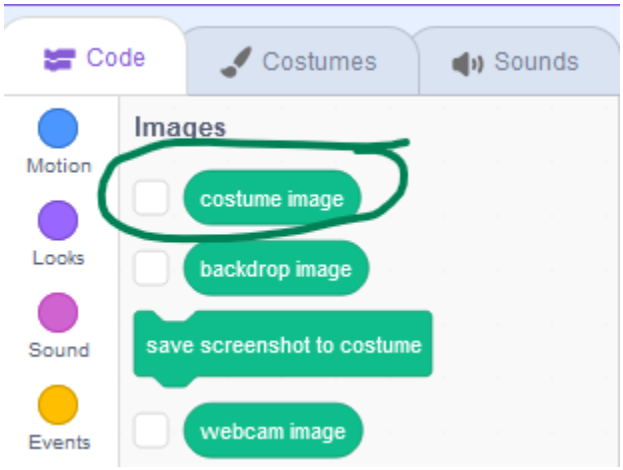


21. Drag this block to the white ‘0’ in the orange block labeled ‘set ML label to ‘0’

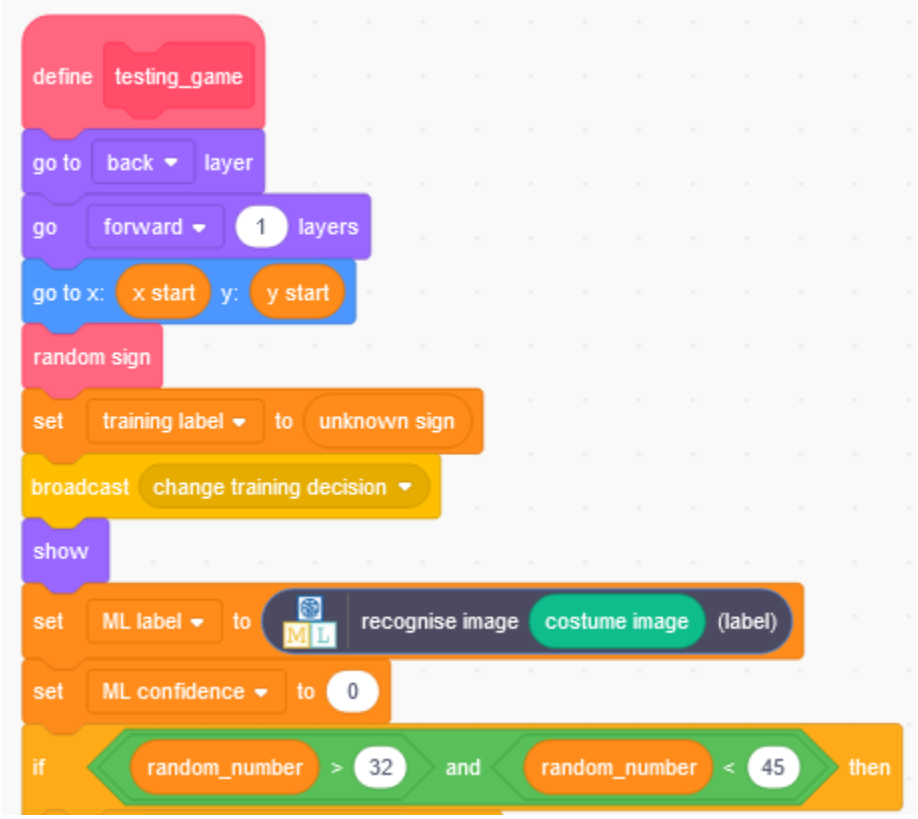
It should look like this:



