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import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
from keras.models import Sequential
from keras.layers import Dense, Activation
from keras.optimizers import SGD
from sklearn.metrics import accuracy_score, precision_score, recall_score, confusion_matrix
from sklearn.model_selection import train_test_split

url = "https://marcingabryel.pl/ai/iris.csv"
df = pd.read_csv(url)

print("Dane początkowe:")
print(df.head())

unique_flower_names = df.iloc[:, -1].unique()
print("\n nazwy kwiatów: \n")
print(unique_flower_names)

chosen_flower = "Setosa"
df['y'] = df.iloc[:, -1].apply(lambda x: 1 if x == chosen_flower else 0)

print(df)

unique_y_values = df['y'].unique()
print("\n wartości kolumny y:")
print(unique_y_values)

x = df.iloc[:, :4].values
y = df['y'].values
print('X: ', x.shape)
print('Y: ', y.shape)

x_train, x_test, y_train, y_test = train_test_split(x, y, stratify=y, test_size=0.2)

model = Sequential()
model.add(Dense(units=4, activation='relu', input_dim=4))
model.add(Dense(units=1, activation='sigmoid'))
model.compile(optimizer='adam', loss='binary_crossentropy', metrics=['accuracy'])
model.summary()

pred = np.round(model.predict(x).flatten())
for i in range(len(x)):
    print(x[i], y[i], pred[i], df.iloc[i, -2])

history = model.fit(x, y, epochs=15, batch_size=4, verbose=1)

y_result_train = model.predict(x_train)
y_result_train = np.round(y_result_train)

pred2 = np.round(model.predict(x).flatten())
for i in range(len(x)):
    print(x[i], y[i], pred2[i], df.iloc[i, -2])

bledy = 0
for i in range(len(y_train)):
    if y_result_train[i] != y_train[i]:
        bledy += 1

print("Liczba błędów łącznie: ", bledy)

y_pred = model.predict(x_train)

y_pred_rounded = [np.round(pred) for pred in y_pred]
print(y_pred_rounded[2])

accuracy = accuracy_score(y_train, y_pred_rounded)

conf_matrix = confusion_matrix(y_train, y_pred_rounded)

# Wyświetlanie wyników
print("Dokładność:", accuracy)
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[6.3 3.3 6. 2.5] 0 0.0 Virginica
[5.8 2.7 5.1 1.9] 0 0.0 Virginica
[7.1 3. 5.9 2.1] 0 0.0 Virginica
[6.3 2.9 5.6 1.8] 0 0.0 Virginica
[6.5 3. 5.8 2.2] 0 0.0 Virginica
[7.6 3. 6.6 2.1] 0 0.0 Virginica
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[6.4 3.1 5.5 1.8] 0 0.0 Virginica
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[6.9 3.1 5.4 2.1] 0 0.0 Virginica
[6.7 3.1 5.6 2.4] 0 0.0 Virginica
[6.9 3.1 5.1 2.3] 0 0.0 Virginica
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[6.7 3.3 5.7 2.5] 0 0.0 Virginica
[6.7 3. 5.2 2.3] 0 0.0 Virginica
[6.3 2.5 5. 1.9] 0 0.0 Virginica
[6.5 3. 5.2 2. ] 0 0.0 Virginica
[6.2 3.4 5.4 2.3] 0 0.0 Virginica
[5.9 3. 5.1 1.8] 0 0.0 Virginica
Liczba bladów łącznie: 40
4/4 [=====] - 0s 3ms/step
[0.]
Dokładność: 0.6666666666666666
Precyzja: 0.0
/usr/local/lib/python3.10/dist-packages/sklearn/metrics/_classification.py:1344: UndefinedMetricWarning: Precision is ill-defined and
_warn_prf(average, modifier, msg_start, len(result))
```