

Categorization of animals based on their characteristics

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Objective

- We want to create a model that predicts the type of animal for example fish, bird, amphibian, etc., based on some genetic characteristics.

Dataset

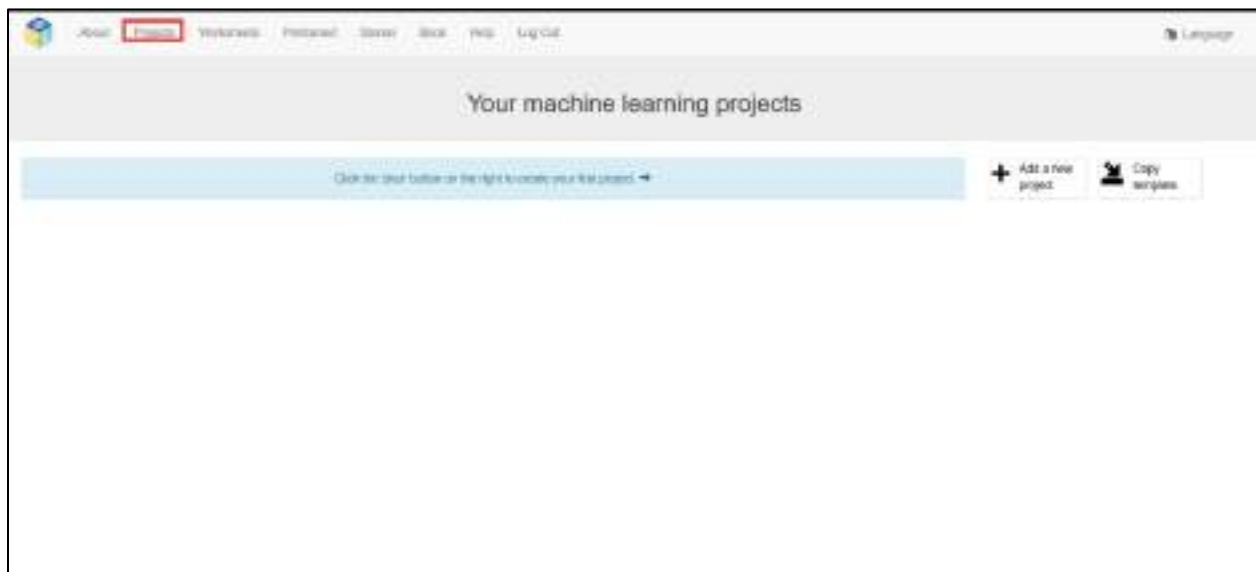
- We will use a synthetic dataset, the data is not real, it was created using ChatGPT
- Below you can find a table that contains the characteristics we use to classify an animal and their possible values

Column	Description	Values
milk	Produces milk	1 / 0 (1 = yes, 0 = no)
feathers	It has wings	1 / 0 (1 = yes, 0 = no)
scales	It has scales	1 / 0 (1 = yes, 0 = no)
legs	Number of feet	Numerical
fly	Can fly	1 / 0 (1 = yes, 0 = no)
swim	Can swim	1 / 0 (1 = yes, 0 = no)
eggs	Lays eggs	1 / 0 (1 = yes, 0 = no)
cold	Cold-blooded	1 / 0 (1 = yes, 0 = no)
tail	It has a tail	1 / 0 (1 = yes, 0 = no)
body_size	Body length in centimeters	Numerical

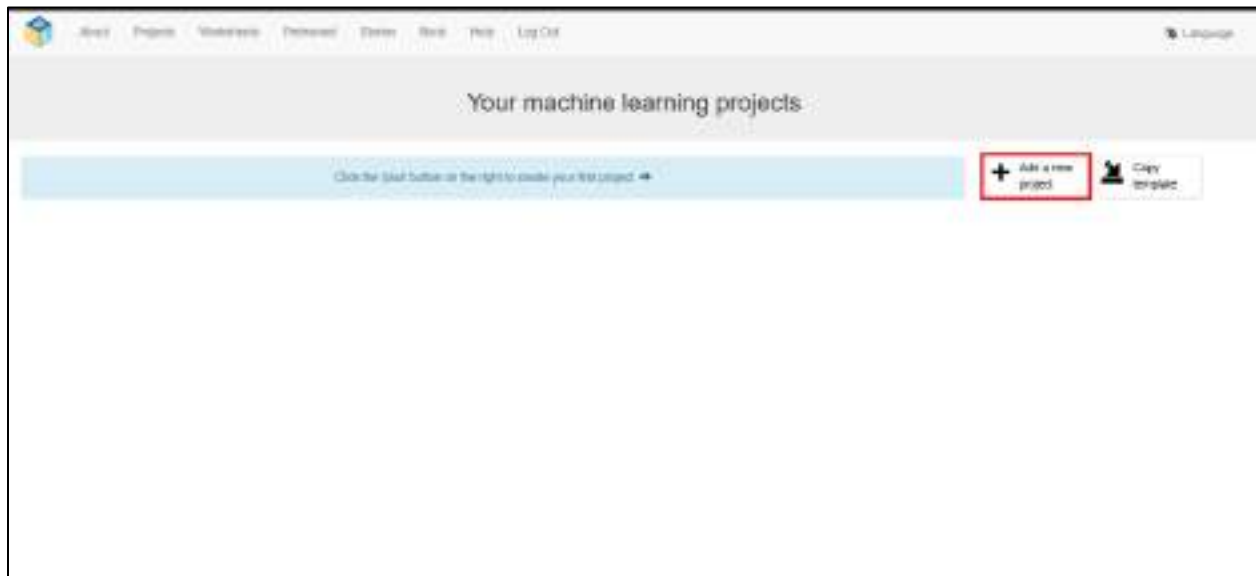
- The possible categories of an animal will be:
 1. **amphibian** = amphibian
 2. **bird** = bird
 3. **Insect** = insect
 4. **fish** = fish
 5. **invertebrate** = Invertebrate
 6. **mammal** = mammal
 7. **serpent** = reptile
- You can find and download the dataset here: [Training Dataset](#)