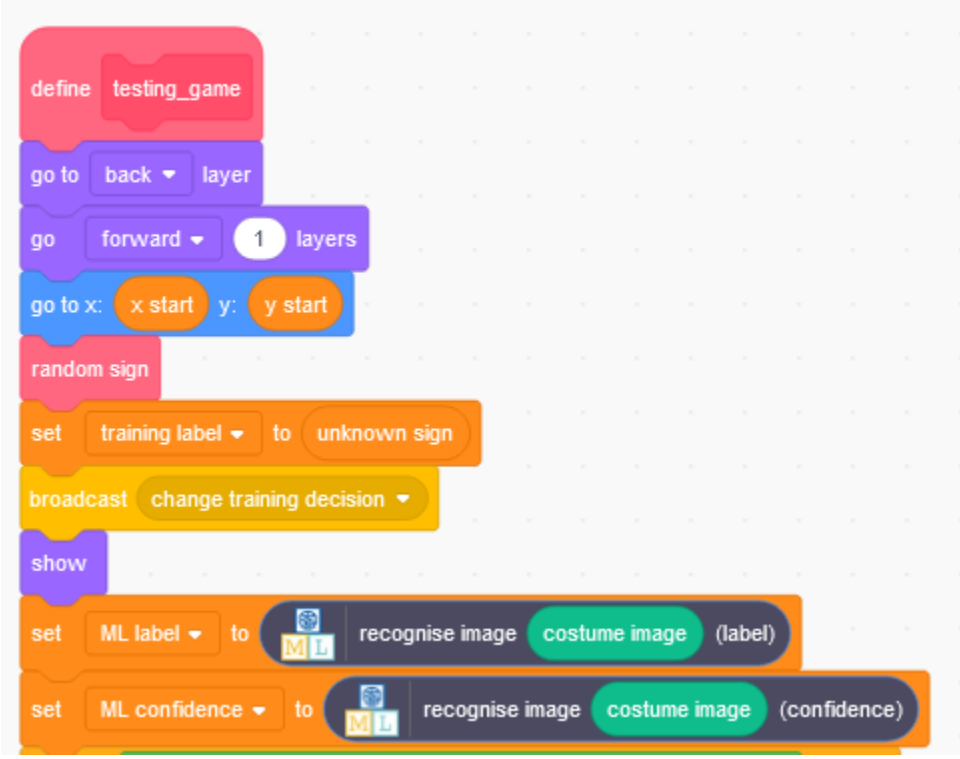
22. On the left section of the screen under ‘Images, find the ‘costume image’ block



23. Drag the ‘costume image’ block to the white ‘image’ of the block you just added. It should look like this:



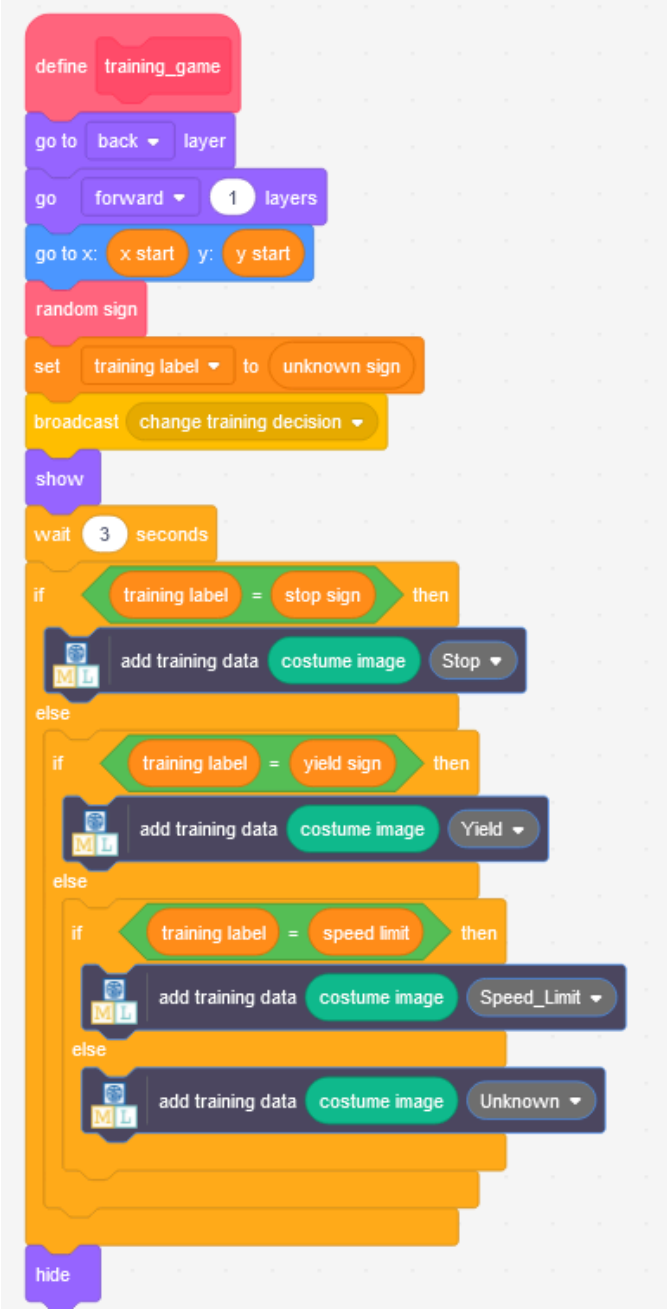
24. Repeat the previous three steps for ‘recognise image ‘image’ (confidence) button and drag it to the orange ‘set ML confidence to 0’ block. It should look like this:



