



# Pokémon statistics

In this project you will train a computer to predict the type of Pokémon based on their statistics, like their size and fighting abilities.

The image shows a Scratch project titled "pokemon-statistics". The stage features several Pokémons: Squirtle, Pikachu, Charmander, Jigglypuff, and Doduo. The script area contains the following code:

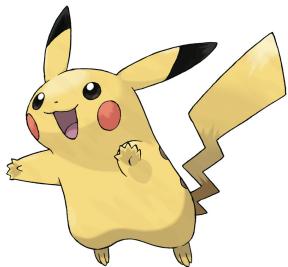
```
when green flag clicked
  [ML recognise numbers height 0 weight 9
  go to back layer
  recognise numbers height 0 weight 9
  hide variable prediction
  set prediction to ( )
  when this sprite clicked
    broadcast request-to-classify
  ]
  when I receive classify
    hide variable prediction
    set prediction to ( )
    [ML recognise numbers height height
    show variable prediction
    ]

```

The script area also includes a "when green flag clicked" loop that initializes variables and sets up a "when this sprite clicked" event for the Squirtle sprite. This event triggers a broadcast message "request-to-classify". The "when I receive classify" event handles the incoming broadcast by hiding the "prediction" variable, setting it to ( ), and then using the ML block to recognize numbers based on height and weight, finally displaying the prediction.



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This is Pikachu.

Pikachu is an **electric** Pokémon.

There are lots of different types of Pokémon.

The screenshot shows the Pokédex entry for Jigglypuff (No. 010). It includes the Pokédex data, training information, and breeding details. A blue arrow points from the text "Jigglypuff is a fairy Pokémon." to the "Type" section of the Pokédex data, which lists "Normal/Fairy".

Jigglypuff is a **fairy** Pokémon.

Check the types of other Pokémon in the Pokémon database at <https://pokemondb.net>

The types of Pokémon are:

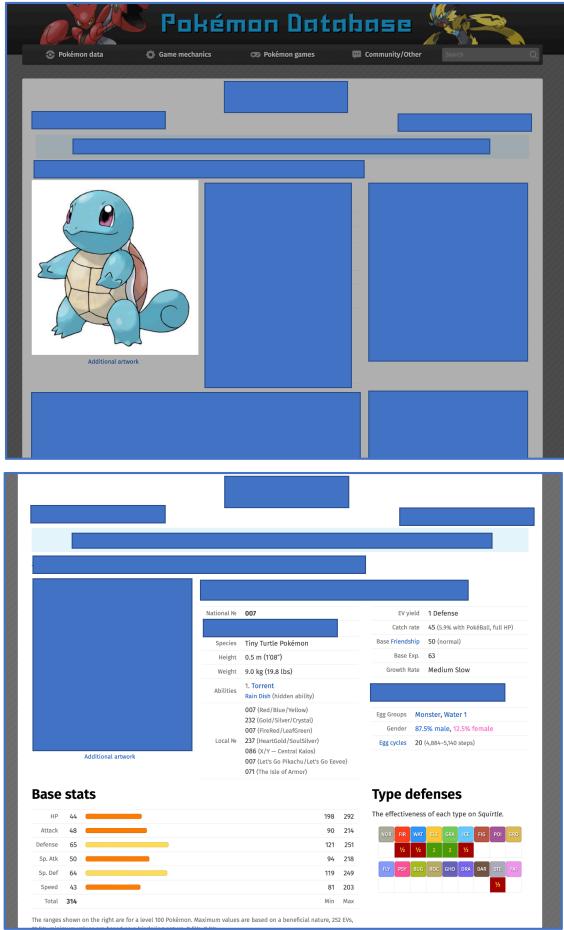
- Normal
- Grass
- Ground
- Rock
- Fire
- Ice
- Flying
- Ghost
- Steel
- Water
- Fighting
- Psychic
- Dragon
- Fairy
- Electric
- Poison
- Bug
- Dark

The screenshot shows the Pokédex entry for Squirtle (No. 007). It includes the Pokédex data, training information, and breeding details. A blue arrow points from the text "What type of Pokémon is Squirtle?" to the "Type" section of the Pokédex data, which lists "Water".

What type of Pokémon is Squirtle?

Try to guess.

What information do you think you could use to guess the type?



Would you use the way that it **looks**?

Do you think the colours and the shapes would give you a good clue for what the type is?

Would you use the **statistics** that describe the Pokémon's size, abilities, and fighting style?

Do you think those numbers would give you a good clue for what the type is?

Neither is perfect.

There aren't rules. But we can learn what they have in common and use this to make a guess.

