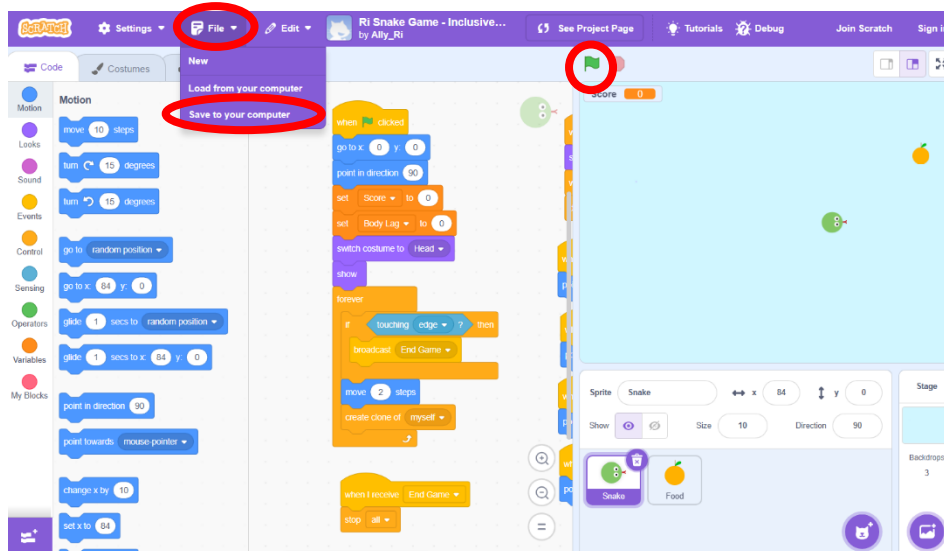


Ri Off the Shelf Masterclass: Inclusive technology

Guide to building an AI controlled game

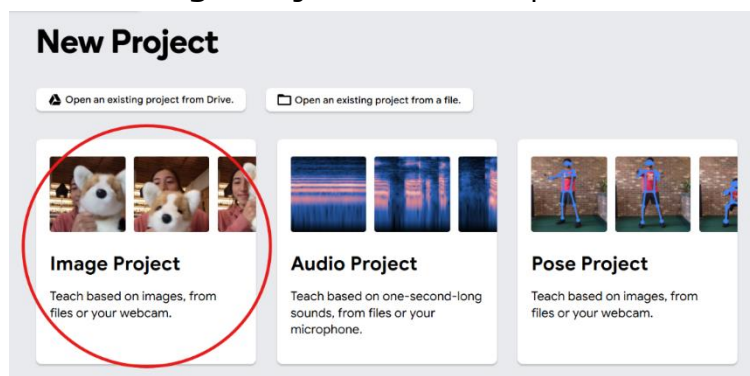
Downloading the game in Scratch

1. Visit the snake Scratch game, available here:
<https://scratch.mit.edu/projects/1208597798/>.
2. Click the 'See inside' button. Have a short play with the game. To start the game, click the **green flag icon** above the game on the right. Use the arrow or WASD keys on your keyboard to control the snake in the game. To gain points, make the snake eat the fruit, and don't touch the edges of the screen.
3. Once you have finished, click the File button on the top menu, then select 'Save to your computer'.

