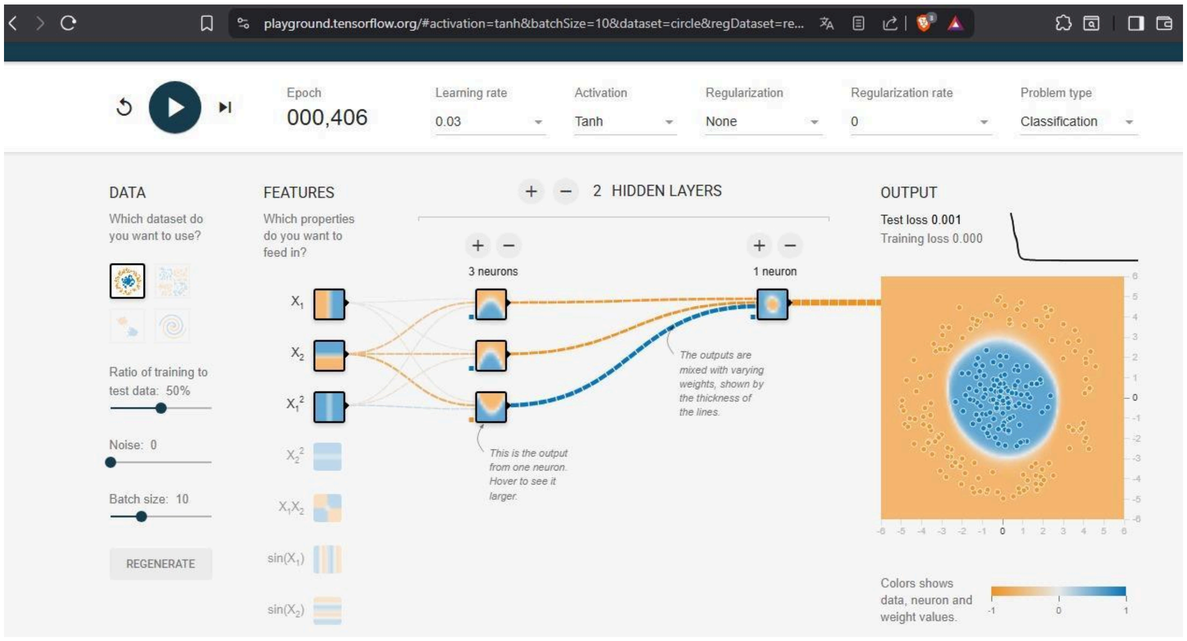
ANGELA MUÑOZ

ACTIVIDAD 1


playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=re...

Epoch 000,406 | Learning rate 0.03 | Activation Tanh | Regularization None | Regularization rate 0 | Problem type Classification

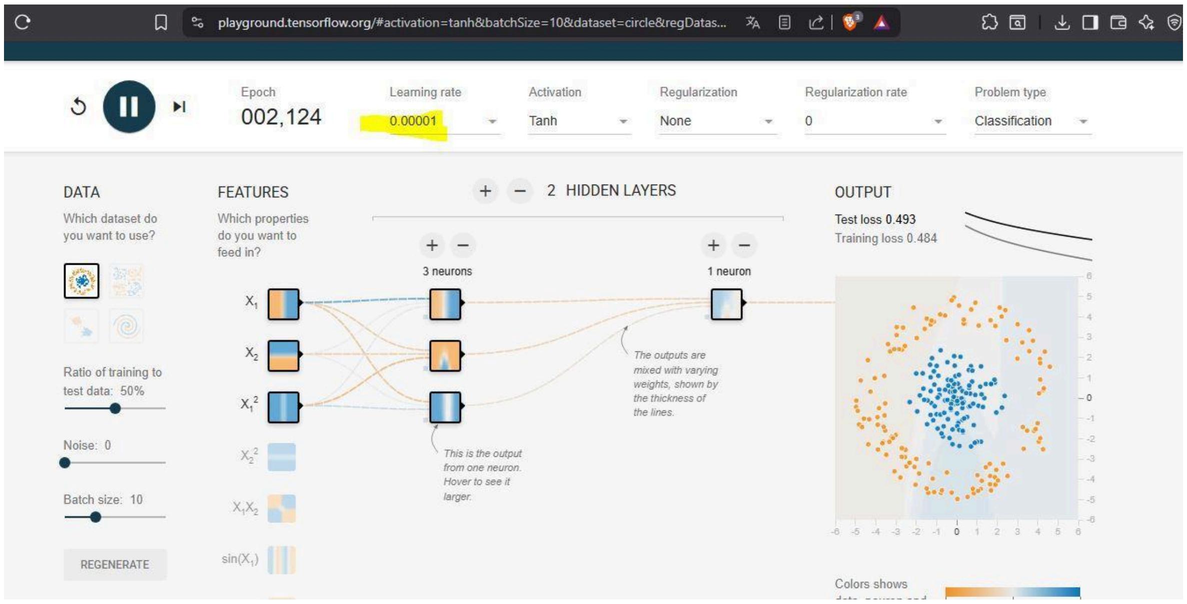
DATA — Which dataset do you want to use? Ratio of training to test data: 50% · Noise: 0 · Batch size: 10 · REGENERATE

FEATURES — Which properties do you want to feed in? X_1, X_2, X_1^2, X_2^2, X_1X_2, $\sin(X_1)$, $\sin(X_2)$

2 HIDDEN LAYERS — 3 neurons · 1 neuron

OUTPUT — Test loss 0.001 · Training loss 0.000

This is the output from one neuron. Hover to see it larger.
The outputs are mixed with varying weights, shown by the thickness of the lines.
Colors shows data, neuron and weight values.


playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDatas...

Epoch 002,124 | Learning rate 0.00001 | Activation Tanh | Regularization None | Regularization rate 0 | Problem type Classification

DATA — Which dataset do you want to use? Ratio of training to test data: 50% · Noise: 0 · Batch size: 10 · REGENERATE

FEATURES — Which properties do you want to feed in? X_1, X_2, X_1^2, X_2^2, X_1X_2, $\sin(X_1)$

2 HIDDEN LAYERS — 3 neurons · 1 neuron

OUTPUT — Test loss 0.493 · Training loss 0.484

This is the output from one neuron. Hover to see it larger.
The outputs are mixed with varying weights, shown by the thickness of the lines.
Colors shows

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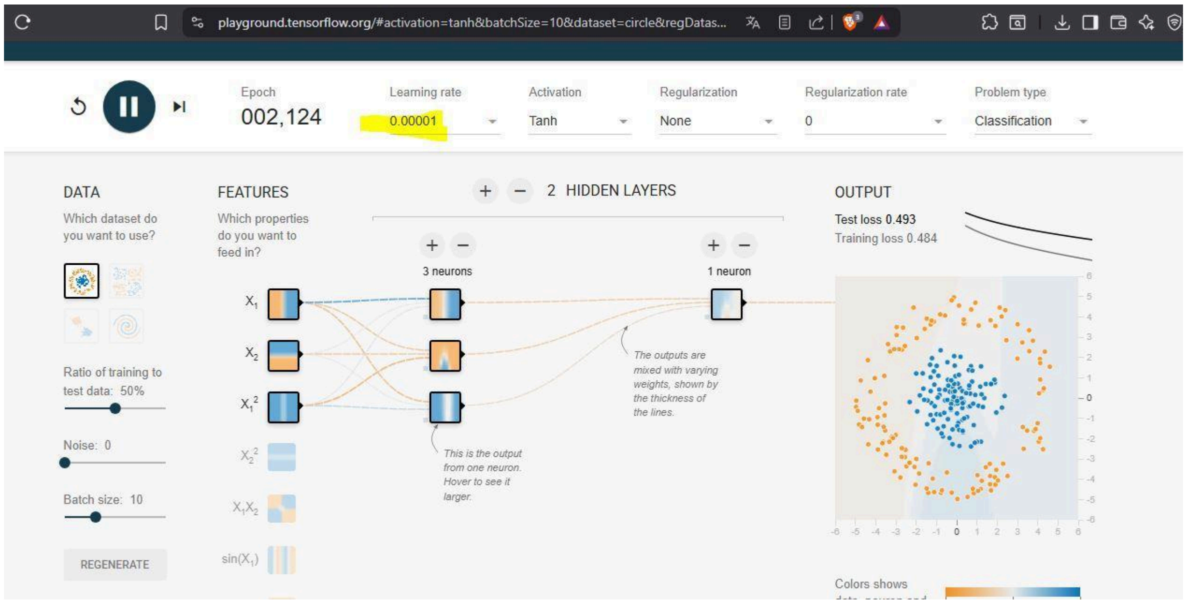

playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDatas...