Activities

Activity 1: Read the code

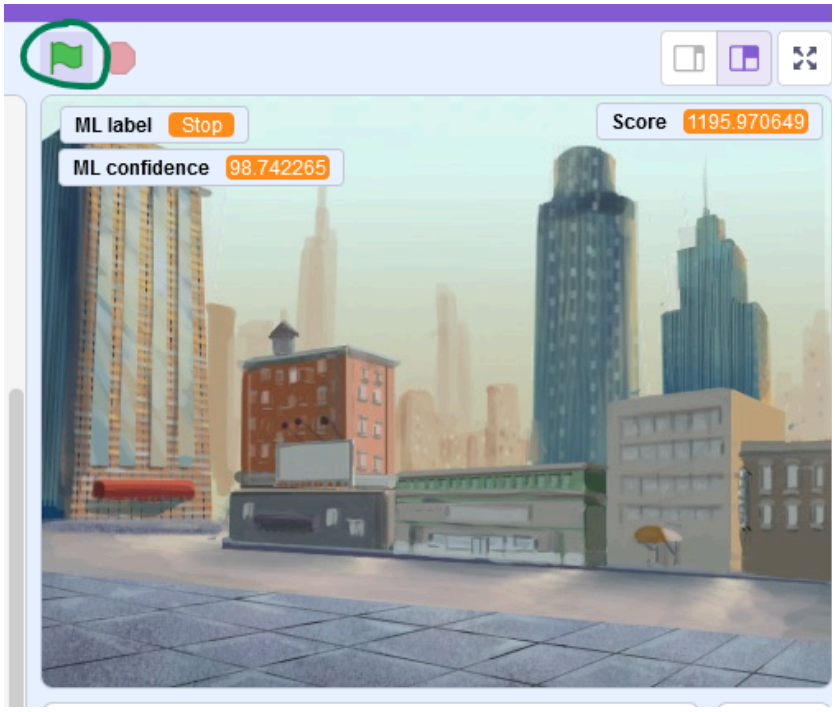
Read all the code blocks under ‘define training game’ (the code block you just added to).