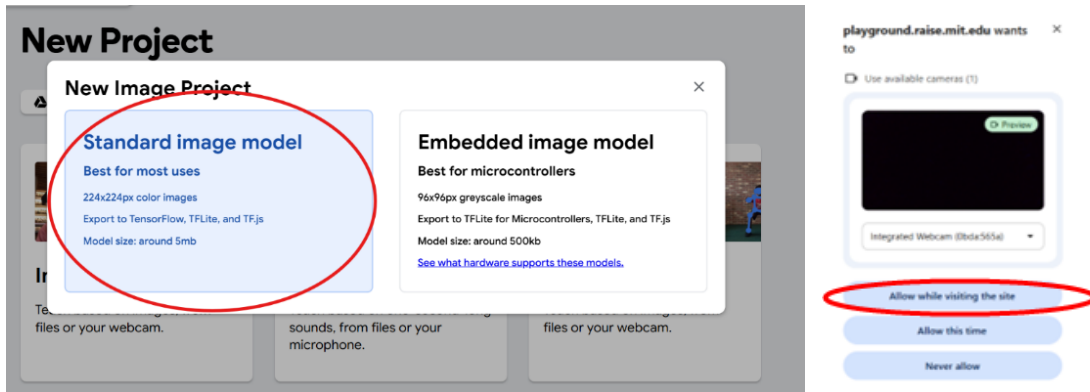


Building your AI model

4. Open the teachable machine web application (<https://teachablemachine.withgoogle.com/train>) and start a new project. Select '**Image Project**' from the options on screen.

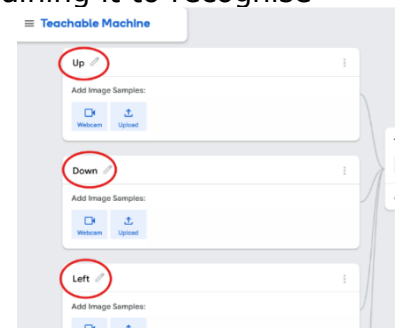


5. From the pop-up menu, select the '**standard image model**' option.

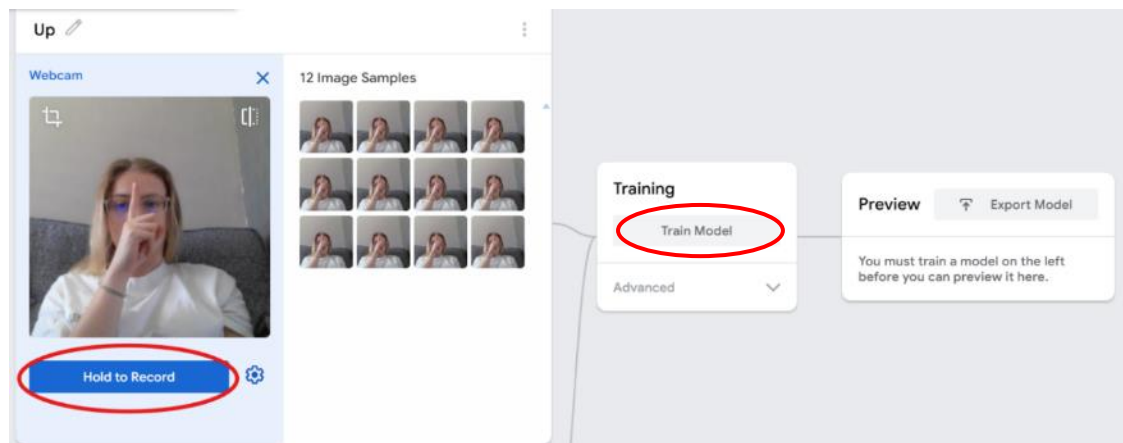


If a pop up appears asking for camera permission, click '**allow while visiting the site**', or whichever alternative option appears for the browser you are using.

6. Once you have opened your new model you can start training it to recognise different actions which will be used to control the movement of the character in the game. Add classes to the model, so there are 4 different classes. Rename each of the classes so that you can recognise them easily (e.g. Up, Down, Left and Right).