Create, train, learn, and test

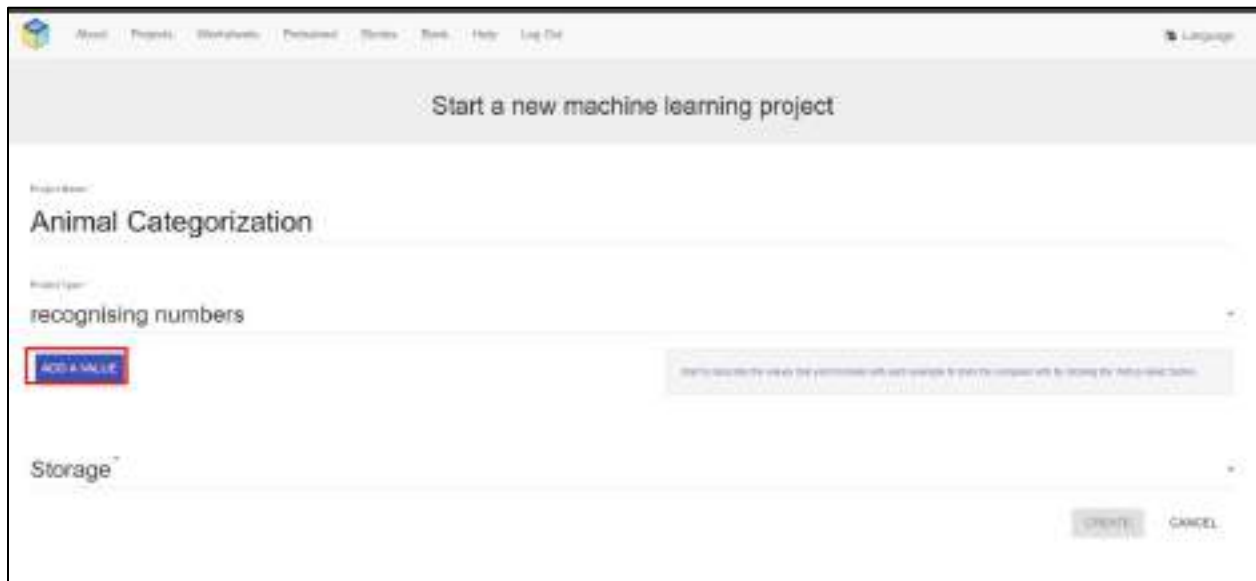
- Follow the link here: <https://machinelearningforkids.co.uk/#!/login>
- Log in and click on the "Projects" tab



- Click **"Add a new project"**



- Add a **"Project Name"**
- As **"Project Type"** select **"recognising numbers"**
- Click **"ADD A VALUE"**



- For each of the above columns (in the table) create a value
- Select number as the "**Type of value**" for all values, as the possible values of each column/value are 1 or 0
- Click "**ADD ANOTHER VALUE**" to add the next value

Project Name: **Animal Categorization**

Project Type: **recognising numbers**

Value 1	Type of value
milk	number

ADD ANOTHER VALUE

Storage

CONTINUE **CANCEL**

- At the end your screen should be as below:

recognising numbers

Value 1	Type of value
milk	number
legs	number
eggs	number
body_size	number
feathers	number
fly	number
cold	number
scales	number
tail	number
body_size	number