Epoch 002,124 | Learning rate 0.00001 | Activation Tanh | Regularization None | Regularization rate 0 | Problem type Classification

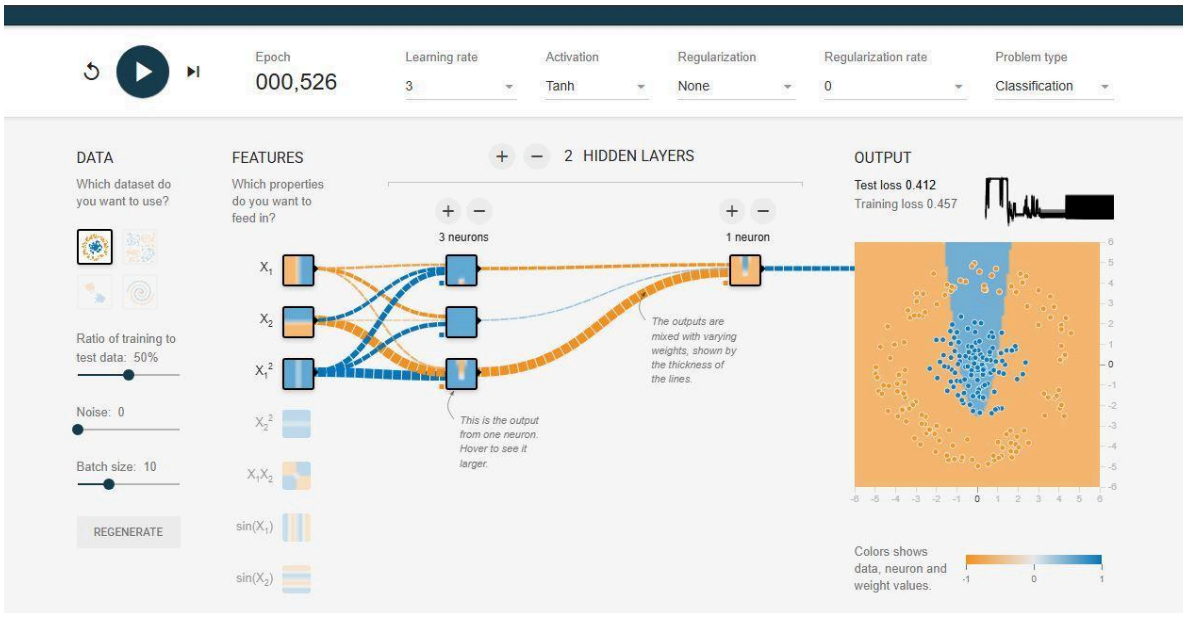
DATA
Which dataset do you want to use?
Ratio of training to test data: 50%
Noise: 0
Batch size: 10

FEATURES
Which properties do you want to feed in?

2 HIDDEN LAYERS
3 neurons
1 neuron

OUTPUT
Test loss 0.493
Training loss 0.484

REGENERATE
X₁
X₂
X₁²
X₂²
X₁X₂
sin(X₁)
The outputs are mixed with varying weights, shown by the thickness of the lines.
This is the output from one neuron. Hover to see it larger.
Colors shows


Epoch 000,526 | Learning rate 3 | Activation Tanh | Regularization None | Regularization rate 0 | Problem type Classification

DATA
Which dataset do you want to use?
Ratio of training to test data: 50%
Noise: 0
Batch size: 10

FEATURES
Which properties do you want to feed in?

2 HIDDEN LAYERS
3 neurons
1 neuron

OUTPUT
Test loss 0.412
Training loss 0.457

REGENERATE
X₁
X₂
X₁²
X₂²
X₁X₂
sin(X₁)
sin(X₂)
The outputs are mixed with varying weights, shown by the thickness of the lines.
This is the output from one neuron. Hover to see it larger.
Colors shows data, neuron and weight values.
-1
0
1

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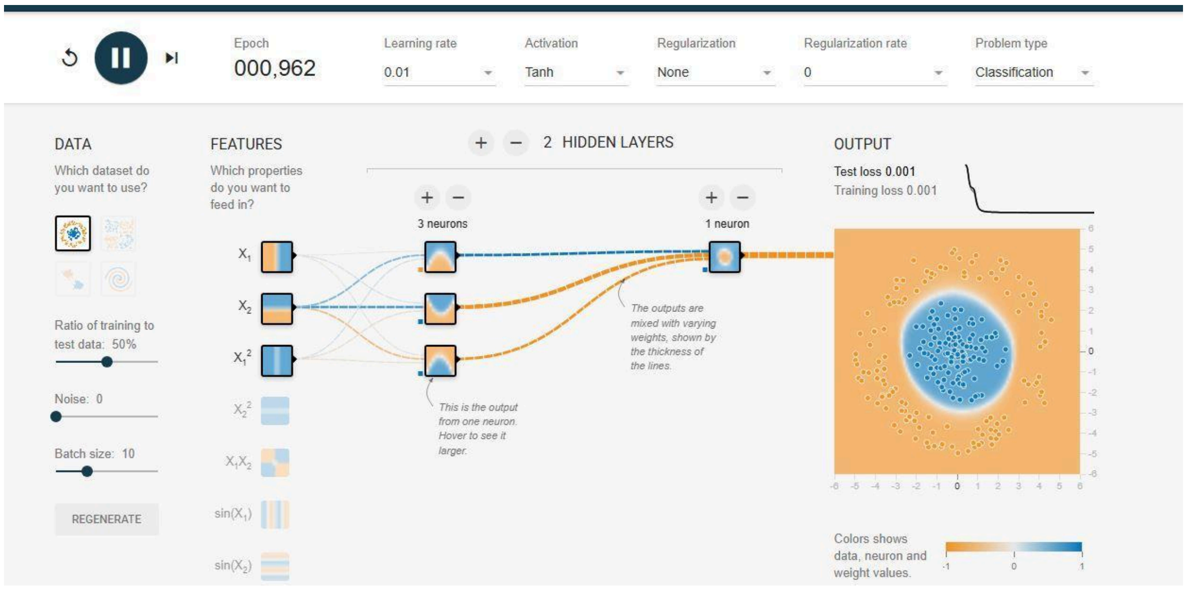

Epoch 000,962

Learning rate 0.01

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

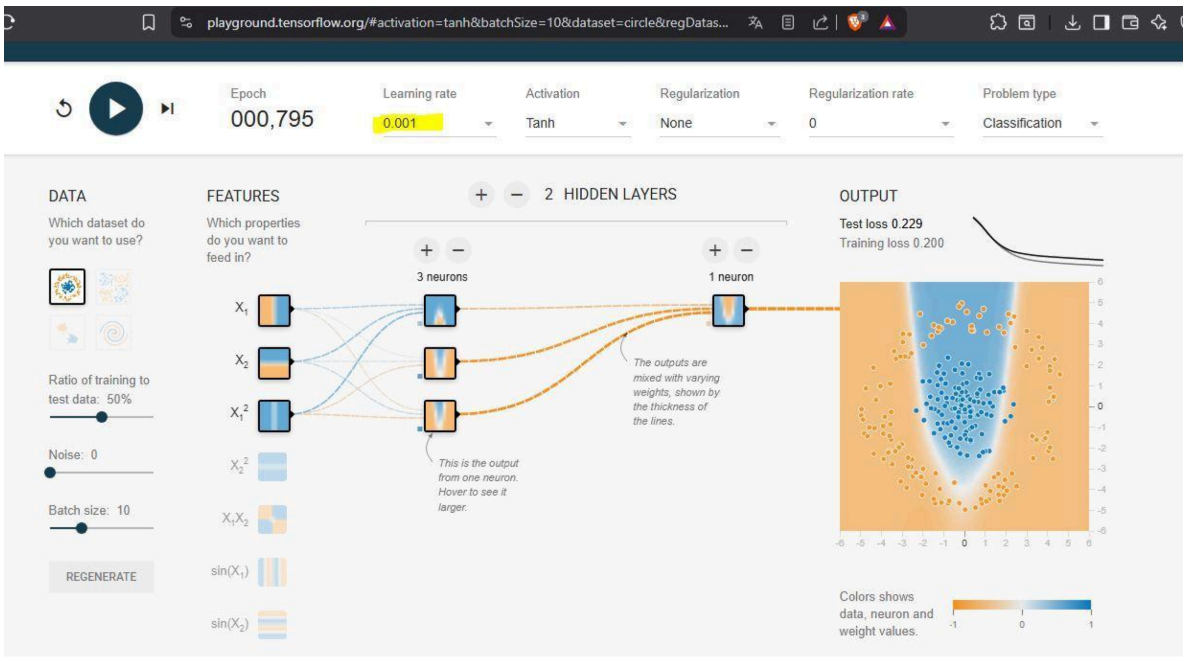
The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.001

Training loss 0.001

Colors shows data, neuron and weight values.


playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDatas...