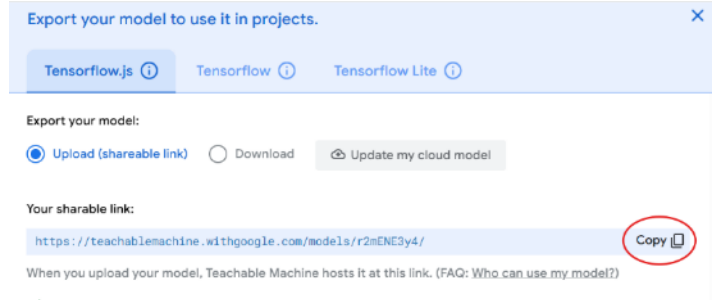
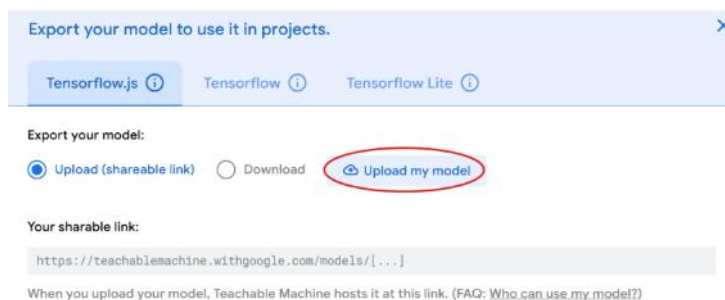
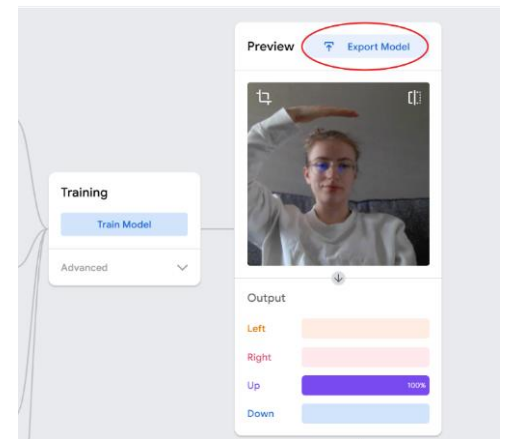
7. You can now begin training the model. For each of the classes open the **webcam** option and perform your action for that function (e.g. Up = pointing upwards). Press and hold the '**hold to record**' button and hold your pose for 6 seconds to record images to train your model with.



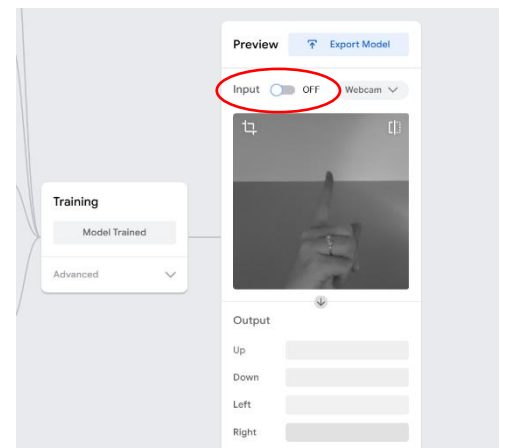
8. Once you have recorded images for all 4 classes, click the '**train model**' button. This may take a few minutes, but do not close the tab or leave the window while this is happening.
9. Once the model has been trained, you can then use the preview function to check that it is working properly. Perform your poses and check the bars below to see if it is recognising the movements correctly. If there are some actions that are more difficult for the model to recognise, consider adding

more sample images to the classes so that it has more data to train on. You may also need to remove some images from a class if they do not show the correct action being performed. To do this, hover over an image and select the bin icon that appears.

10. Once you have finished, click the '**Export Model**' button and in the pop-up window, click the '**Upload my model**' button. Once the model is uploaded, click '**Copy**' to copy the sharable link – this will be used in the code of your snake game in Scratch.

