

```

from google.colab import drive
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import LabelEncoder
from keras.utils import np_utils
from keras.wrappers.scikit_learn import KerasClassifier
from sklearn.model_selection import KFold
from sklearn.model_selection import cross_val_score
from sklearn.preprocessing import MinMaxScaler
import matplotlib.pyplot as plt
import numpy as np
import tensorflow as tf
from tensorflow.keras.layers import Flatten
from tensorflow.keras.layers import Dense, Dropout
from tensorflow.keras import regularizers
from sklearn.metrics import classification_report, confusion_matrix
from sklearn import metrics
from sklearn.preprocessing import StandardScaler

```

```

drive.mount("/content/drive")
path = "/content/drive/MyDrive/Capstone/exercise_datasetV2.csv"
df = pd.read_csv(path)
print(df.head())
banyak_kategori = len(df.index)

```

```

Mounted at /content/drive
Activity, Exercise or Sport (1 hour) Intensity Description \
0      Cycling, mountain bike, bmx      NaN
1  Cycling, <10 mph, leisure bicycling  NaN

```

Your session crashed after using all available RAM. If you are interested in access to high-RAM runtimes, you may want to check out [View runtime logs](#)
[Colab Pro](#).

```

0      60      1.733733
1      60      0.823236
2      60      3.294974
3      60      1.234853
4      60      1.647825

```

```

list_berat = []
for i in range(len(df.index)):
    list_berat.append(1)

df['berat'] = list_berat
dict_df = {'Activity, Exercise or Sport (1 hour)': [], 'Duration (minutes)': [], 'Calories per kg': [], 'berat': []}
df_new = df
for index, row in df.iterrows():
    print(index)
    menit = row['Duration (minutes)']
    activity = row['Activity, Exercise or Sport (1 hour)']
    calories = row['Calories per kg']
    for i in range(1,menit):
        for j in range(2,101):
            new_calories = calories*1.0/60*i*j
            list_activity = dict_df.get('Activity, Exercise or Sport (1 hour)')
            list_duration = dict_df.get('Duration (minutes)')
            list_calories = dict_df.get('Calories per kg')
            list_berat = dict_df.get('berat')
            list_activity.append(activity)
            list_duration.append(i)
            list_calories.append(new_calories)
            list_berat.append(j)
        #new_row = pd.DataFrame({'Activity, Exercise or Sport (1 hour)': [activity], 'Duration (minutes)': [i], 'Calories per k

df_curr = pd.DataFrame(dict_df)
df_new = pd.concat([df_curr, df_new.loc[:]]).reset_index(drop=True)
#df2 = pd.concat([new_row,df.loc[:]].reset_index(drop=True)
print(df_new.head())
print(df_new.tail())

```

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247
Activity, Exercise or Sport (1 hour) Duration (minutes) Calories per kg \
0      Cycling, mountain bike, bmx      1      0.058358
1      Cycling, mountain bike, bmx      1      0.087536
2      Cycling, mountain bike, bmx      1      0.116715
3      Cycling, mountain bike, bmx      1      0.145894
4      Cycling, mountain bike, bmx      1      0.175073

berat Intensity Description
0      2      NaN
1      3      NaN
2      4      NaN
3      5      NaN
4      6      NaN

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1448815 Teach physical education,exercise class

Calories per kg berat Intensity Description
1448811      0.721008      1      NaN
1448812      0.515199      1      NaN
1448813      0.617427      1      NaN
1448814      0.823236      1      NaN
1448815      0.823236      1      NaN

print(len(df_new.index))
print(df_new.describe())
print(df_new.dtypes)
df_new.rename(columns = {'Activity, Exercise or Sport (1 hour)': 'activity', 'Duration (minutes)': 'durasi' , 'Calories per kg
print(df_new.head())

1448816
Duration (minutes) Calories per kg berat
count      1.448816e+06      1.448816e+06      1.448816e+06
mean      3.000514e+01      3.467251e+01      5.099144e+01
std      1.703246e+01      3.748635e+01      2.858243e+01
min      1.000000e+00      1.033558e-02      1.000000e+00
25%      1.500000e+01      8.237434e+00      2.600000e+01
50%      3.000000e+01      2.219663e+01      5.100000e+01
75%      4.500000e+01      4.774767e+01      7.600000e+01
max      6.000000e+01      3.644815e+02      1.000000e+02
Activity, Exercise or Sport (1 hour)      object
Duration (minutes)      int64
Calories per kg      float64
berat      int64
Intensity Description      object
dtype: object

      activity durasi calories berat Intensity Description
0  Cycling, mountain bike, bmx      1  0.058358      2      NaN
1  Cycling, mountain bike, bmx      1  0.087536      3      NaN
2  Cycling, mountain bike, bmx      1  0.116715      4      NaN
3  Cycling, mountain bike, bmx      1  0.145894      5      NaN
4  Cycling, mountain bike, bmx      1  0.175073      6      NaN