Epoch 000,795

Learning rate 0.001

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.229

Training loss 0.200

Colors shows data, neuron and weight values.

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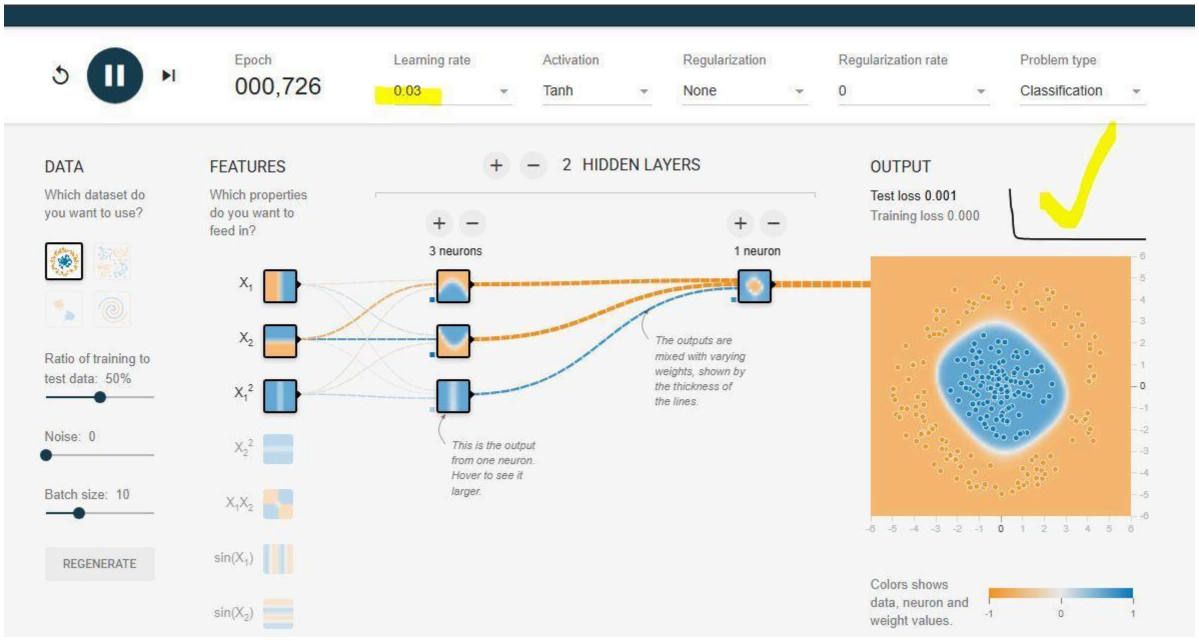


Epoch 000,726

Learning rate 0.03

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

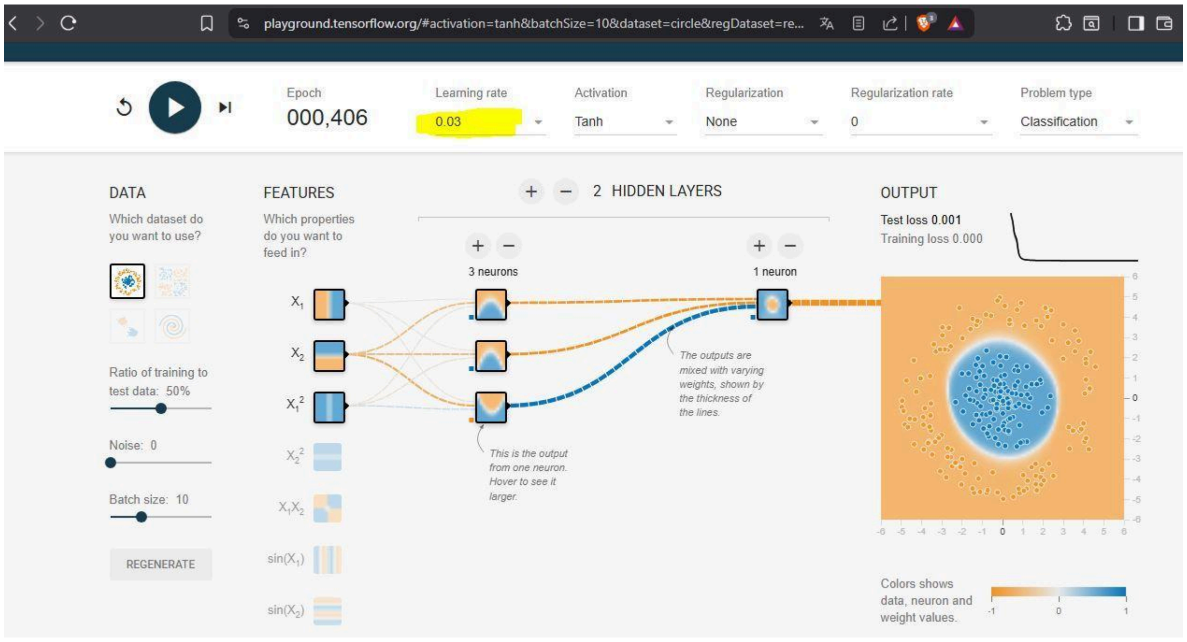
The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.001

Training loss 0.000

Colors shows data, neuron and weight values.



playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDataset=re...

Epoch 000,406

Learning rate 0.03

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.001

Training loss 0.000

Colors shows data, neuron and weight values.

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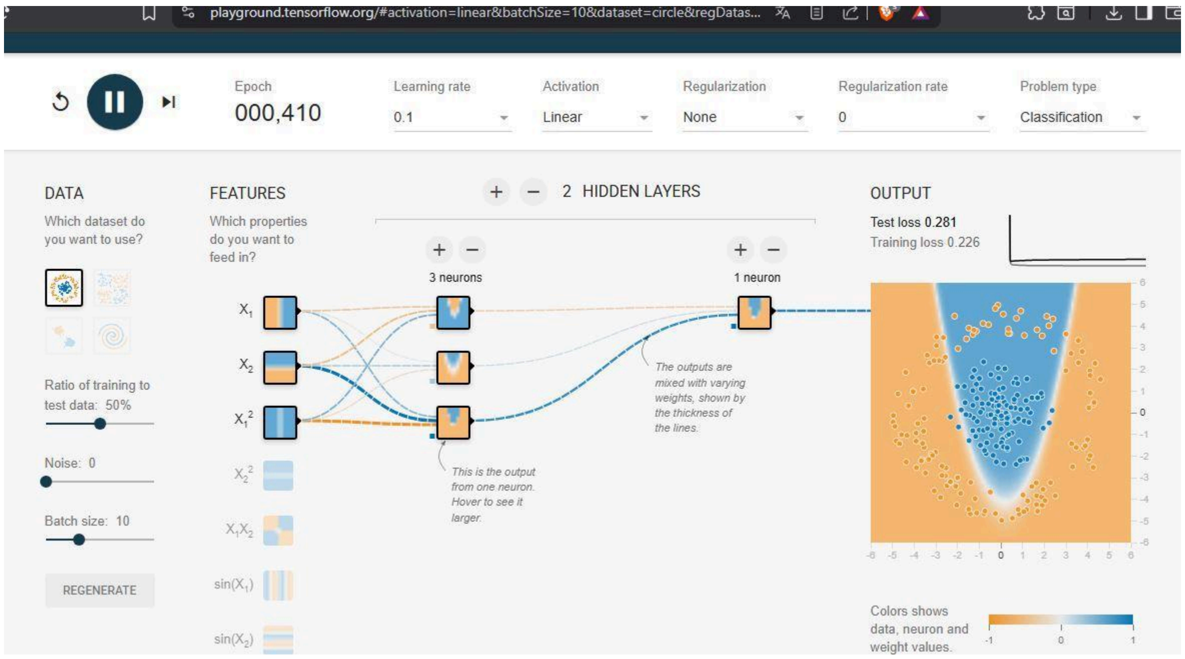


playground.tensorflow.org/#activation=linear&batchSize=10&dataset=circle&regDatas...