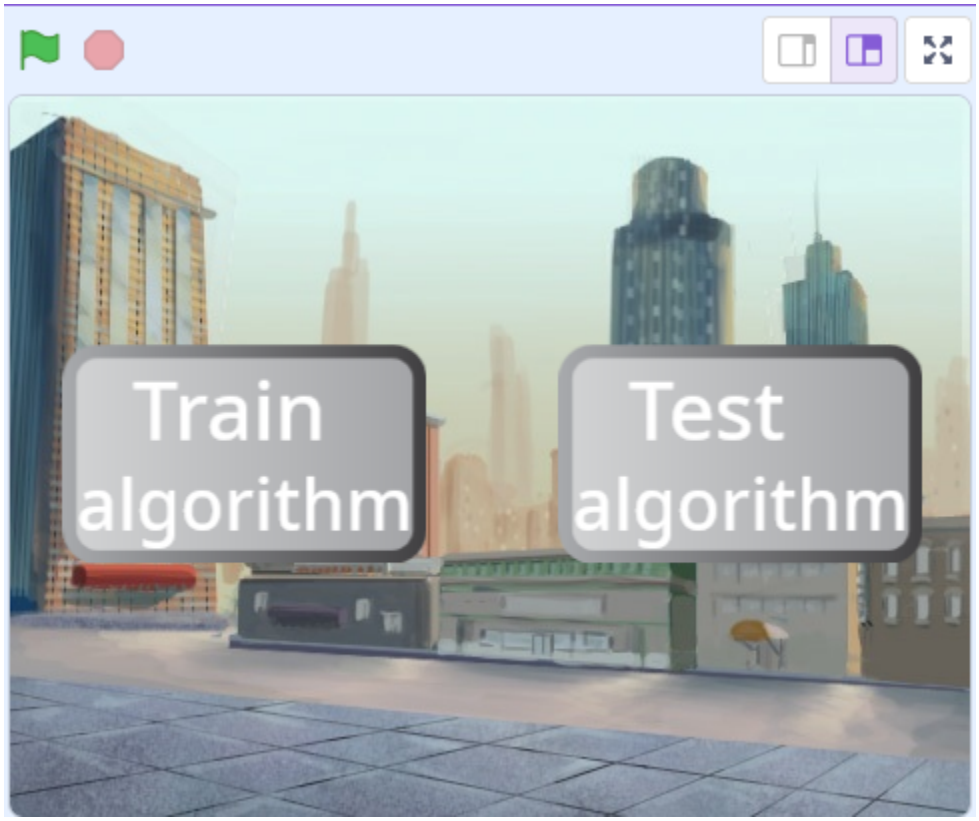
What do you think this code is doing? Write your answer here:

Activity 2: Train on 5 Images

1. Click on the green flag above the picture on the top right of the screen



2. Select ‘Train algorithm’



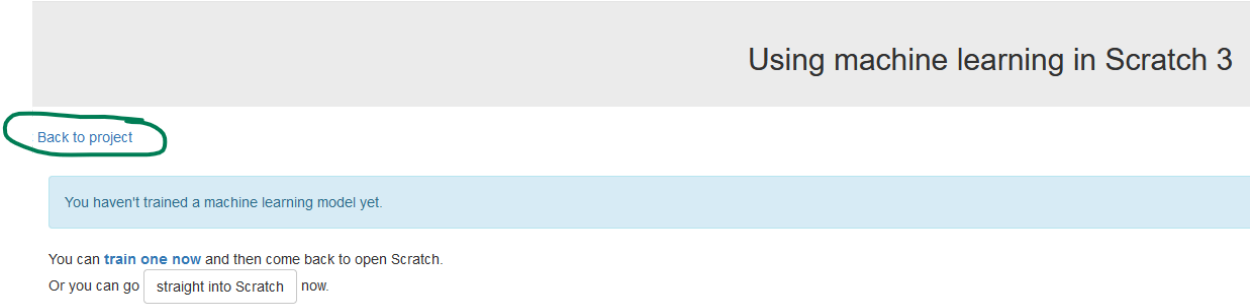
3. Images of traffic signs will appear for 3 seconds each. For each sign, click on the buttons at the top to train your machine learning model about how to label signs.

Select ‘Stop sign’ when you see a stop sign, ‘Speed Limit’ when you see a speed limit sign, ‘Yield Sign’ when you see a yield sign, and ‘Unknown sign’ for all other signs

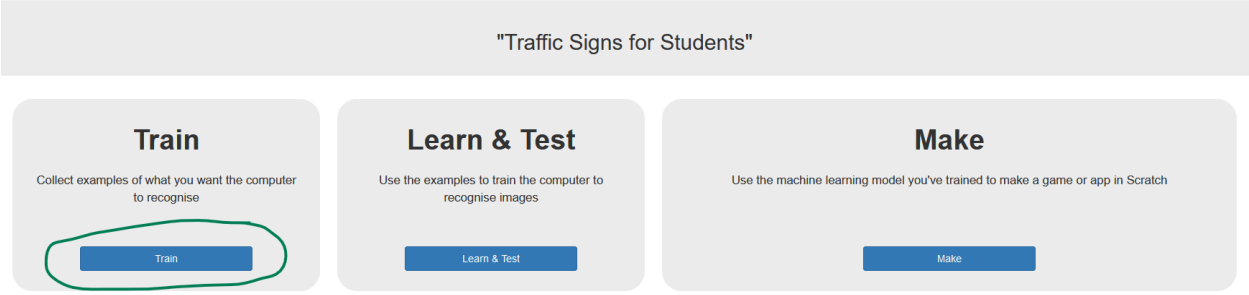
4. After you've trained 5 images, click on the red octagon next the green flag to stop the game

Congratulations! You just trained a machine learning model! Scratch will use the information you provided to teach the machine learning model how to recognize and label street signs.