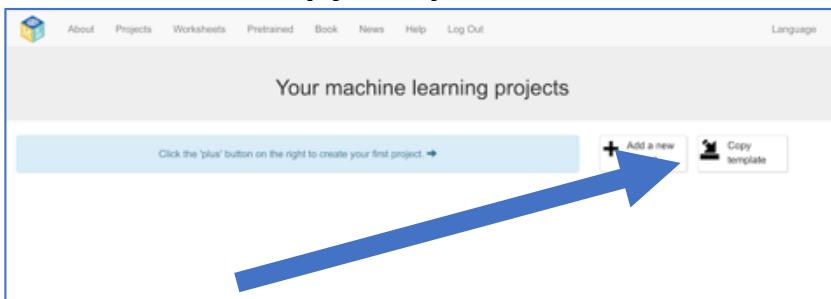
Computers can do this. Computers can work without relying on rules, by learning what things have in common and using this to make predictions.

We call this type of computing **Machine Learning**.

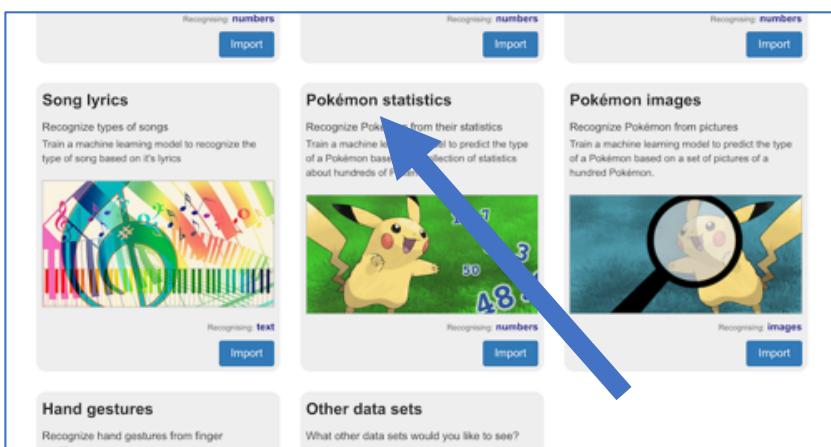
In this project, you will train a computer to be able to predict the type of a Pokémon based on their statistics, by training it with the statistics for a few hundred example Pokémon.

To make things a little quicker, we won't train the computer to recognise every type of Pokémon, we'll just focus on six of the types as an example.

1. Go to <https://machinelearningforkids.co.uk/> in a web browser
2. Click on “Get started”
3. Click on “Try it now”
4. Click on “Copy template”

