Project_CS230_Fire_Propagation

February 21, 2020

[20]:
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import numpy as np
import pandas as pd

from keras.models import Model
from keras.layers import Dense, Dropout, Activation
from keras.models import Sequential
from keras.layers import Input, Dense
from keras.utils import plot_model
from keras.optimizers import Adam
from sklearn.preprocessing import MinMaxScaler
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt

def CreateDataset(file):
    df = pd.read_table(file)
    df.columns = ["x_coord", "y_coord", "month", "day",
                  "ffmc", "dmc", "dc", "isi", "temp",
                  "rh", "wind", "rain", "area"]
    np.random.seed(19)

    mms = MinMaxScaler()
    df["area"] = mms.fit_transform(df["area"].values.reshape(-1, 1))

    y = df.pop("area")
    X = df

    return X, y


def create_model():
    model = Sequential()

    model.add(Dense(50, activation='relu'))
    model.add(Dense(50, activation='relu'))
    model.add(Dense(25, activation='relu'))
    model.add(Dense(10, activation='relu'))
    model.add(Dense(1, activation='linear'))
```

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    opt = Adam(lr=0.002, beta_1=0.9, beta_2=0.999, epsilon=1e-08)

    model.compile(loss='mse', optimizer=opt, metrics=['accuracy'])

    return model

def train_model(X, y):
    X_train, X_test, y_train, y_test = train_test_split(X.values, y.values,␣
 ↪test_size=0.15, random_state=19)

    model = create_model()

    history = model.fit(X_train, y_train, epochs=30, verbose=1,␣
 ↪validation_data=(X_test, y_test))

    plt.plot(history.history['loss'])
    plt.plot(history.history['val_loss'])
    plt.title("Model's loss")
    plt.ylabel('Loss')
    plt.xlabel('Epoch')
    plt.legend(['Train', 'Test'], loc='upper left')
    plt.savefig("Training and test losses")
    plt.show()

    return model


def main():

    X, y = CreateDataset("data.txt")

    model = train_model(X, y)
    data1 = "6,5,9,6,92.5,121.1,674.4,8.6,25.1,27,4,0"
    data2 = "2,2,8,6,93.7,231.1,715.1,8.4,21.9,42,2.2,0"

    data1 = np.array(list(map(float, data1.split(",")))).reshape(-1,1).T
    data2 = np.array(list(map(float, data2.split(",")))).reshape(-1,1).T
    predicted1 = model.predict(data1)
    predicted2 = model.predict(data2)

    print(predicted1, predicted2)

    model.save_weights("model_weights.h5")
    print("\nModel weights saved to: 'model_weights.h5'")
```

```
if __name__ == "__main__":
    main()
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```
Train on 439 samples, validate on 78 samples
Epoch 1/30
439/439 [==============================] - 0s 995us/step - loss: 147.9579 -
accuracy: 0.0319 - val_loss: 4.0319 - val_accuracy: 0.1410
Epoch 2/30
439/439 [==============================] - 0s 99us/step - loss: 6.2840 -
accuracy: 0.1093 - val_loss: 3.2180 - val_accuracy: 0.1667
Epoch 3/30
439/439 [==============================] - 0s 96us/step - loss: 1.3391 -
accuracy: 0.2005 - val_loss: 0.9826 - val_accuracy: 0.2179
Epoch 4/30
439/439 [==============================] - 0s 97us/step - loss: 0.6017 -
accuracy: 0.2665 - val_loss: 0.7752 - val_accuracy: 0.2821
Epoch 5/30
439/439 [==============================] - 0s 105us/step - loss: 0.4817 -
accuracy: 0.2711 - val_loss: 0.4494 - val_accuracy: 0.2436
Epoch 6/30
439/439 [==============================] - 0s 115us/step - loss: 0.3404 -
accuracy: 0.3052 - val_loss: 0.3738 - val_accuracy: 0.3077
Epoch 7/30
439/439 [==============================] - 0s 114us/step - loss: 0.2881 -
accuracy: 0.3166 - val_loss: 0.3402 - val_accuracy: 0.3205