Epoch 000,410

Learning rate 0.1

Activation Linear

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

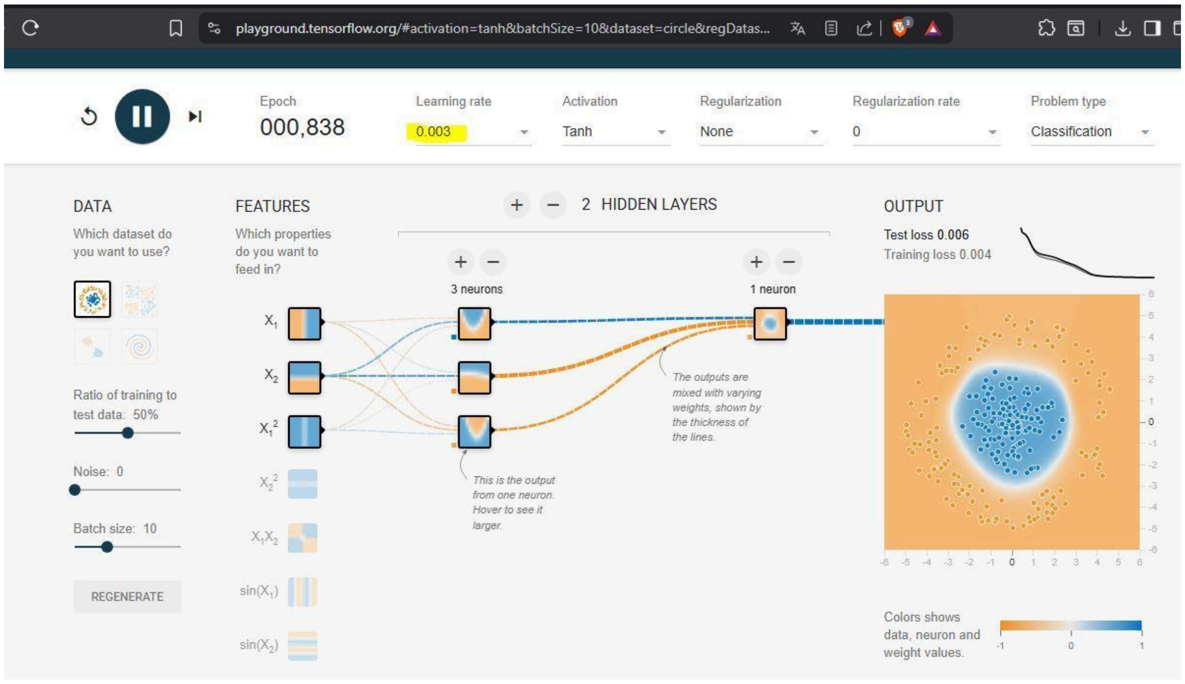
The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.281

Training loss 0.226

Colors shows data, neuron and weight values.



playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDatas...

Epoch 000,838

Learning rate 0.003

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

This is the output from one neuron. Hover to see it larger.

The outputs are mixed with varying weights, shown by the thickness of the lines.

OUTPUT

Test loss 0.006

Training loss 0.004

Colors shows data, neuron and weight values.

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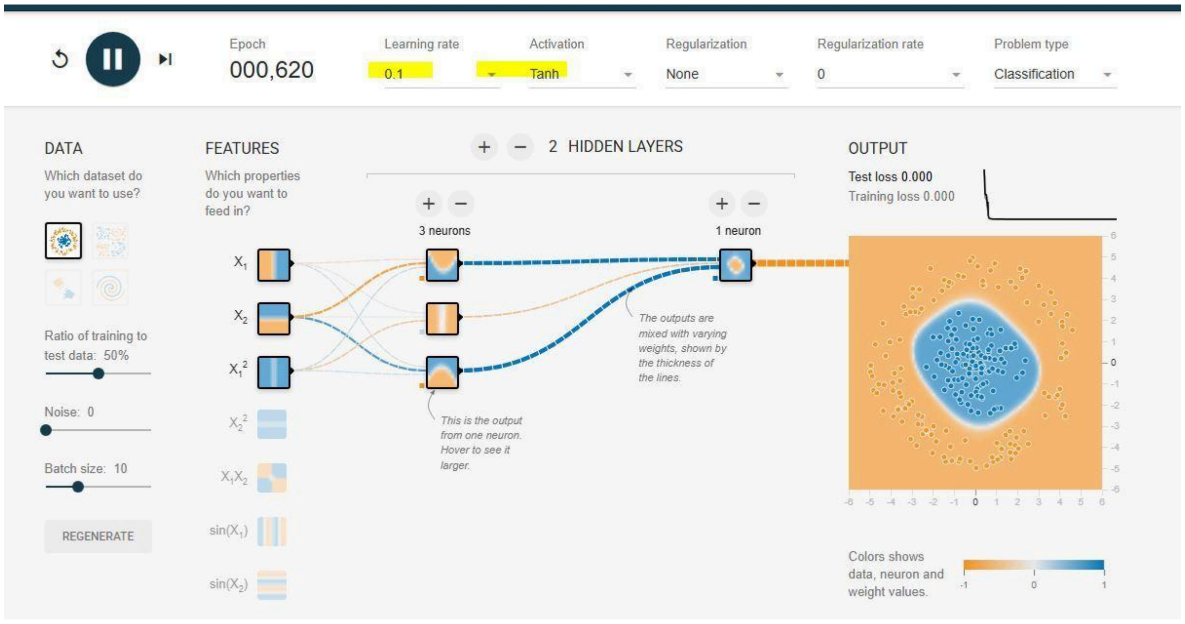


Epoch 000,620

Learning rate 0.1

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

The outputs are mixed with varying weights, shown by the thickness of the lines.

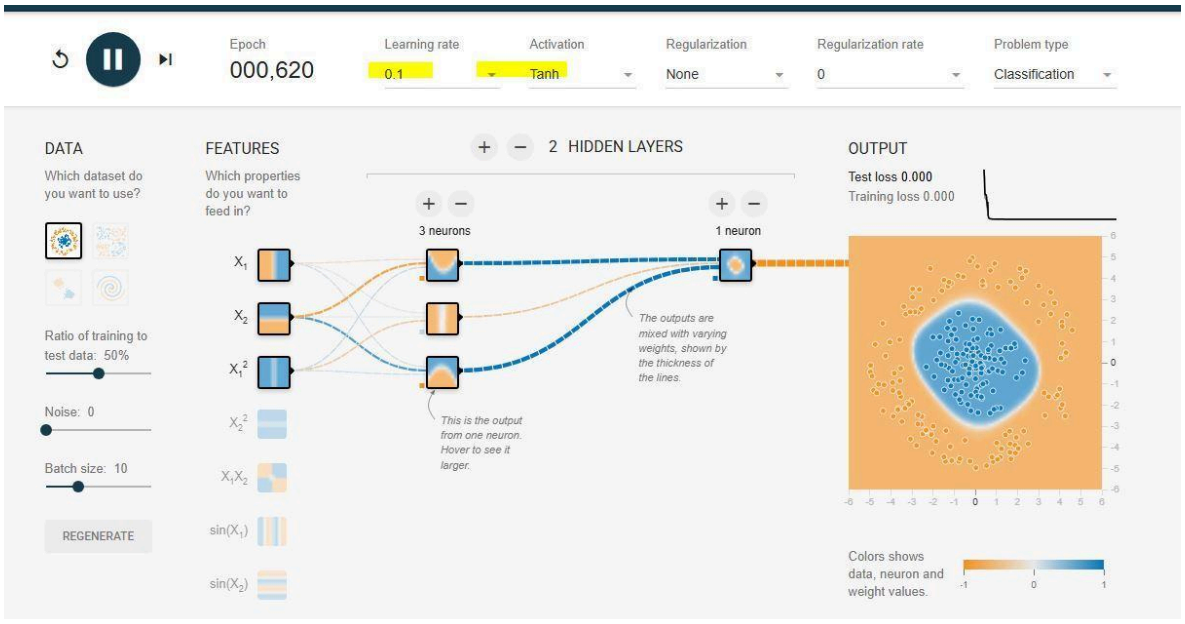
This is the output from one neuron. Hover to see it larger.