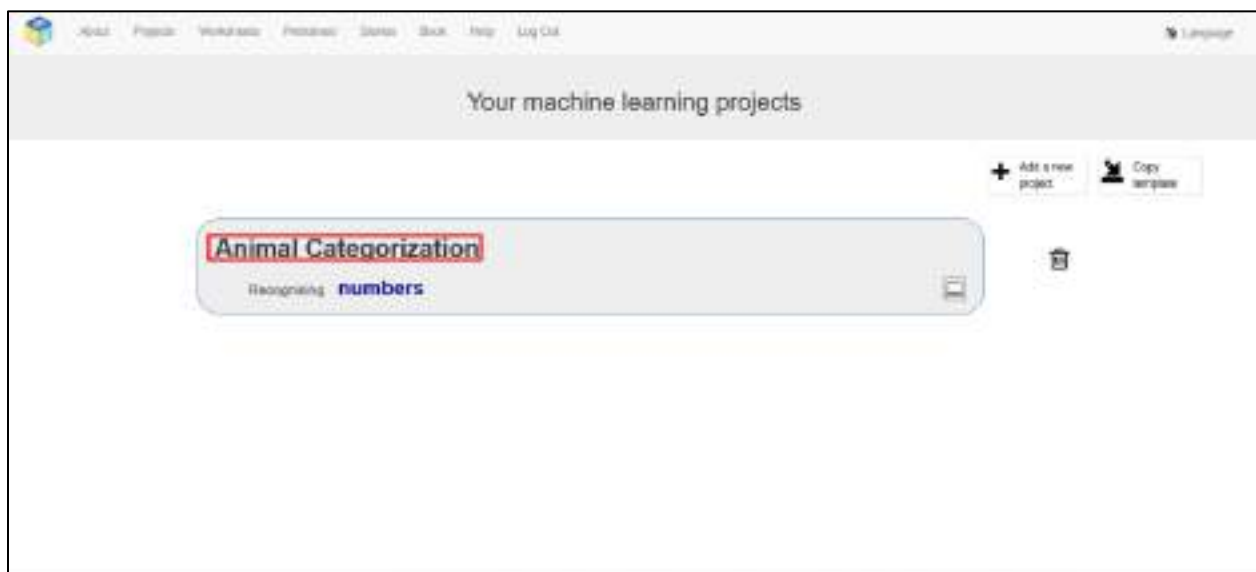
ADD ANOTHER VALUE

You can not add more than 10 values in a project

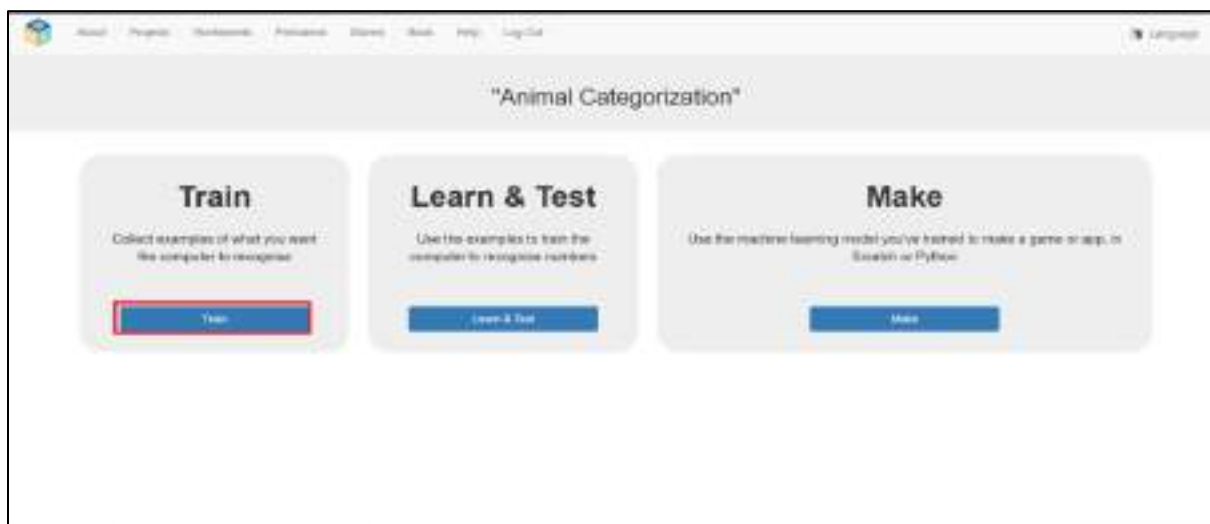
- In the "Storage" tab, select "In your browser" and click "CREATE"



- Click on the title of the project



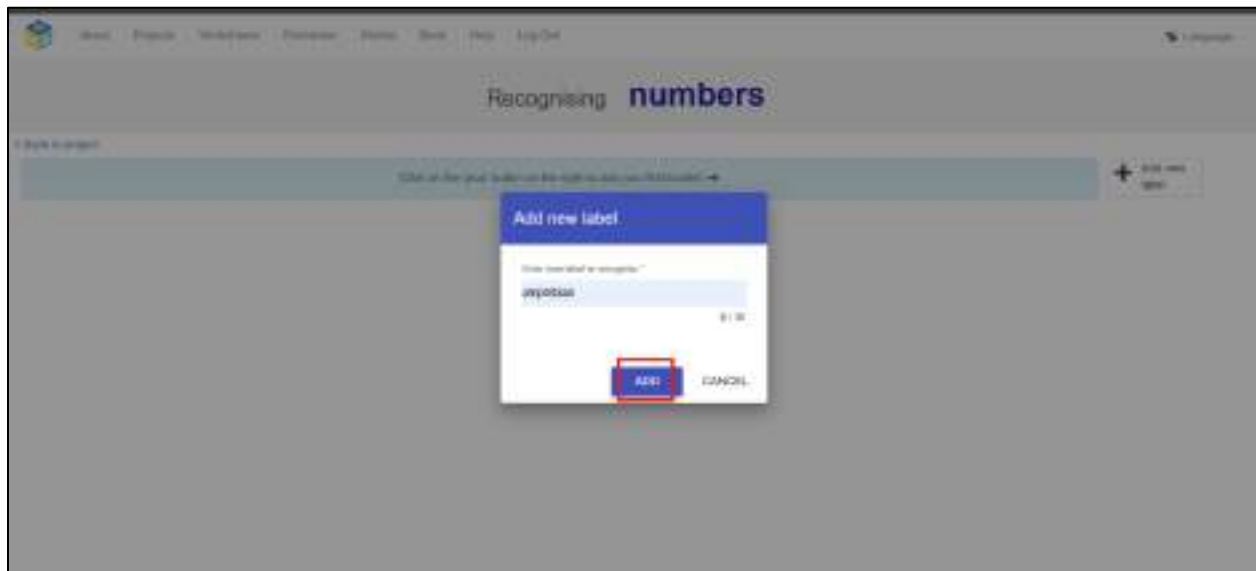
- Click "Train"



- Create a tag for each of the 7 categories above
- Click on "**Add new label**"



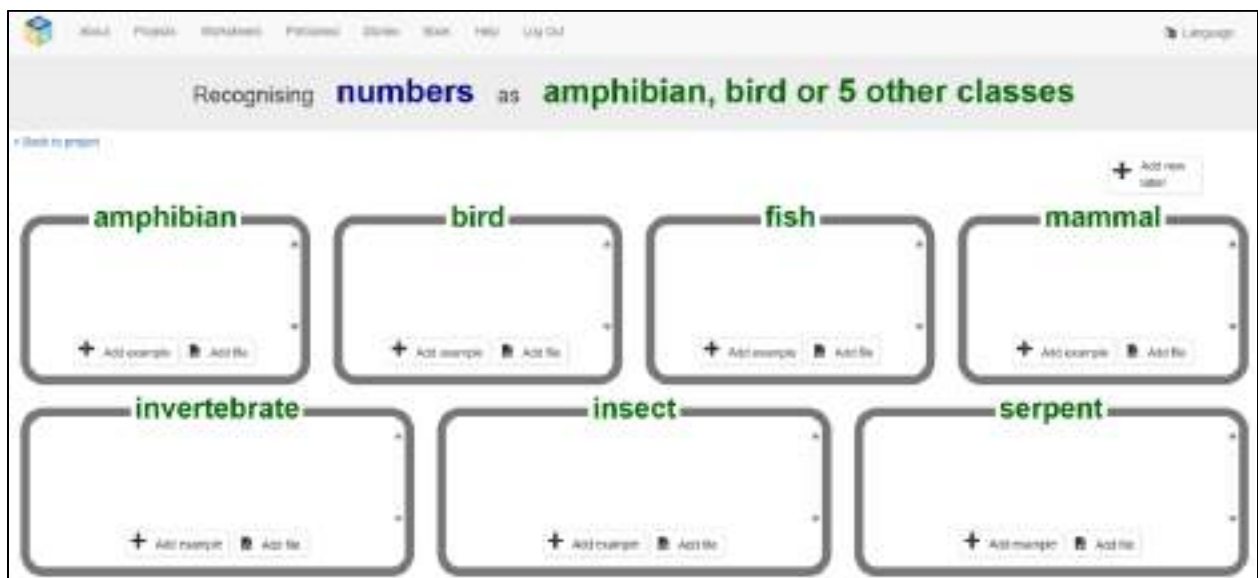
- Type the name of the first class "**amphibian**"
- Click on "**ADD**"