target = df['Activity, Exercise or Sport (1 hour)']
print(df_new.head())
numeric_feature_names = ['durasi', 'calories', 'berat']
numeric_features = df_new[numeric_feature_names]
numeric_features.head()
```

	activity	durasi	calories	berat	Intensity	Description
0	Cycling, mountain bike, bmx	1	0.058358	2		NaN
1	Cycling, mountain bike, bmx	1	0.087536	3		NaN
2	Cycling, mountain bike, bmx	1	0.116715	4		NaN
3	Cycling, mountain bike, bmx	1	0.145894	5		NaN
4	Cycling, mountain bike, bmx	1	0.175073	6		NaN

	durasi	calories	berat
0	1	0.058358	2
1	1	0.087536	3
2	1	0.116715	4
3	1	0.145894	5

```

"""
def get_base_model():
    model = tf.keras.Sequential([
        normalizer,
        tf.keras.layers.Dense(10, activation='relu'),
        tf.keras.layers.Dense(10, activation='relu'),
        tf.keras.layers.Dense(banyak_kategori, activation = 'softmax')
    ])

    model.compile(optimizer=tf.keras.optimizers.Adam(learning_rate=2e-3),
                  loss='categorical_crossentropy',
                  metrics=['accuracy'])

    return model
"""

'\ndef get_base_model():\n    model = tf.keras.Sequential([\n        normalizer,\n        tf.keras.layers.Dense(10, activation='rel\n        tf.keras.layers.Dense(10, activation = 'softmax')\n    ])\n\n    model.compile(c\n        ategorical_crossentropy',\n        metrics=['accuracy'])\n    ret

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encoder = LabelEncoder()
encoder.fit(y)
encoded_Y = encoder.transform(y)
# convert integers to dummy variables (i.e. one hot encoded)
dummy_y = np_utils.to_categorical(encoded_Y)
"""

'\ny = df_new['activity']\nencoder = LabelEncoder()\nencoder.fit(y)\nencoded_Y = encoder.transform(y)\n# convert integers\nhot encoded)\ndummy_y = np_utils.to_categorical(encoded_Y)\n'

#est = KerasClassifier(build_fn= get_base_model, epochs=200, batch_size=5, verbose=0)

#kfold = KFold(n_splits=5, shuffle=True)

"""
x = df_new[numeric_feature_names]

results = cross_val_score(est, x, dummy_y, cv=kfold)
print("Baseline: %.2f%% (%.2f%%)" % (results.mean()*100, results.std()*100))
"""

'\nx = df_new[numeric_feature_names]\n\nresults = cross_val_score(est, x, dummy_y, cv=kfold)\nprint("Baseline: %.2f%% (%.\nresults.std()*100))\n'

"""
https://machinelearningmastery.com/multi-class-classification-tutorial-keras-deep-learning-library/\nhttps://www.tensorflow.org/tutorials/load_data/pandas_dataframe\nhttps://regenerativetoday.com/a-step-by-step-tutorial-to-develop-a-multi-output-model-in-tensorflow/\n
"""

'\nhttps://machinelearningmastery.com/multi-class-classification-tutorial-keras-deep-learning-library/\nhttps://www.tensc\na/pandas_dataframe\nhttps://regenerativetoday.com/a-step-by-step-tutorial-to-develop-a-multi-output-model-in-tensorflow/'

jumlah_class = len(df_new['activity'].value_counts())
print(jumlah_class)

```

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```
df_new['activity'] = df_new['activity'].astype('category')
df_new['activity_category'] = df_new['activity'].cat.codes.astype('category')
print(df_new.head())
```

	activity	durasi	calories	berat	Intensity	Description	\
0	Cycling, mountain bike, bmx	1	0.058358	2			NaN
1	Cycling, mountain bike, bmx	1	0.087536	3			NaN
2	Cycling, mountain bike, bmx	1	0.116715	4			NaN
3	Cycling, mountain bike, bmx	1	0.145894	5			NaN
4	Cycling, mountain bike, bmx	1	0.175073	6			NaN

	activity_category
0	61
1	61
2	61
3	61
4	61

```
df_new_2 = df_new.drop(columns = ['activity', 'Intensity Description'])
sc = StandardScaler()
x = pd.DataFrame(sc.fit_transform(df_new_2))
```

```
df_new_2['durasi'] = MinMaxScaler().fit_transform(np.array(df_new_2['durasi']).reshape(-1,1))
df_new_2['calories'] = MinMaxScaler().fit_transform(np.array(df_new_2['calories']).reshape(-1,1))
df_new_2['berat'] = MinMaxScaler().fit_transform(np.array(df_new_2['berat']).reshape(-1,1))
```

```
y = tf.keras.utils.to_categorical(df_new["activity_category"].values, num_classes=jumlah_class)
```

```
x_train, x_test, y_train, y_test = train_test_split(x.values, y, test_size=0.2)
```