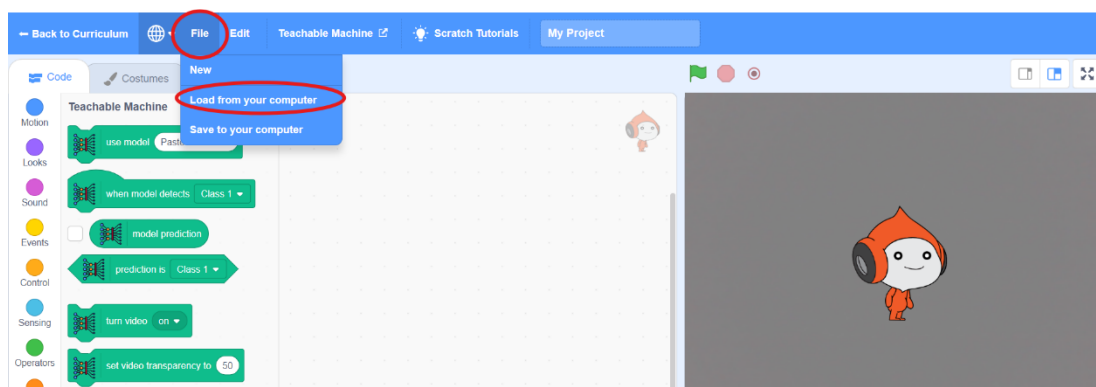


11. **IMPORTANT:** Before moving on to the next step, turn off your webcam in teachable machine by clicking the switch next to 'Input' to the off position. Once this is off, the camera preview will pause and turn grey. It is important you do this before the next step, as otherwise Scratch will not be able to use your webcam.

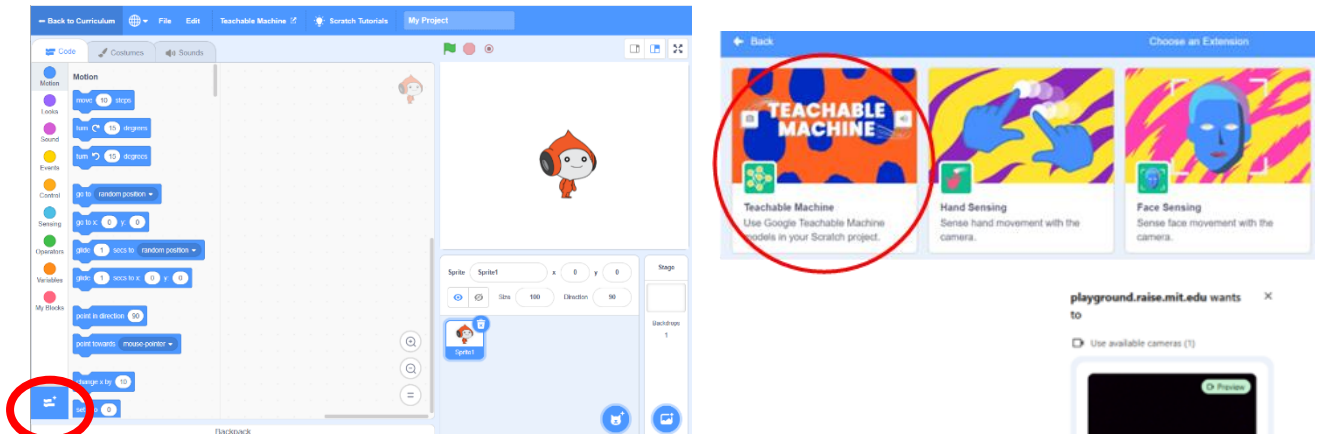


Using the AI model in Scratch

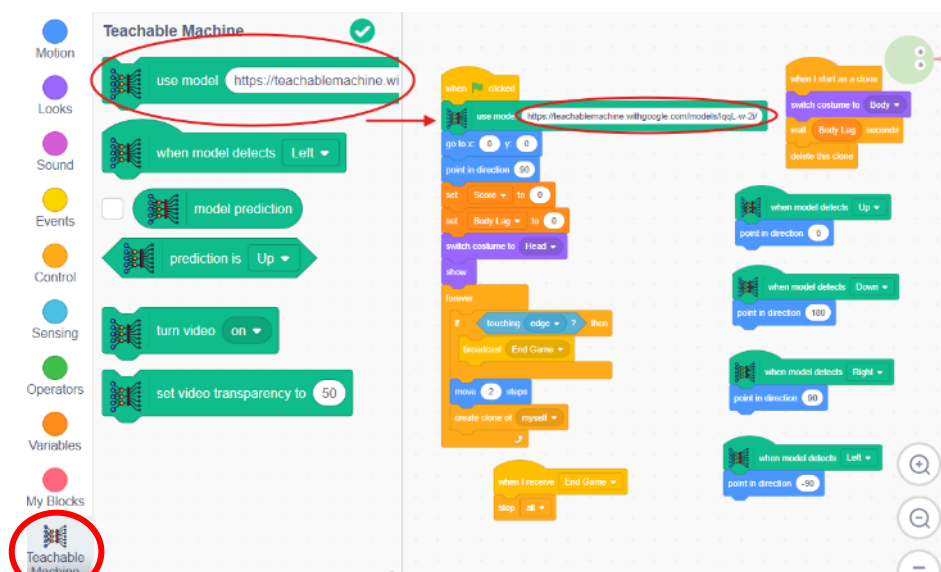
12. Visit the Dancing with AI Scratch extension playground, available here: <https://playground.raise.mit.edu/create/>.
13. Select '**File**' and click '**Load from your computer**' in the drop-down menu. In the popup, select the file you downloaded earlier to upload it into Scratch.