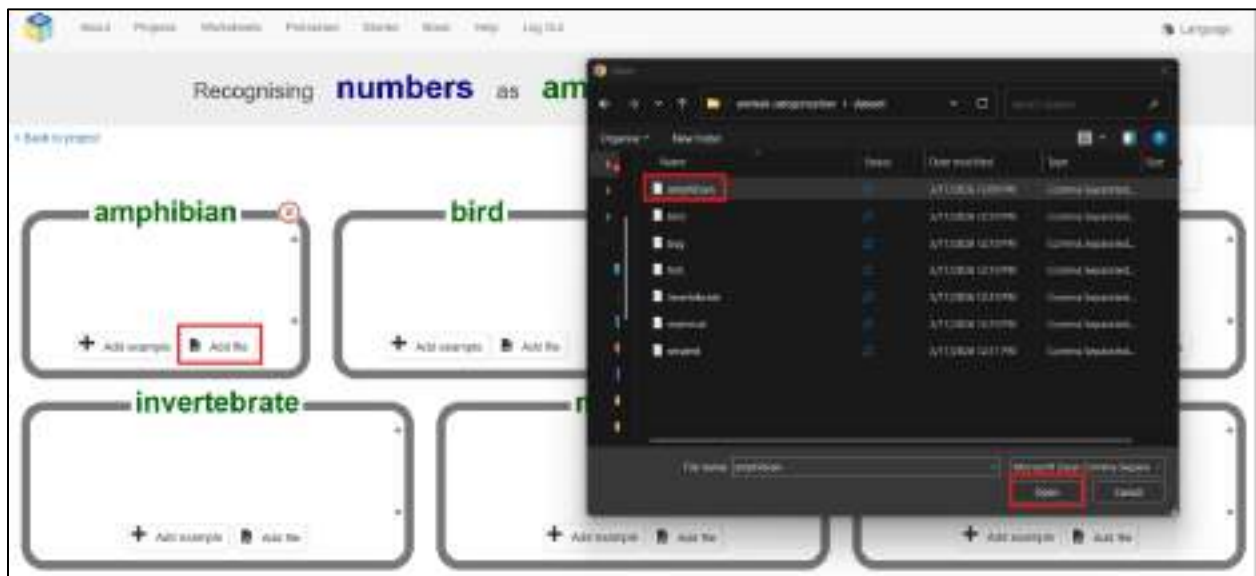
- Click "**Add new label**" again



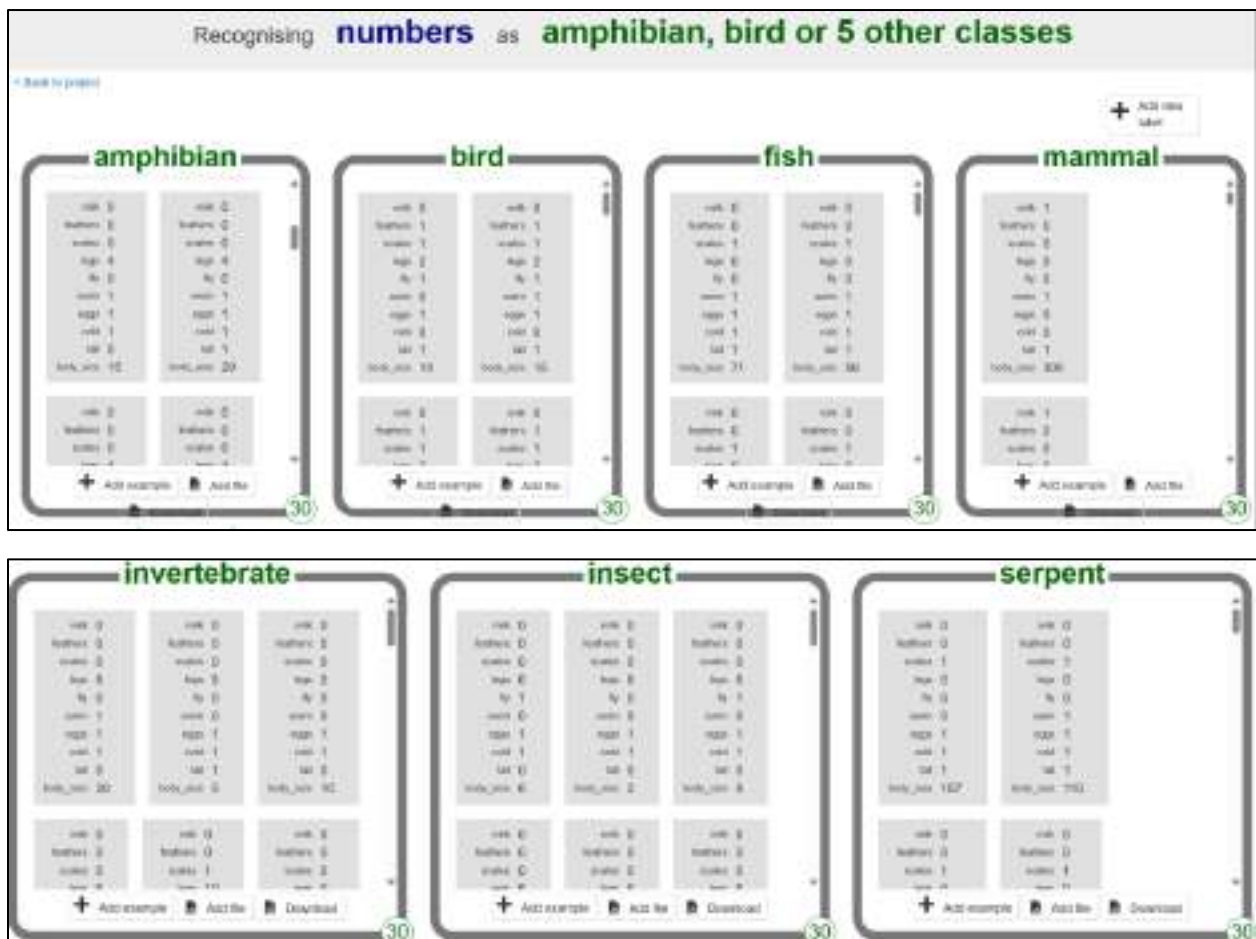
- In the end, your screen should look like the following:



