

Machine Learning Basic Example

Create your first ML model

Consider the following sets of numbers. Can you see the relationship between them?

X:	-1	0	1	2	3	4
Y:	-2	1	4	7	10	13

As you look at them, you might notice that the value of X is increasing by 1 as you read left to right and the corresponding value of Y is increasing by 3. You probably think that Y equals 3X plus or minus something. Then, you'd probably look at the 0 on X and see that Y is 1, and you'd come up with the relationship $Y=3X+1$.

That's almost exactly how you would use code to train a model to spot the patterns in the data!

Now, look at the code to do it.

How would you train a neural network to do the equivalent task? Using data! By feeding it with a set of X's and a set of Y's, it should be able to figure out the relationship between them.

Code (Python)

```
import tensorflow as tf
import numpy as np
from tensorflow import keras

model = tf.keras.Sequential([keras.layers.Dense(units=1, input_shape=[1])])

model.compile(optimizer='sgd', loss='mean_squared_error')

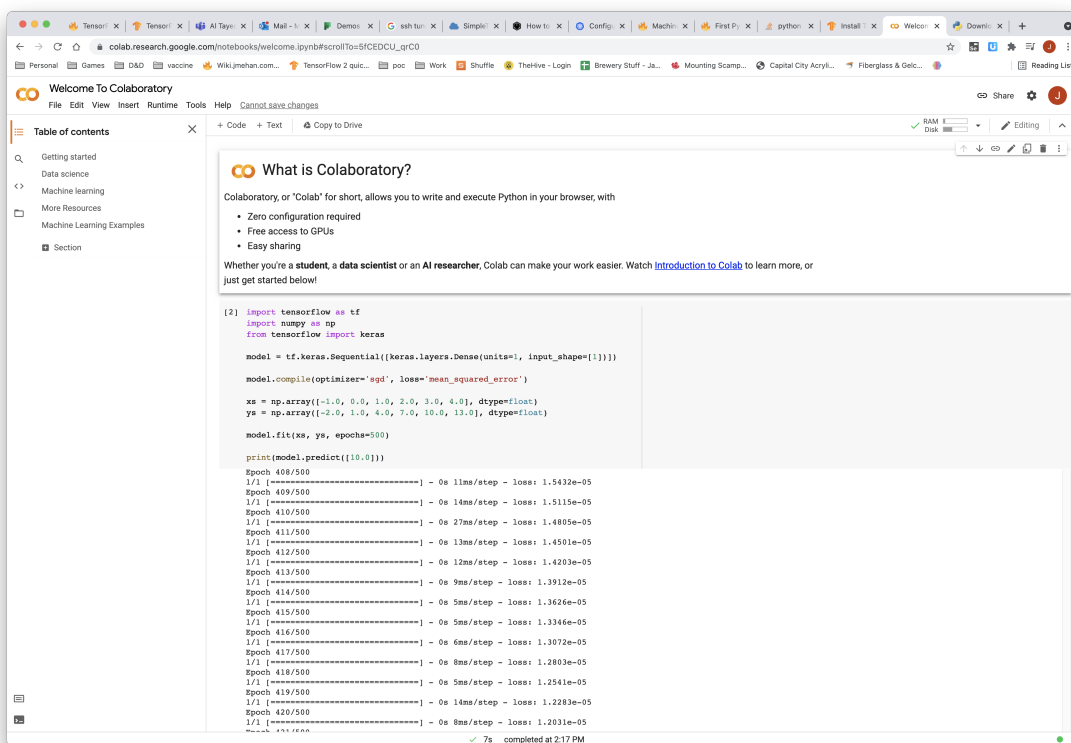
xs = np.array([-1.0, 0.0, 1.0, 2.0, 3.0, 4.0], dtype=float)
ys = np.array([-2.0, 1.0, 4.0, 7.0, 10.0, 13.0], dtype=float)

model.fit(xs, ys, epochs=500)

print(model.predict([10.0]))
```

Run it in Colaboratory

Browse to <https://colab.research.google.com/notebooks/welcome.ipynb>



Past in your code and click run.

Output

```
Epoch 1/500
1/1 [=====] - 0s 217ms/step - loss: 110.2153
....
Epoch 500/500
1/1 [=====] - 0s 4ms/step - loss: 2.2867e-06
[[30.995588]]
```

For 10, the prediction is **30.995588**

which is close to the expected $Y = 3X + 1 = 3 \cdot 10 + 1 = 31$

Run it Locally

You may need to update pip3, etc...

```
$pip3 install --user --upgrade pip
```

Install tensorflow

```
$ pip3 install --user --upgrade tensorflow
```

Run code

> python3 <file>

```
$ python3 simplePredict.py
...
Epoch 500/500
1/1 [=====] - 0s 640us/step - loss: 1.7887e-06
[[31.003902]]
```

References

Reference	URL
Intro to Machine Learning (ML Zero to Hero - Part 1)	https://www.youtube.com/watch?v=KNAWp2S3w94&t=308s
Basic Computer Vision with ML (ML Zero to Hero - Part 2)	https://www.youtube.com/watch?v=bemDFpNooA8
Hello World for Machine Learning	https://developers.google.com/codelabs/tensorflow-1-helloworld#2
Colaboratory	https://colab.research.google.com/notebooks/welcome.ipynb