14. Click the blue **'Add Extension'** button in the bottom left corner. Click the **Teachable Machine** extension in the menu, to load it into Scratch.

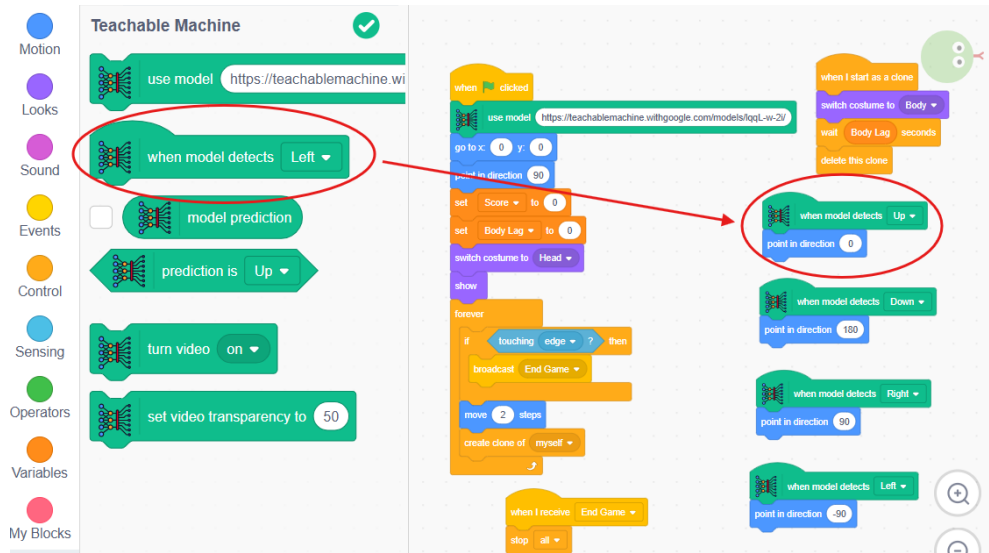


15. If a pop up appears asking for camera permission, click **'allow while visiting the site'**, or whichever alternative option appears for the browser you are using.
16. Select Teachable Machine from the menu on the left. Drag the **'use model'** block and place under the **'when (green flag) clicked'** block in the code. Paste the sharable link you copied into this box, so that when the game is started it will use the model you made in teachable machine.



IMPORTANT: You will need to click the **green flag** icon above the game on the right to allow the model to load. When it is ready, a green tick will appear in the menu.

17. To allow you to use the movements you trained your model on, to control your game, swap the current commands '**when UP arrow pressed**' (orange boxes) with the teachable machine commands '**when model detects UP**' (green boxes). Replace the left, right, up and down arrow commands to each have a green box.



18. Press the green flag icon to begin the game and use your actions to control the snake.

Troubleshooting:

- **My webcam isn't working in Scratch!** If your webcam is not working and you cannot see yourself behind the game preview, it may be that the webcam is still being used by teachable machine. Return to teachable machine and turn off your webcam, following step 11. Return to the Scratch playground (<https://playground.raise.mit.edu/create/>). You may need to refresh the page, and repeat steps 13-18.
- **My snake is not responding to my actions very well!** If the snake does not respond well to your actions, you may need to improve your teachable machine model. Check that the model gives a very high output for each of your classes (we want it as close to 100% confidence as possible) in teachable machine. To improve your model, remove any images that do not show the action correctly, and add in new images to the classes that are not performing well. Then repeat steps 10-18.