- Now for each of the categories click on "Add file" select the appropriate file and click on "Open"



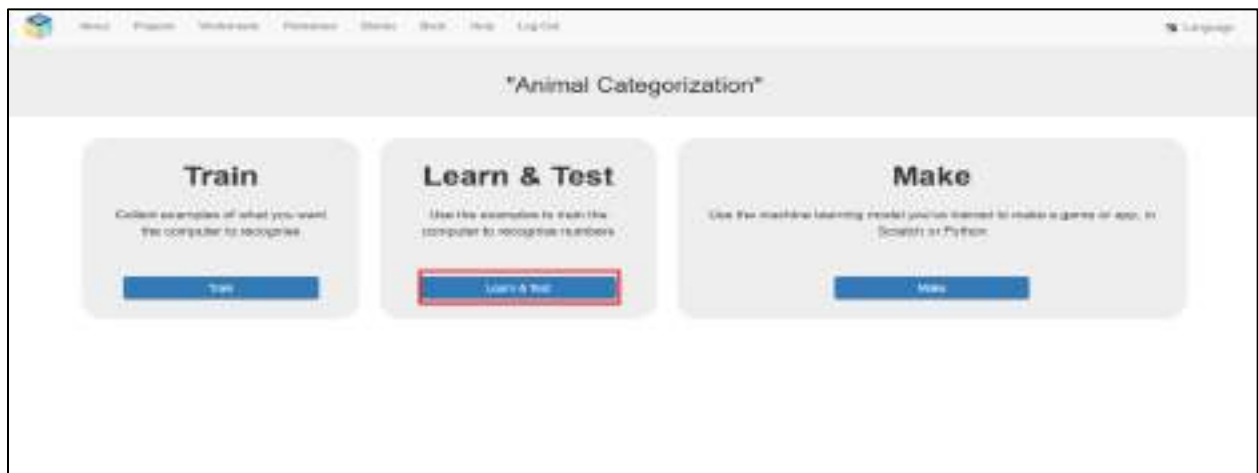
- Do the same for all categories, in the end your screen should look like the following:



- Click on "Back to project"



- Click on "Learn & Test"



- Go down a little and click on "**Train new machine learning model**"

You have collected examples of numbers for a computer to use to recognise when numbers are amphibians, birds or 5 other classes.

You've collected:

- 30 examples of amphibians,
- 30 examples of birds,
- 30 examples of bugs,
- 30 examples of fish,
- 30 examples of invertebrates,
- 30 examples of mammals,
- 30 examples of reptiles.

Ready to start the computer's training?

Click the button below to start training a machine learning model using the examples you have collected so far.

(Or go back to the Train page if you want to collect some more examples first.)

Let's start training computer:

Train new machine learning model

- After a few seconds your screen will look like the following:

- 30 examples of fish,
- 30 examples of mammals,
- 30 examples of invertebrates,
- 30 examples of birds,
- 30 examples of reptiles.

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 difference the extra examples will make!

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

snake	
butterfly	
train	
frog	
fly	
swim	
kangaroo	
cat	
car	
empty_place	

Describe your model!

- Click on "**Describe your model!!**"

- You can see the decision tree and also you can test your model

Understand your machine learning model

[Back to model](#)

The technique used to create your machine learning model is called a **Decision Tree Classifier**.