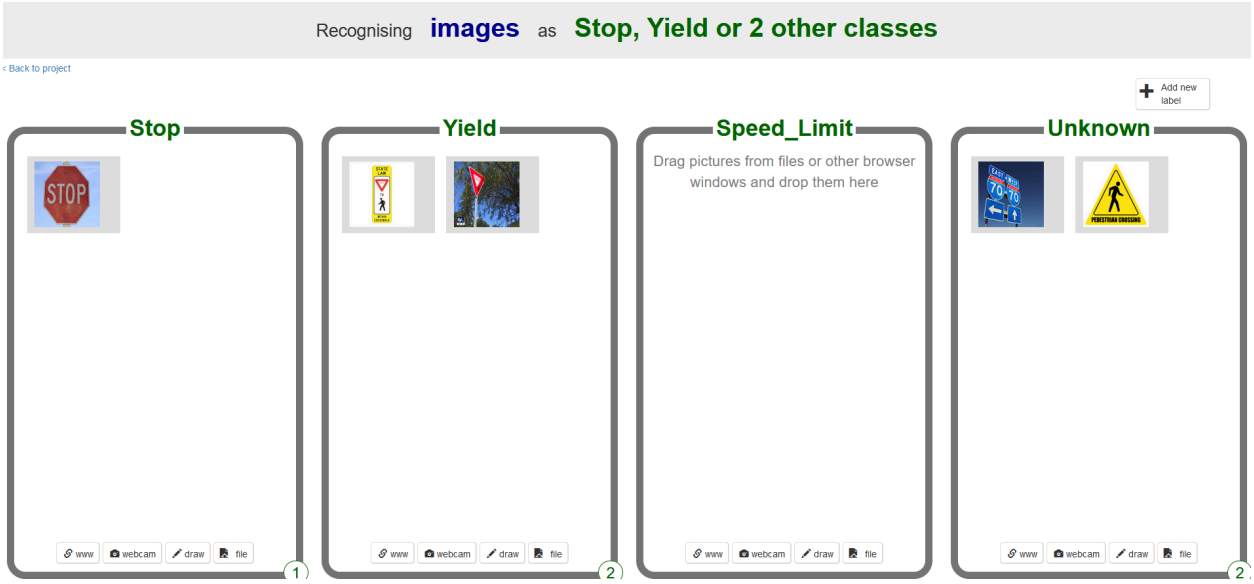
5. Go to the previous tab (where you clicked on 'straight into Scratch' to open a new window) and click on 'Back to Project'



