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from google.colab import drive
from keras.models import Sequential
from keras.layers import Dense, Activation
from keras.optimizers import SGD
import pandas as pd
import matplotlib.pyplot as plt
import numpy as np

drive.mount('/content/drive')
df = pd.read_csv('/content/drive/MyDrive/lab5f1.csv')

x = df[['x1', 'x2', 'x3']].to_numpy()
y = df['y'].to_numpy()

model = Sequential()
model.add(Dense(3, activation='sigmoid', input_dim=3, name="first"))
model.add(Dense(1, activation='sigmoid', name="second"))

model.compile(optimizer=SGD(learning_rate=0.1), loss='mse' ,metrics=['accuracy'] )

pred = np.round(model.predict(x).flatten())
for i in range(len(x)):
    print(x[i], y[i], pred[i])

history = model.fit(x, y, epochs=2000, batch_size=1, verbose=1)

plt.plot(history.history['loss'])
plt.title('Model loss')
plt.ylabel('Loss')
plt.xlabel('Epoch')
plt.legend(['Train'], loc='upper right')
plt.show()

plt.plot(history.history['accuracy'])
plt.title('Model accuracy')
plt.ylabel('Accuracy')
plt.xlabel('Epoch')
plt.legend(['Train'], loc='upper right')
plt.show()

print("Wyniki: ");
pred = np.round(model.predict(x).flatten())
for i in range(len(x)):
    print(x[i], y[i], pred[i])
```

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Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).
1/1 [=====] - 0s 66ms/step
[0 0 0] 0 0.0
[0 0 1] 1 0.0
[0 1 0] 1 0.0
[0 1 1] 0 0.0
[1 0 0] 1 0.0
[1 0 1] 0 0.0
[1 1 0] 0 0.0
[1 1 1] 1 0.0
Epoch 1/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2672 - accuracy: 0.5000
Epoch 2/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2642 - accuracy: 0.5000
Epoch 3/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2617 - accuracy: 0.5000
Epoch 4/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2602 - accuracy: 0.5000
Epoch 5/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2589 - accuracy: 0.5000
Epoch 6/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2581 - accuracy: 0.3750
Epoch 7/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2577 - accuracy: 0.3750
Epoch 8/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2575 - accuracy: 0.5000
Epoch 9/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2567 - accuracy: 0.3750
Epoch 10/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2570 - accuracy: 0.5000
Epoch 11/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2564 - accuracy: 0.5000
Epoch 12/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2567 - accuracy: 0.3750
Epoch 13/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2565 - accuracy: 0.3750
Epoch 14/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2566 - accuracy: 0.3750
Epoch 15/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.5000
Epoch 16/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.2500
Epoch 17/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2565 - accuracy: 0.2500
Epoch 18/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2565 - accuracy: 0.3750
Epoch 19/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.5000
Epoch 20/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.6250
Epoch 21/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.3750
Epoch 22/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2565 - accuracy: 0.3750
Epoch 23/2000
8/8 [=====] - 0s 5ms/step - loss: 0.2565 - accuracy: 0.1250
Epoch 24/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.3750
Epoch 25/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.3750
Epoch 26/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2565 - accuracy: 0.2500
Epoch 27/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.2500
Epoch 28/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.3750
Epoch 29/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2562 - accuracy: 0.3750
Epoch 30/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2561 - accuracy: 0.3750
Epoch 31/2000
8/8 [=====] - 0s 5ms/step - loss: 0.2562 - accuracy: 0.5000
Epoch 32/2000
8/8 [=====] - 0s 4ms/step - loss: 0.2564 - accuracy: 0.3750
Epoch 33/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.3750
Epoch 34/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2564 - accuracy: 0.5000
Epoch 35/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2562 - accuracy: 0.3750
Epoch 36/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.2500
Epoch 37/2000
8/8 [=====] - 0s 3ms/step - loss: 0.2563 - accuracy: 0.2500
Epoch 38/2000
```