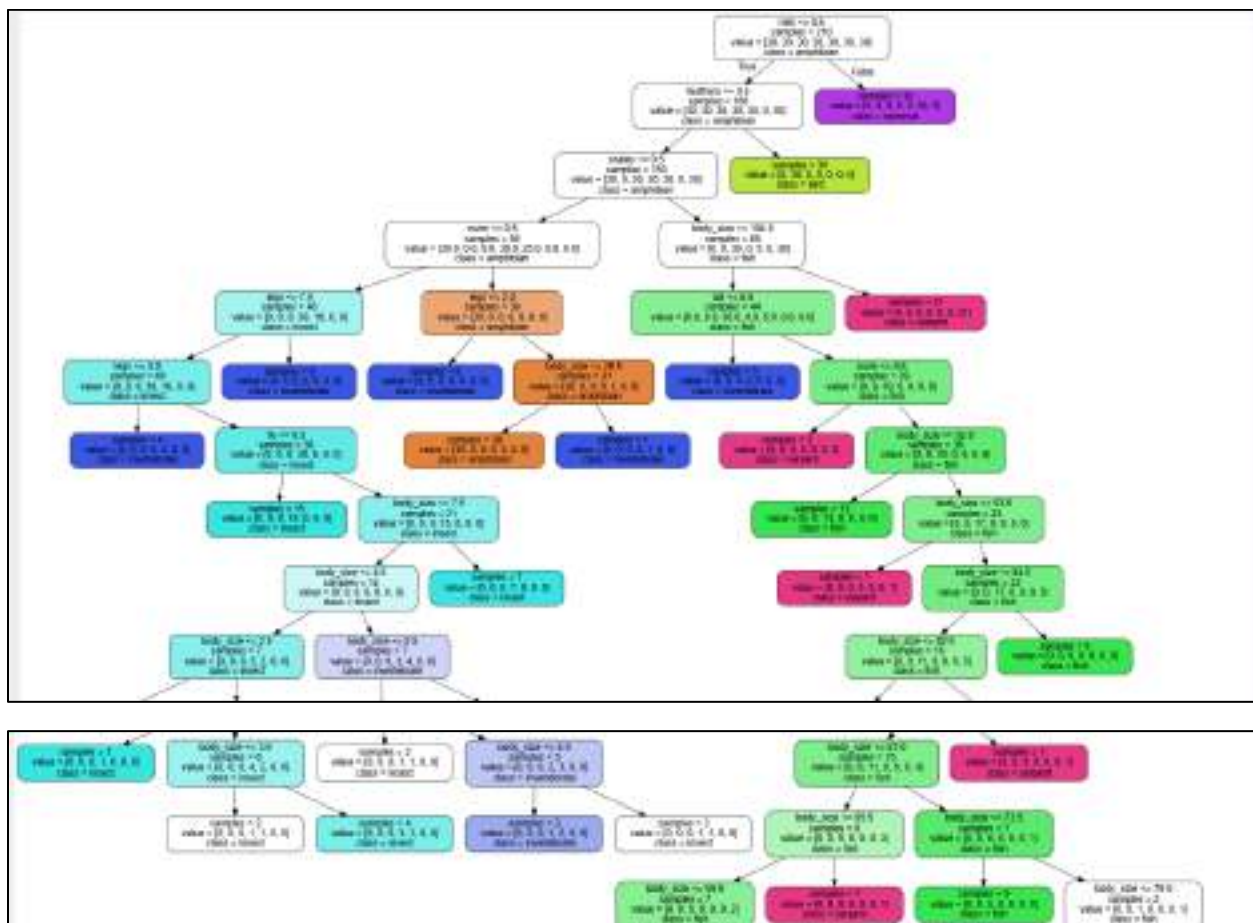
This is not the only way to train a machine learning model, but we're using it because it's very quick and easy to train, and it is one of the easiest techniques to understand. This page shows you the decision tree that was created based on the training examples that you have collected.

When you test your model, the computer starts at the top of the tree, and follows a path until it reaches the bottom. The label at the bottom of the tree is the prediction that the machine learning model makes.

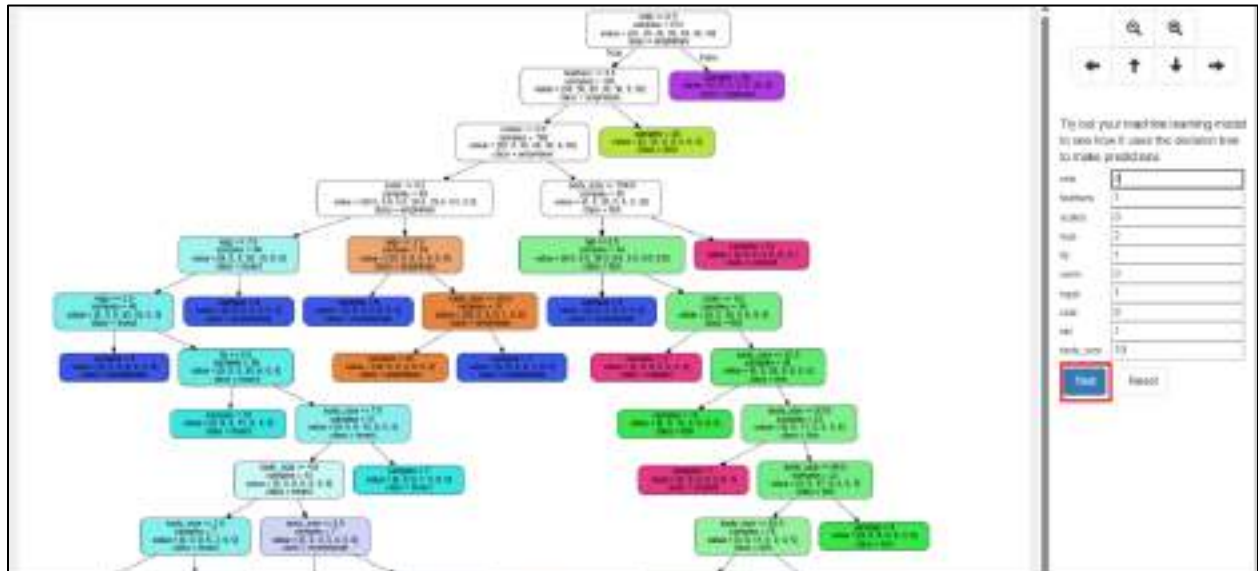
At each test in the tree, it reads the test described at the top of the box. If your test values pass the test described in the box, it follows the arrow to the left. If it doesn't pass the test, it follows the arrow to the right.

The **samples** shown in each box tells you how many examples in your training data matches that part of the decision tree.