6. Click on the blue ‘Train’ button

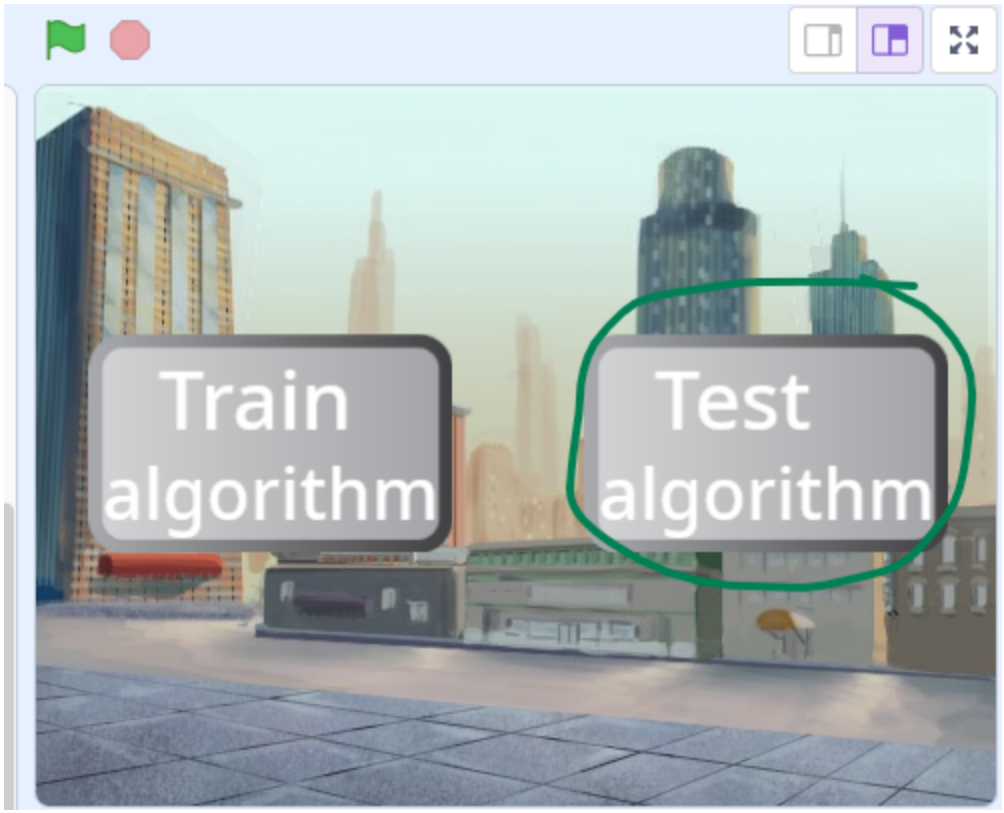


7. The images from when you trained the algorithm should be in the right boxes. If you made any mistakes (example: there’s a picture of a stop sign labeled ‘yield’), feel free to remove those pictures from the training data by clicking the small ‘x’ when you hover over the picture.



8. If you were teaching a little kid about street signs, is the information in your training data enough for them to understand how to recognize a stop sign, yield sign, and speed limit sign? Why or why not? Write your answer below.
9. Go back to the tab with the ‘Scratch’ game and click the green flag at the top of the right section of the screen:

10. This time click on ‘Test algorithm’



‘Test algorithm’ will pick 15 random images of street signs and use your training data to try to label each image. Don’t worry if it takes a minute for the game to start – training a model can take time!

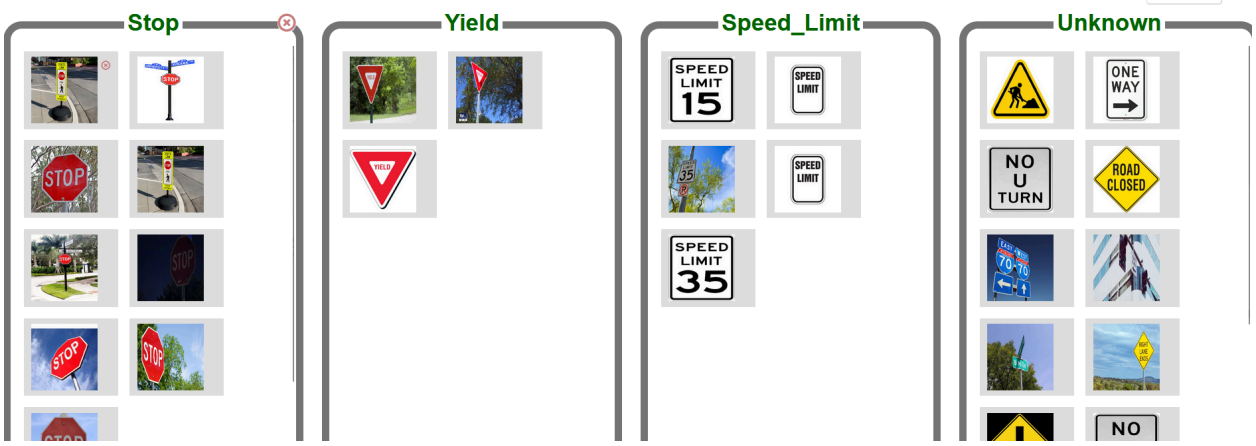
You don’t need to click anything, just watch as your algorithm labels each image and see how many you got correct. For each image labeled correctly, your score will increase by how confident your algorithm is that it labeled the image correctly.