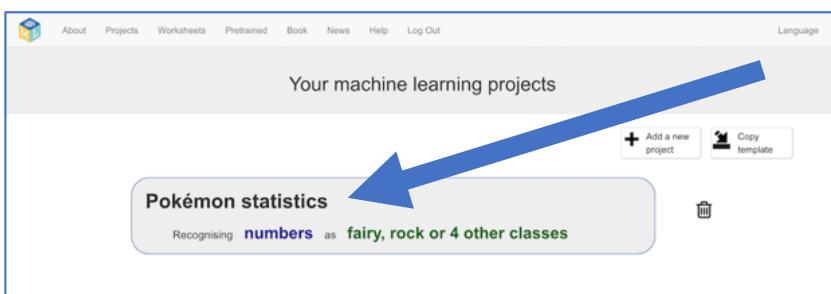


5. Click on “Pokémon statistics”

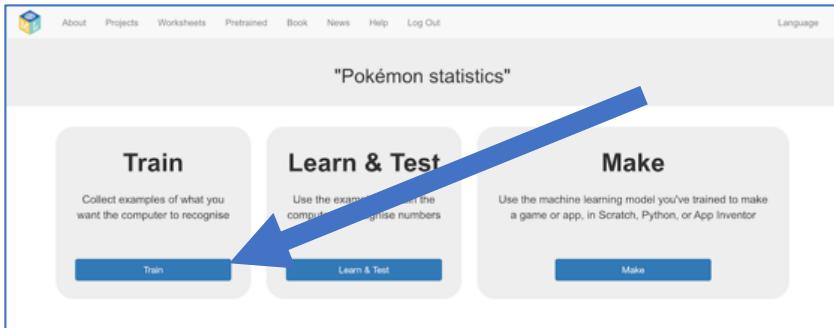


6. Click on “IMPORT”

7. Click on “Pokemon statistics”



## 8. Click on “Train”



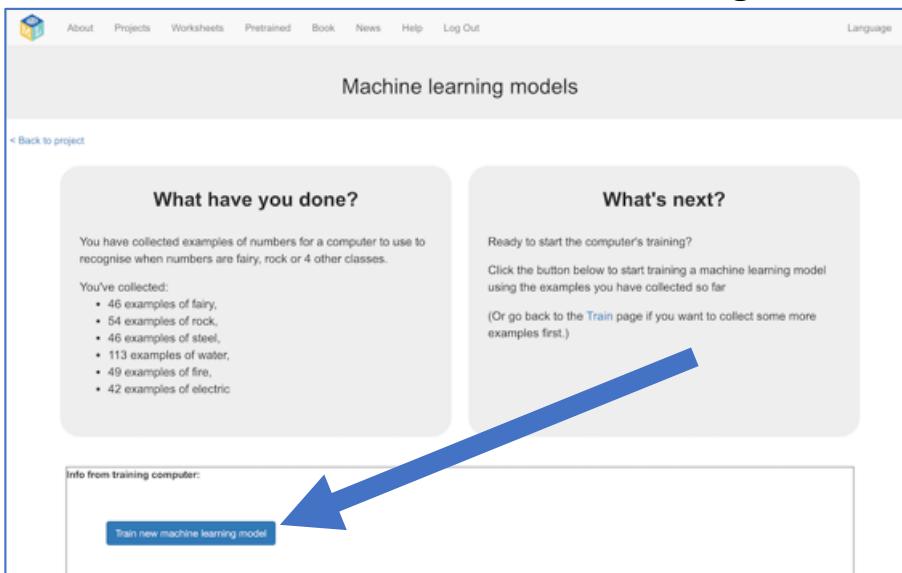
## 9. Look through the training statistics

*These are the statistics for a few hundred Pokémon that you will use to train the computer with.*

## 10. Click on “Back to project”

## 11. Click on “Learn & Test”

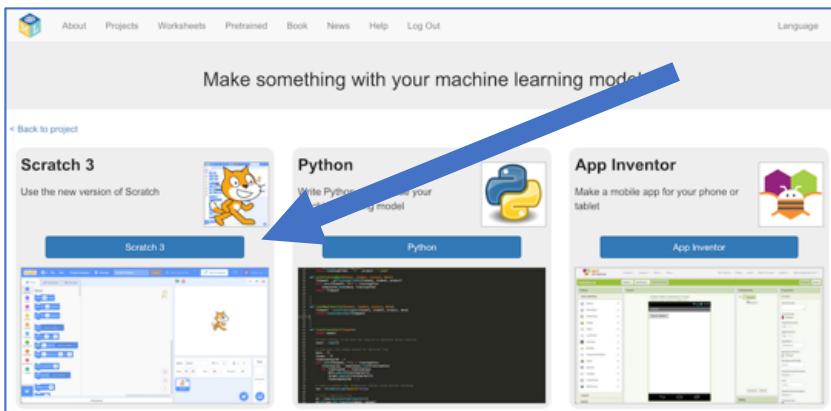
## 12. Click on “Train new machine learning model”



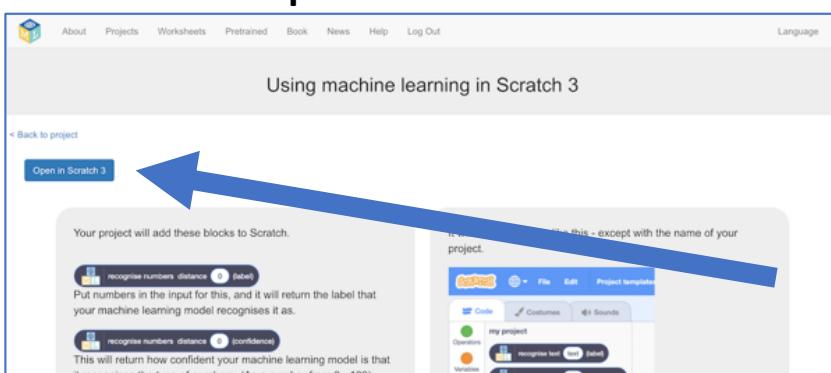
## 13. Click on “Back to project”

## 14. Click on “Make”

## 15. Click on “Scratch 3”



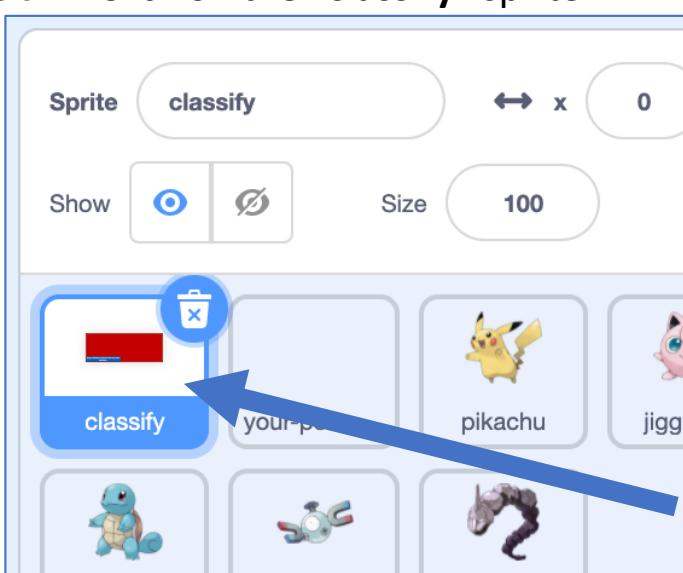
## 16. Click on “Open in Scratch 3”