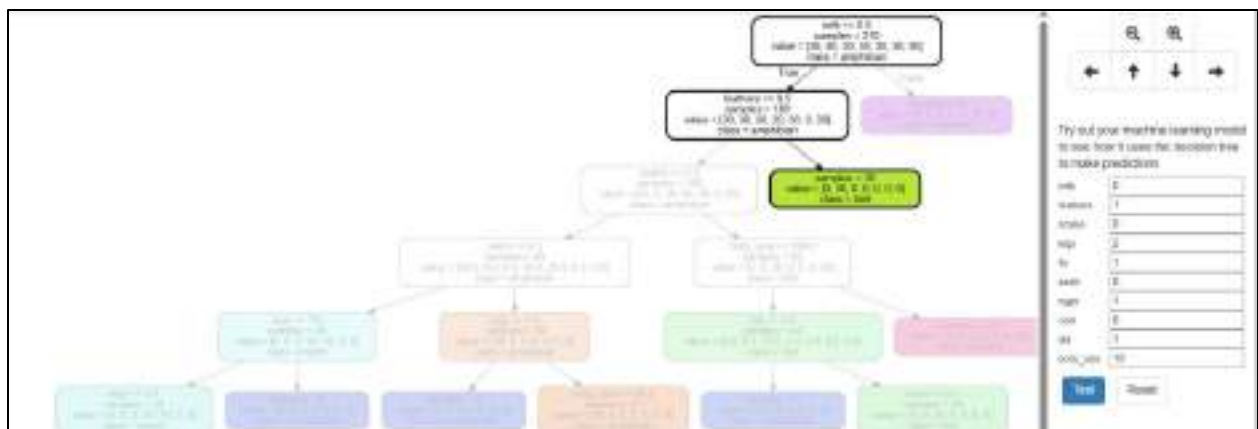
The **value** shown in each box tells you how many examples in your training data passed the test shown at the top (following the left arrow) and how many examples didn't pass the test at the top (following the right arrow).



- Download the test file from here: [Test Dataset](#)
- Add the values of the first row to the fields on the right side of the screen, there is no field for the label, because this will be the prediction of the model
- Click on "Test"



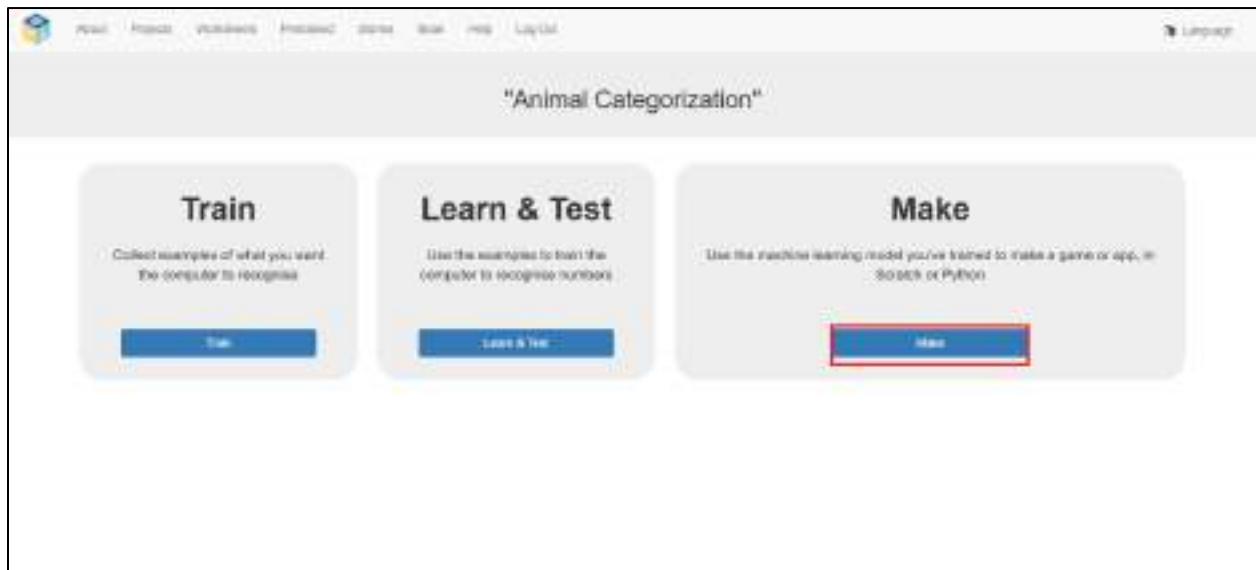
- We can see that our model predicts "bird" which is true since the label of the test data is also "bird"



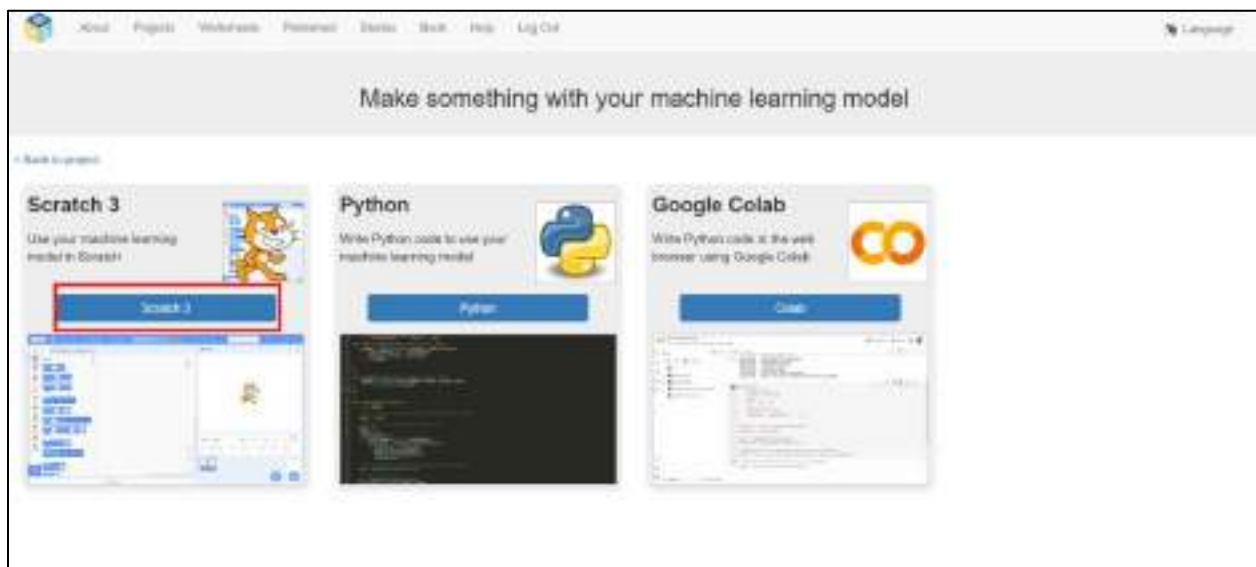
- Click "Back to model" (top left)
- Click on "Back to project" (top left)