11. What is your score? Write it down here:

12. Did your algorithm recognize most of the images correctly? Why or why not?

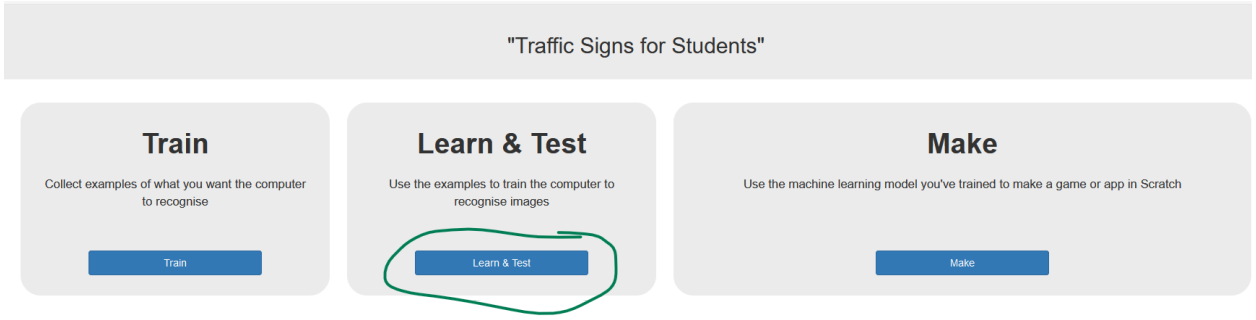
Activity 3: Train on at least 20 Images

1. Repeat all the training steps in Activity 2, but this train on at least 20 images. Make sure your training data shows at least 3 images for each category.