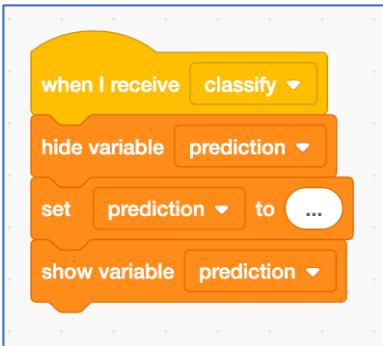
## 17. Click on “Project templates”

## 18. Click on “Pokémon statistics”

## 19. Click on the “classify” sprite



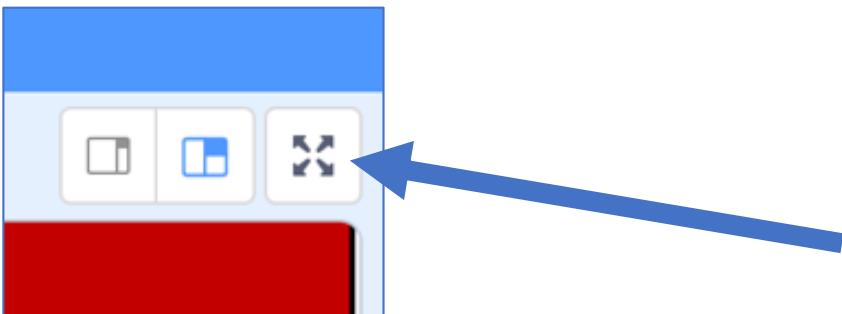
**20.** Find the “when I receive classify” code



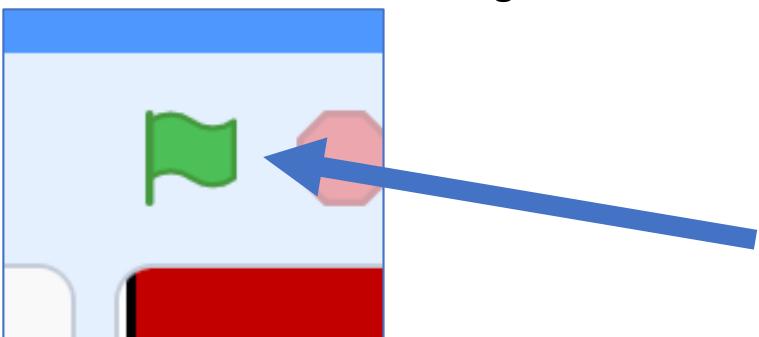
**21.** Update the code to use your machine learning model



**22.** Click on the “full-screen” button



**23.** Click on the “Green Flag”



## What have you done so far?

You've used the statistics of a random sample of a few hundred Pokémons to train a computer to be able to predict the type of a Pokémon from the numbers describing their size and abilities. You've set up a Scratch project that can use your machine learning model.

Next, you'll test your model to see how good it is at guessing the type of new Pokémons.

Statistics for **six** Pokémons have been prepared for you in the Scratch project. All six of these are Pokémons that were **not** included in the training data you used to train your machine learning model.

### Why do you think this is important?

Drag one of them onto the red box, then click on the blue button.

The statistics for your chosen Pokémon will be displayed, along with the prediction made by your machine learning model.

(The picture of the Pokémon is not used by the machine learning model - it's just included in the project to make it look better!)

Pokémons used in this activity came from  
<https://www.kaggle.com/vishalsubbiah/pokemon-images-and-types>

Pokémons data used in this activity came from  
<https://www.kaggle.com/abcsds/pokemon>

Other screenshots used in this activity came from  
<https://pokemondb.net>

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## 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?

### **Design your own Pokémon!**

Try inventing your own Pokémon. A sprite called “your-pokemon” is included in the Scratch project ready for you to fill in.

You can draw a Pokémon in Scratch using the drawing tools for a new sprite.

Or you can draw it with pen and paper, and then use the camera tool to create a new costume in Scratch from a webcam photo of your drawing.

Then you can fill in the statistics for your Pokémon.

What type does your machine learning model think it is?