Implementation

- Click **"Make"**



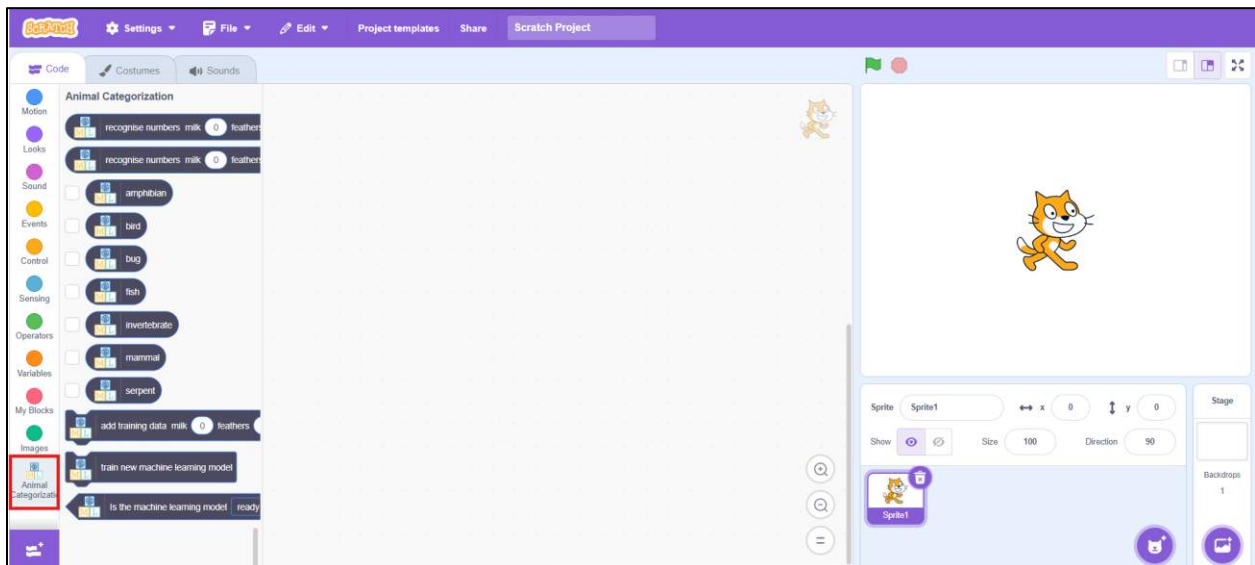
- Click on **"Scratch 3"**



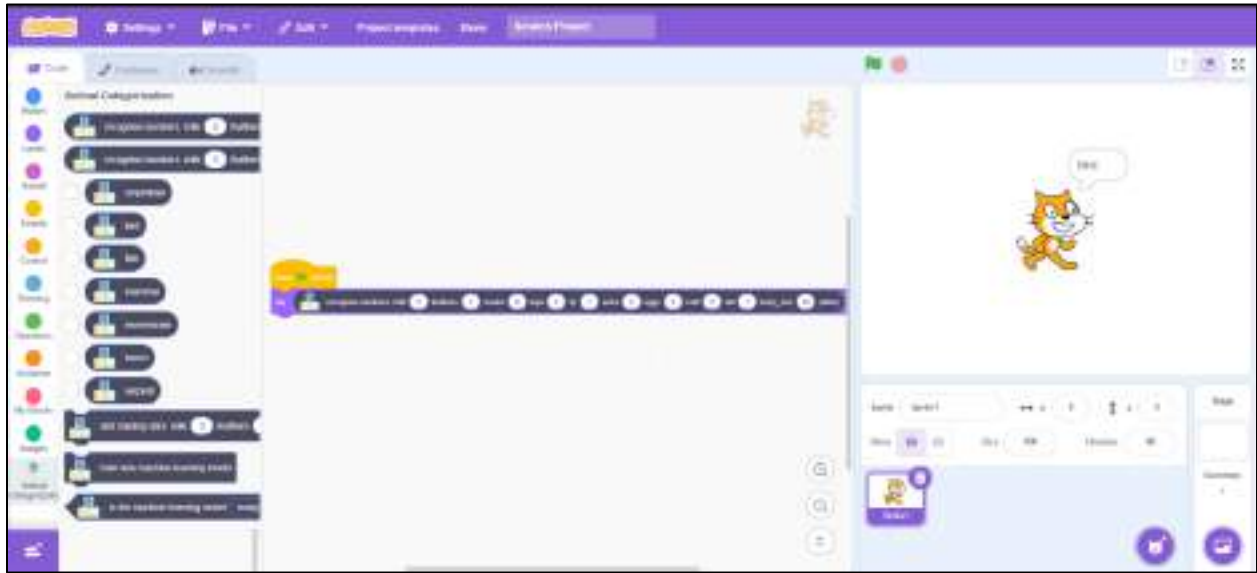
- Click on "**Open in Scratch 3**"



- We will test our model using commands in scratch, in the end the cat will tell the prediction of the model
- All commands related to our model can be found in the "**Animal Categorization**" tab



- Check out the code block colors below and create in turn



- You can change the prices and do more testing!