OUTPUT

Test loss 0.000

Training loss 0.000

Colors shows data, neuron and weight values.



Epoch 000,620

Learning rate 0.1

Activation Tanh

Regularization None

Regularization rate 0

Problem type Classification

DATA

Which dataset do you want to use?

Ratio of training to test data: 50%

Noise: 0

Batch size: 10

REGENERATE

FEATURES

Which properties do you want to feed in?

2 HIDDEN LAYERS

3 neurons

1 neuron

The outputs are mixed with varying weights, shown by the thickness of the lines.

This is the output from one neuron. Hover to see it larger.

OUTPUT

Test loss 0.000

Training loss 0.000

Colors shows data, neuron and weight values.

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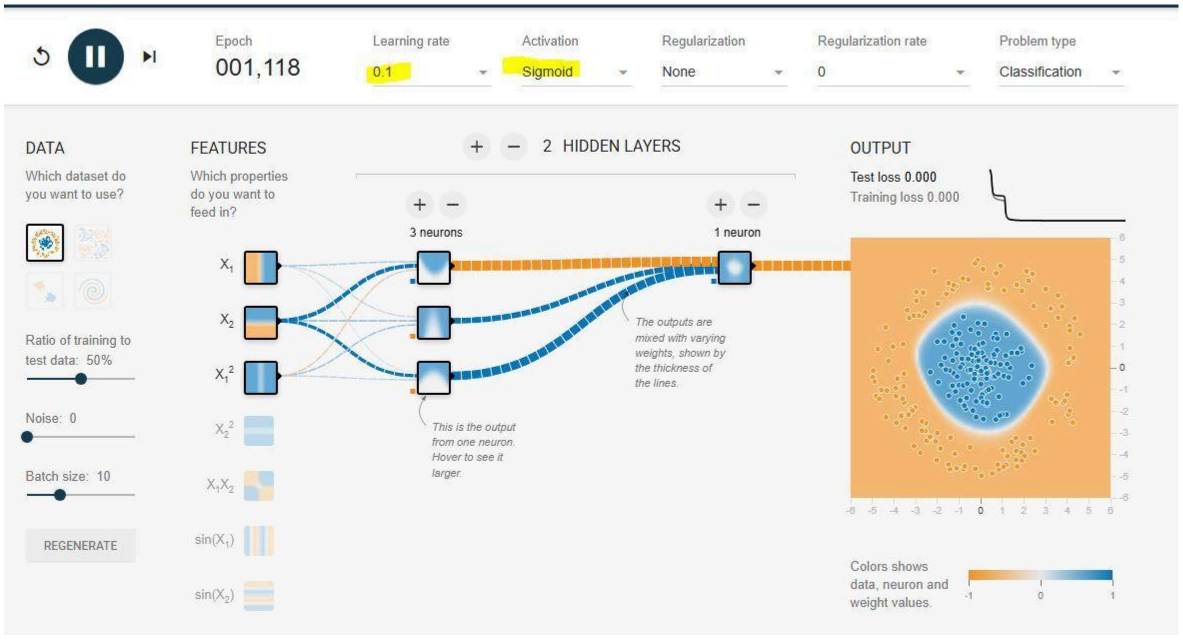

Epoch 001,118
Learning rate 0.1
Activation Sigmoid
Regularization None
Regularization rate 0
Problem type Classification

DATA
Which dataset do you want to use?
Ratio of training to test data: 50%
Noise: 0
Batch size: 10
REGENERATE

FEATURES
Which properties do you want to feed in?

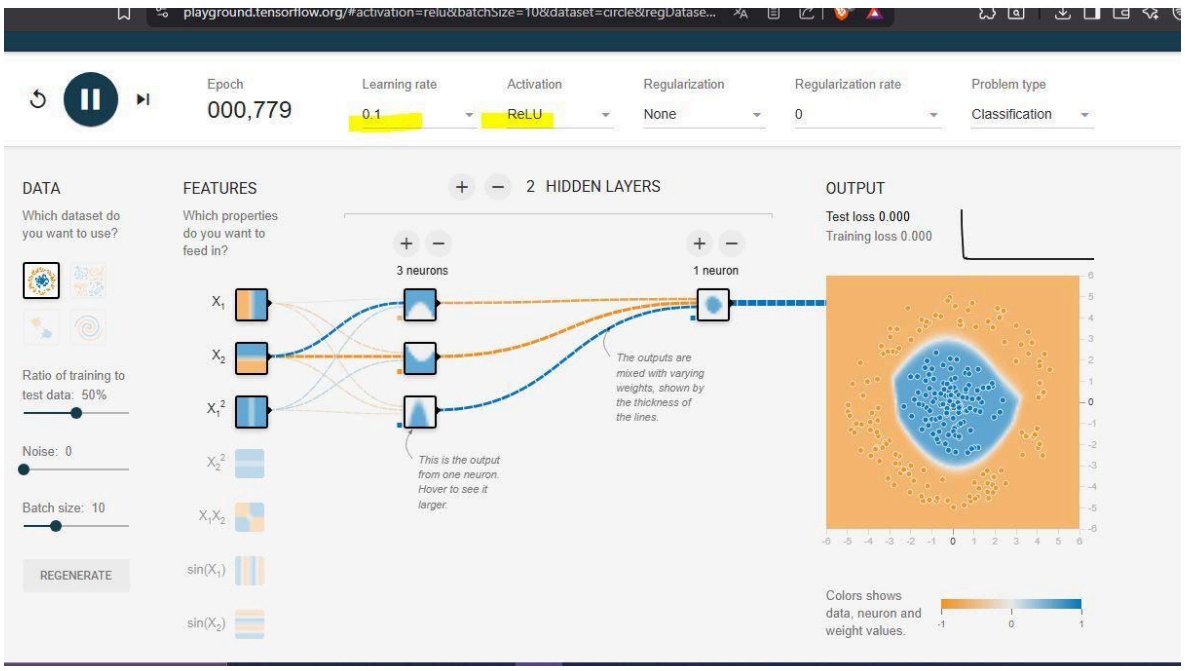
2 HIDDEN LAYERS
3 neurons
1 neuron

The outputs are mixed with varying weights, shown by the thickness of the lines.

This is the output from one neuron. Hover to see it larger.

OUTPUT
Test loss 0.000
Training loss 0.000

Colors shows data, neuron and weight values.


playground.tensorflow.org/#activation=relu&batchSize=10&dataset=circle&regDatase...

Epoch 000,779
Learning rate 0.1
Activation ReLU
Regularization None
Regularization rate 0
Problem type Classification

DATA
Which dataset do you want to use?
Ratio of training to test data: 50%
Noise: 0
Batch size: 10
REGENERATE

FEATURES
Which properties do you want to feed in?

2 HIDDEN LAYERS
3 neurons
1 neuron

The outputs are mixed with varying weights, shown by the thickness of the lines.

This is the output from one neuron. Hover to see it larger.

OUTPUT
Test loss 0.000
Training loss 0.000

Colors shows data, neuron and weight values.