Epoch 8/30
439/439 [==============================] - 0s 105us/step - loss: 0.2552 -
accuracy: 0.3394 - val_loss: 0.2677 - val_accuracy: 0.3205
Epoch 9/30
439/439 [==============================] - 0s 103us/step - loss: 0.2089 -
accuracy: 0.3645 - val_loss: 0.2686 - val_accuracy: 0.3718
Epoch 10/30
439/439 [==============================] - 0s 109us/step - loss: 0.1869 -
accuracy: 0.3736 - val_loss: 0.2211 - val_accuracy: 0.2949
Epoch 11/30
439/439 [==============================] - 0s 105us/step - loss: 0.1728 -
accuracy: 0.3713 - val_loss: 0.1965 - val_accuracy: 0.3462
Epoch 12/30
439/439 [==============================] - 0s 112us/step - loss: 0.1603 -
accuracy: 0.3872 - val_loss: 0.1913 - val_accuracy: 0.3590
Epoch 13/30
439/439 [==============================] - 0s 108us/step - loss: 0.1460 -
accuracy: 0.3895 - val_loss: 0.1867 - val_accuracy: 0.3718
Epoch 14/30
439/439 [==============================] - 0s 118us/step - loss: 0.1352 -
accuracy: 0.4077 - val_loss: 0.1548 - val_accuracy: 0.3333
Epoch 15/30
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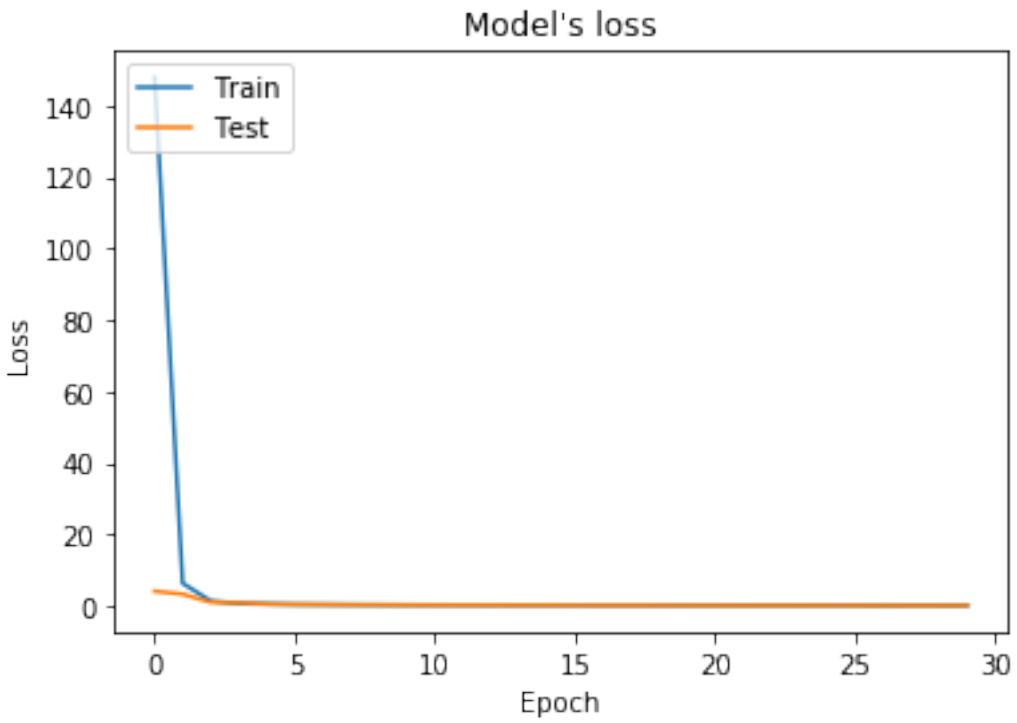
439/439 [==============================] - 0s 105us/step - loss: 0.1267 -
accuracy: 0.4214 - val_loss: 0.1613 - val_accuracy: 0.3462
Epoch 16/30
439/439 [==============================] - 0s 99us/step - loss: 0.1187 -
accuracy: 0.4123 - val_loss: 0.1361 - val_accuracy: 0.3974
Epoch 17/30
439/439 [==============================] - 0s 114us/step - loss: 0.1102 -
accuracy: 0.4260 - val_loss: 0.1201 - val_accuracy: 0.4359
Epoch 18/30
439/439 [==============================] - 0s 119us/step - loss: 0.1002 -
accuracy: 0.4305 - val_loss: 0.1120 - val_accuracy: 0.4103
Epoch 19/30
439/439 [==============================] - 0s 93us/step - loss: 0.0935 -
accuracy: 0.4328 - val_loss: 0.1082 - val_accuracy: 0.3974
Epoch 20/30
439/439 [==============================] - 0s 101us/step - loss: 0.0862 -
accuracy: 0.4305 - val_loss: 0.0794 - val_accuracy: 0.4615
Epoch 21/30
439/439 [==============================] - 0s 110us/step - loss: 0.0753 -
accuracy: 0.4351 - val_loss: 0.0664 - val_accuracy: 0.4744
Epoch 22/30
439/439 [==============================] - 0s 109us/step - loss: 0.0632 -
accuracy: 0.4601 - val_loss: 0.0575 - val_accuracy: 0.4744
Epoch 23/30
439/439 [==============================] - 0s 112us/step - loss: 0.0617 -
accuracy: 0.4579 - val_loss: 0.0632 - val_accuracy: 0.4744
Epoch 24/30
439/439 [==============================] - 0s 116us/step - loss: 0.0663 -
accuracy: 0.4465 - val_loss: 0.0784 - val_accuracy: 0.4615
Epoch 25/30
439/439 [==============================] - 0s 97us/step - loss: 0.0634 -
accuracy: 0.4487 - val_loss: 0.0627 - val_accuracy: 0.4744
Epoch 26/30
439/439 [==============================] - 0s 115us/step - loss: 0.0559 -
accuracy: 0.4579 - val_loss: 0.0612 - val_accuracy: 0.4872
Epoch 27/30
439/439 [==============================] - 0s 107us/step - loss: 0.0523 -
accuracy: 0.4579 - val_loss: 0.0498 - val_accuracy: 0.5000
Epoch 28/30
439/439 [==============================] - 0s 114us/step - loss: 0.0579 -
accuracy: 0.4579 - val_loss: 0.0583 - val_accuracy: 0.4744
Epoch 29/30
439/439 [==============================] - 0s 115us/step - loss: 0.0539 -
accuracy: 0.4579 - val_loss: 0.0549 - val_accuracy: 0.4872
Epoch 30/30
439/439 [==============================] - 0s 99us/step - loss: 0.0511 -
accuracy: 0.4670 - val_loss: 0.0531 - val_accuracy: 0.5000
```

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[[0.15962058]] [[0.05201751]]

Model weights saved to: 'model_weights.h5'
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