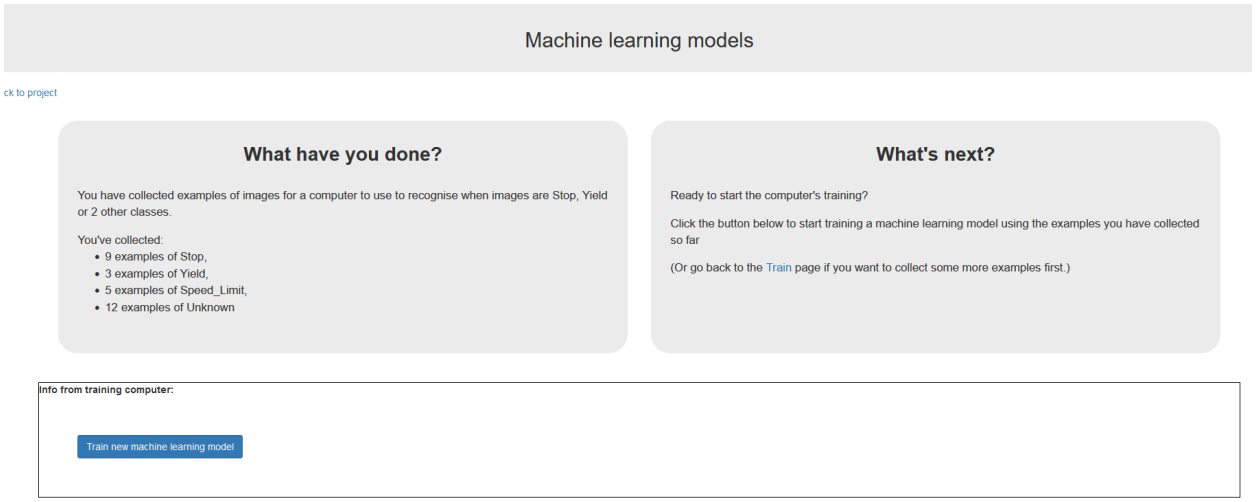


2. Before testing your new training data, verify the training will work. Click on 'Back to Project'

3. Click on the blue 'Learn & Test' button

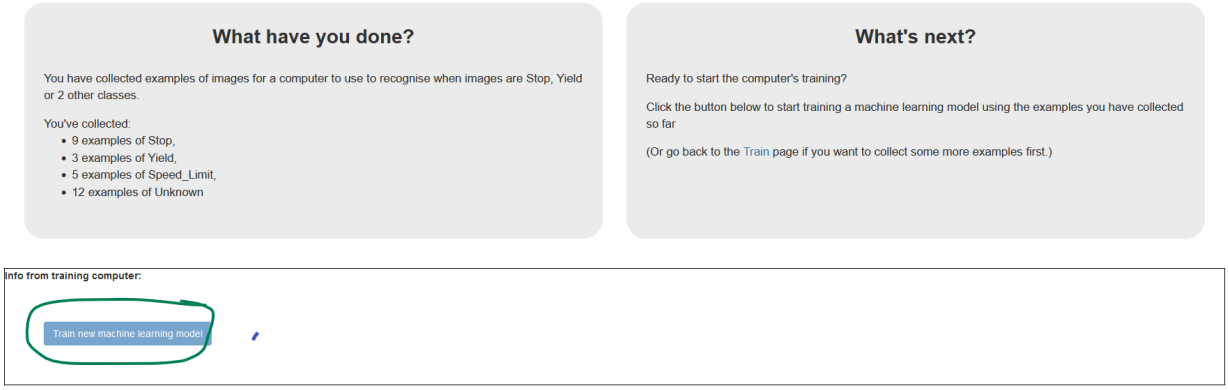


4. The screen should look like this with a blue ‘Train new machine learning model’ button at the bottom of the screen:

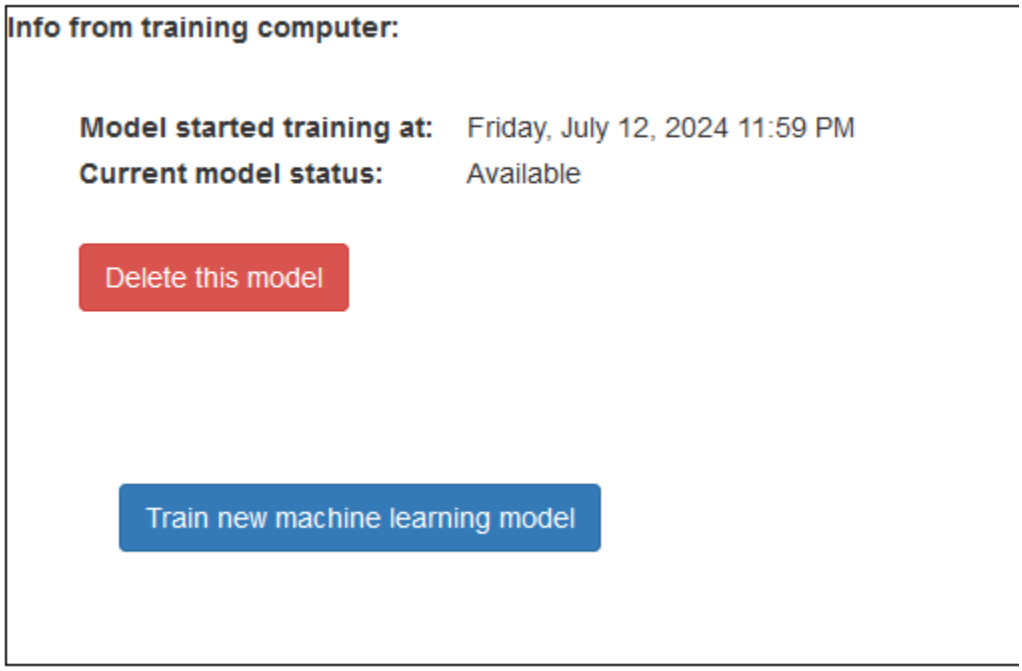


If you don’t see this button, go back to Scratch and train more data.

5. Click the blue, ‘Train new machine learning model’ button and wait for training to complete



6. You should see something like this:



7. Go back to Scratch and test your improved algorithm using the same method as last time.
8. Write down your score:

9. Did your algorithm recognize more images correctly this time? Why or why not?