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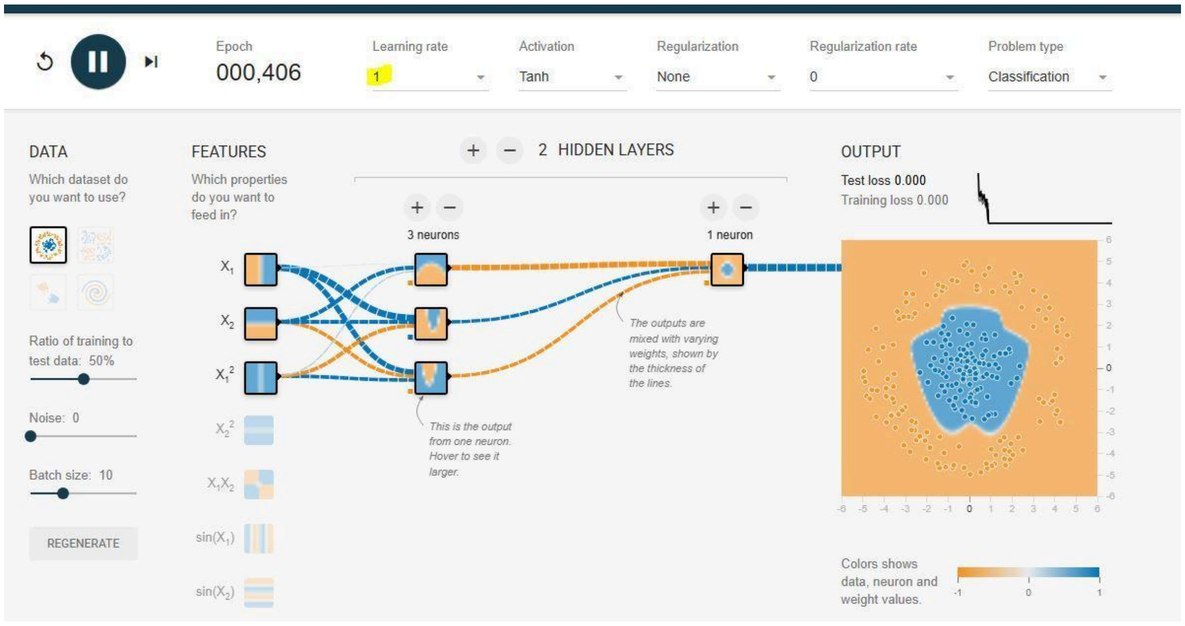


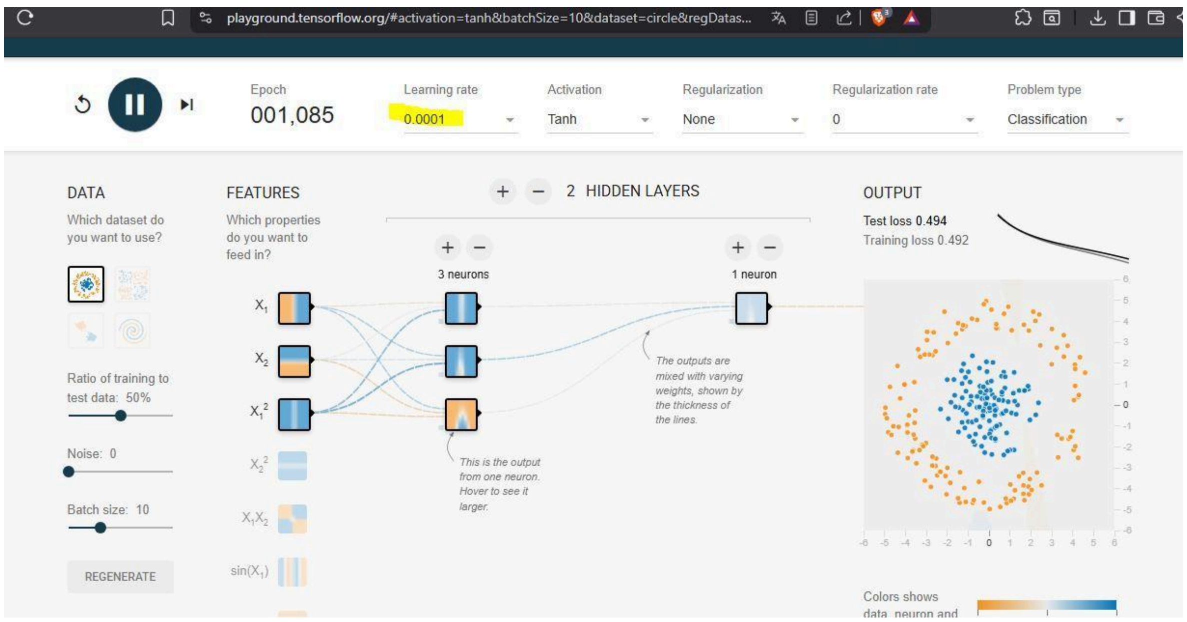
Epoch 000,406 · Learning rate 1 · Activation Tanh · Regularization None · Regularization rate 0 · Problem type Classification

DATA: Ratio of training to test data: 50% · Noise: 0 · Batch size: 10

FEATURES: X_1, X_2, X_1^2 · 2 HIDDEN LAYERS: 3 neurons, 1 neuron

OUTPUT: Test loss 0.000 · Training loss 0.000

REGENERATE
The outputs are mixed with varying weights, shown by the thickness of the lines.
This is the output from one neuron. Hover to see it larger.
Colors shows data, neuron and weight values.
-1
0
1



playground.tensorflow.org/#activation=tanh&batchSize=10&dataset=circle&regDatas...

Epoch 001,085 · Learning rate 0.0001 · Activation Tanh · Regularization None · Regularization rate 0 · Problem type Classification

DATA: Ratio of training to test data: 50% · Noise: 0 · Batch size: 10

FEATURES: X_1, X_2, X_1^2 · 2 HIDDEN LAYERS: 3 neurons, 1 neuron

OUTPUT: Test loss 0.494 · Training loss 0.492

REGENERATE
The outputs are mixed with varying weights, shown by the thickness of the lines.
This is the output from one neuron. Hover to see it larger.
Colors shows data, neuron and

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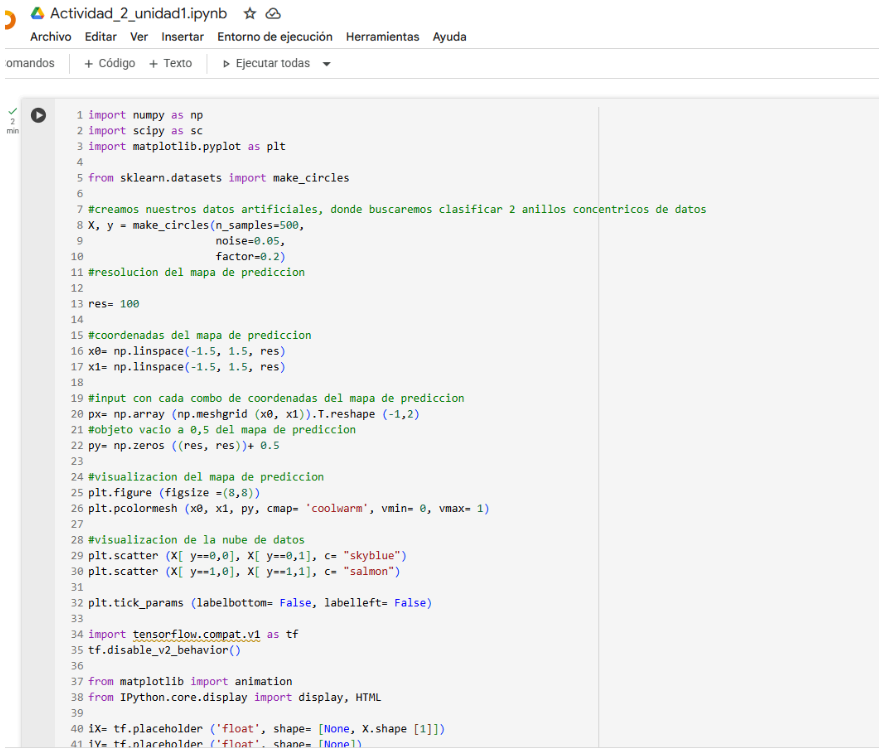
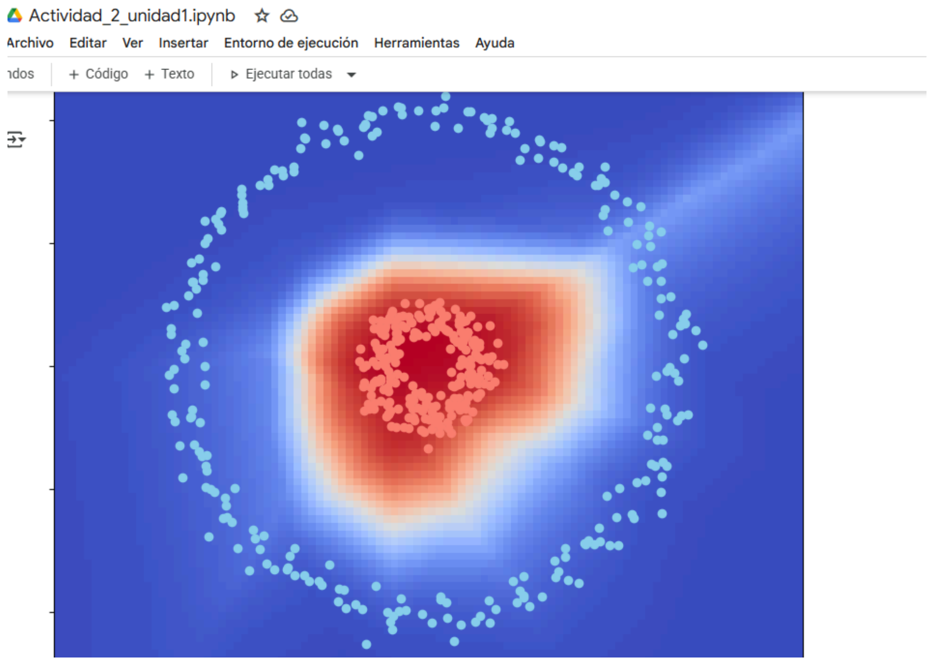
ACTIVIDAD 2

TENSORFLOW


Actividad_2_unidad1.ipynb
Archivo Editar Ver Insertar Entorno de ejecución Herramientas Ayuda
omandos
+ Código + Texto
Ejecutar todas

```
import numpy as np
import scipy as sc
import matplotlib.pyplot as plt

from sklearn.datasets import make_circles

#creamos nuestros datos artificiales, donde buscaremos clasificar 2 anillos concentricos de datos
X, y = make_circles(n_samples=500,
                    noise=0.05,
                    factor=0.2)
#resolucion del mapa de prediccion

res= 100

#coordenadas del mapa de prediccion
x0= np.linspace(-1.5, 1.5, res)
x1= np.linspace(-1.5, 1.5, res)

#input con cada combo de coordenadas del mapa de prediccion
px= np.array (np.meshgrid (x0, x1)).T.reshape (-1,2)
#objeto vacio a 0,5 del mapa de prediccion
py= np.zeros ((res, res))+ 0.5

#visualizacion del mapa de prediccion
plt.figure (figsize =(8,8))
plt.pcolormesh (x0, x1, py, cmap= 'coolwarm', vmin= 0, vmax= 1)

#visualizacion de la nube de datos
plt.scatter (X[ y==0,0], X[ y==0,1], c= "skyblue")
plt.scatter (X[ y==1,0], X[ y==1,1], c= "salmon")

plt.tick_params (labelbottom= False, labelleft= False)

import tensorflow.compat.v1 as tf
tf.disable_v2_behavior()

from matplotlib import animation
from IPython.core.display import display, HTML

iX= tf.placeholder ('float', shape= [None, X.shape [1]])
iY= tf.placeholder ('float', shape= [None])
```



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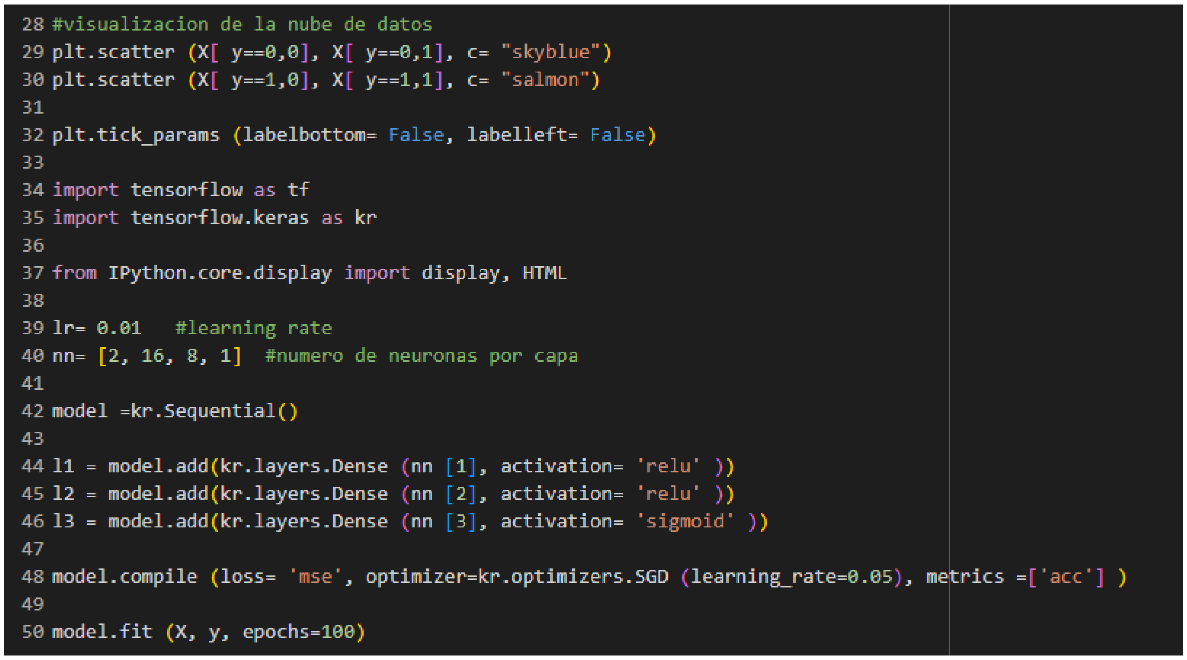
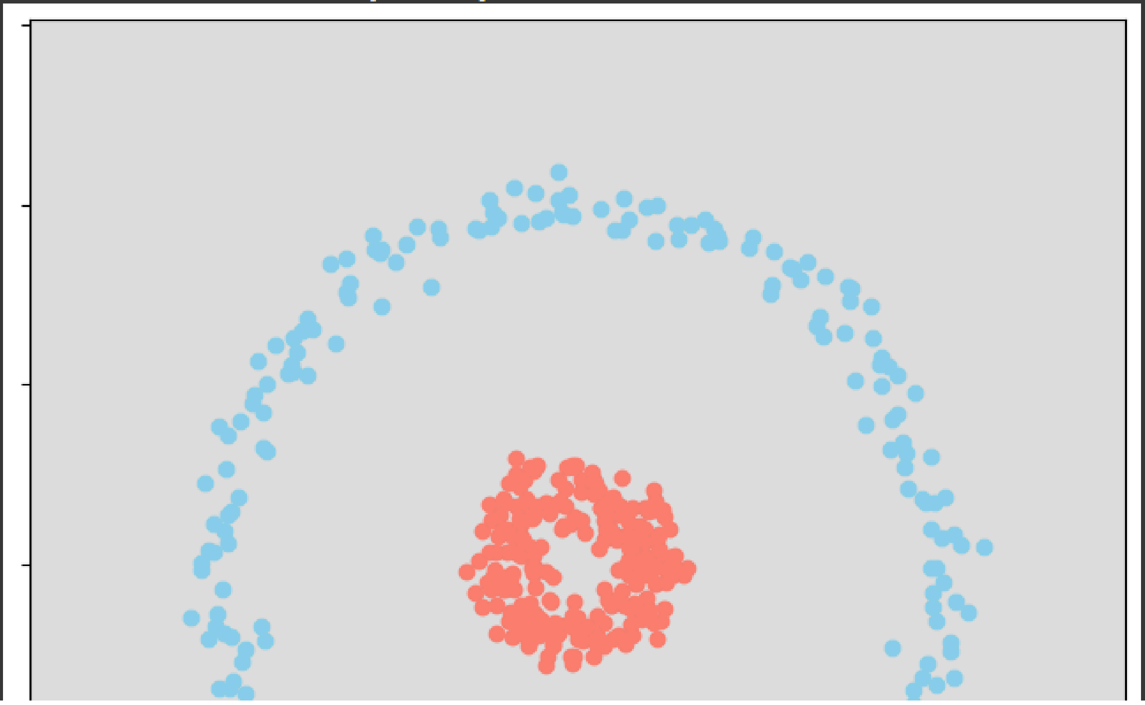
KERAS



```python
#visualizacion de la nube de datos
plt.scatter (X[ y==0,0], X[ y==0,1], c= "skyblue")
plt.scatter (X[ y==1,0], X[ y==1,1], c= "salmon")

plt.tick_params (labelbottom= False, labelleft= False)

import tensorflow as tf
import tensorflow.keras as kr

from IPython.core.display import display, HTML

lr= 0.01    #learning rate
nn= [2, 16, 8, 1]  #numero de neuronas por capa

model =kr.Sequential()

l1 = model.add(kr.layers.Dense (nn [1], activation= 'relu' ))
l2 = model.add(kr.layers.Dense (nn [2], activation= 'relu' ))
l3 = model.add(kr.layers.Dense (nn [3], activation= 'sigmoid' ))

model.compile (loss= 'mse', optimizer=kr.optimizers.SGD (learning_rate=0.05), metrics =['acc'] )

model.fit (X, y, epochs=100)
```

```
Epoch 100/100
16/16 ━━━━━━━━━━━━━━━━━━━━ 0s 2ms/step - acc: 1.0000 - loss: 0.0051
<keras.src.callbacks.history.History at 0x7f652a7e4ad0>
```



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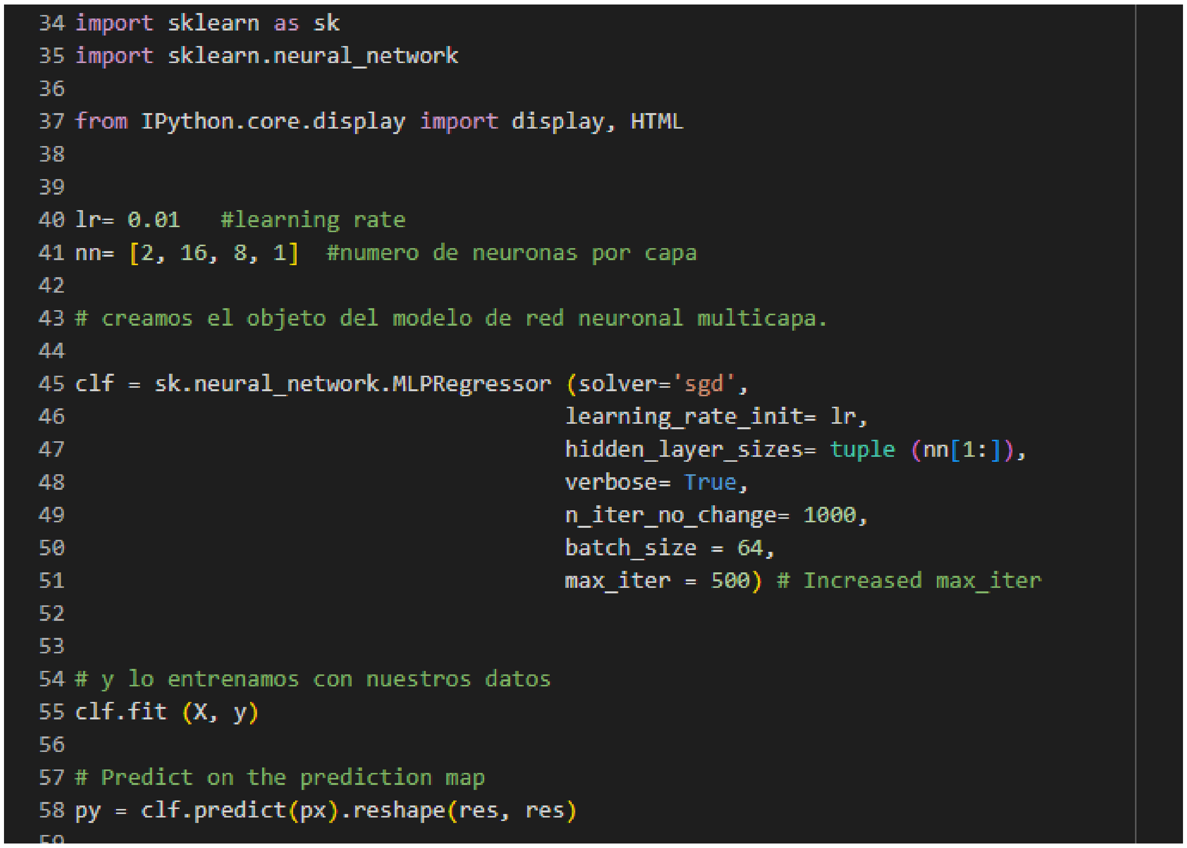
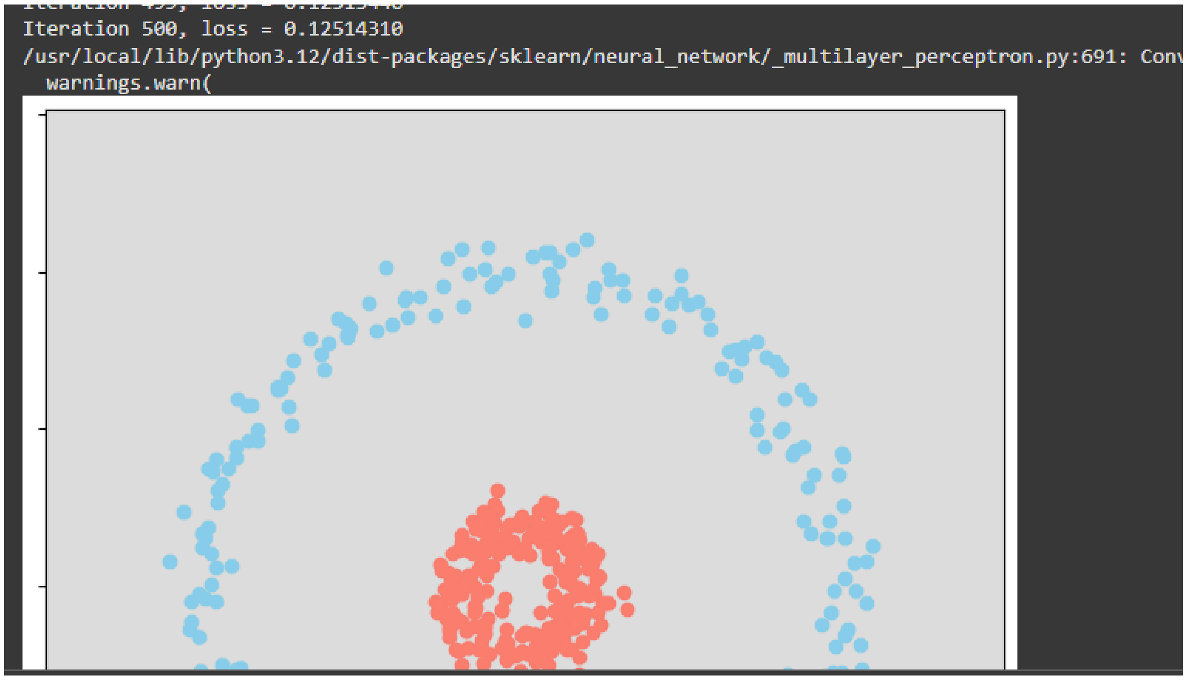
<u>SKLEARN</u>



```
import sklearn as sk
import sklearn.neural_network

from IPython.core.display import display, HTML


lr= 0.01   #learning rate
nn= [2, 16, 8, 1]  #numero de neuronas por capa

# creamos el objeto del modelo de red neuronal multicapa.

clf = sk.neural_network.MLPRegressor (solver='sgd',
                                      learning_rate_init= lr,
                                      hidden_layer_sizes= tuple (nn[1:]),
                                      verbose= True,
                                      n_iter_no_change= 1000,
                                      batch_size = 64,
                                      max_iter = 500) # Increased max_iter


# y lo entrenamos con nuestros datos
clf.fit (X, y)

# Predict on the prediction map
py = clf.predict(px).reshape(res, res)
```



```
Iteration 500, loss = 0.12514310
/usr/local/lib/python3.12/dist-packages/sklearn/neural_network/_multilayer_perceptron.py:691: Conv
  warnings.warn(
```