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```
[[[-1.35066498e+00 -4.83891605e-01 1.22482836e+00 -7.61270455e-01]
 [ 6.45524518e-01 -3.50932742e-01 2.99439752e-04 -8.45080046e-01]
 [-5.90129526e-02 -4.60763979e-01 -1.74633263e-01 1.40381066e+00]
 ...
 [-4.69993144e-01 2.35554652e-01 7.35016792e-01 -1.38984239e+00]
 [-1.64422226e+00 -9.10832216e-01 -1.01431024e+00 -4.81905150e-01]
 [-1.76435864e-01 4.43372659e-02 -6.96736414e-02 -1.13841362e+00]]
 [[0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]
 [[-1.70293372 -0.89776039 1.67965339 0.16063505]
 [-0.46999314 -0.44537205 0.59507063 -1.264128 ]
 [ 0.64552452 1.44016513 0.42013793 -0.16063505]
 ...
 [-0.76355042 -0.46448915 0.80498987 -0.71936566]
 [-0.58741606 0.61334078 1.15485528 1.11047709]
 [ 1.17392762 -0.02819828 -0.06967364 1.32000106]]
 [[0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 ...
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]
 [0. 0. 0. ... 0. 0. 0.]]
```

```
from keras.engine import sequential
def get_model():
    model = tf.keras.Sequential([
        Dense(50, activation='relu'),
        Dense(50, activation='relu'),
        Dense(60, activation='relu'),
        Dense(70, activation='relu'),
        Dense(80, activation='relu'),
        Dense(90, activation='relu'),
        Dense(100, activation='relu'),
        Dense(banyak_kategori, activation='softmax')
    ])

    model.compile(optimizer='adam',
                  loss='categorical_crossentropy',
```

```

        metrics=['accuracy'])
    return model

#x_train=np.asarray(x_train).astype(np.int)

#y_train=np.asarray(y_train).astype(np.int)

my_callbacks = [
    tf.keras.callbacks.EarlyStopping(patience=2),
    tf.keras.callbacks.ModelCheckpoint(filepath='model_{epoch:02d}-{val_loss:.2f}.h5'),
    tf.keras.callbacks.TensorBoard(log_dir='./logs'),
]

model = get_model()

model_fit = model.fit(x_train,
                      y_train,
                      epochs = 15,
                      validation_data = (x_test, y_test))

Epoch 1/15
36221/36221 [=====] - 198s 5ms/step - loss: 0.8080 - accuracy: 0.7010 - val_loss: 0.4960 - val_
Epoch 2/15
36221/36221 [=====] - 172s 5ms/step - loss: 0.4120 - accuracy: 0.8293 - val_loss: 0.3023 - val_
Epoch 3/15
36221/36221 [=====] - 177s 5ms/step - loss: 0.3285 - accuracy: 0.8635 - val_loss: 0.3153 - val_
Epoch 4/15
36221/36221 [=====] - 168s 5ms/step - loss: 0.2768 - accuracy: 0.8866 - val_loss: 0.1998 - val_
Epoch 5/15
36221/36221 [=====] - 181s 5ms/step - loss: 0.2430 - accuracy: 0.9019 - val_loss: 0.2146 - val_
Epoch 6/15
36221/36221 [=====] - 181s 5ms/step - loss: 0.2181 - accuracy: 0.9134 - val_loss: 0.2106 - val_
Epoch 7/15
36221/36221 [=====] - 181s 5ms/step - loss: 0.2005 - accuracy: 0.9215 - val_loss: 0.2084 - val_
Epoch 8/15
36221/36221 [=====] - 181s 5ms/step - loss: 0.1864 - accuracy: 0.9287 - val_loss: 0.6731 - val_
Epoch 9/15
36221/36221 [=====] - 180s 5ms/step - loss: 0.1756 - accuracy: 0.9334 - val_loss: 0.1280 - val_
Epoch 10/15
36221/36221 [=====] - 180s 5ms/step - loss: 0.1654 - accuracy: 0.9386 - val_loss: 0.1829 - val_
Epoch 11/15
36221/36221 [=====] - 176s 5ms/step - loss: 0.1571 - accuracy: 0.9426 - val_loss: 0.0686 - val_
Epoch 12/15
36221/36221 [=====] - 196s 5ms/step - loss: 0.1496 - accuracy: 0.9466 - val_loss: 0.0995 - val_
Epoch 13/15
36221/36221 [=====] - 181s 5ms/step - loss: 0.1395 - accuracy: 0.9499 - val_loss: 0.0671 - val_
Epoch 14/15
36221/36221 [=====] - 182s 5ms/step - loss: 0.1367 - accuracy: 0.9520 - val_loss: 0.1110 - val_
Epoch 15/15
36221/36221 [=====] - 183s 5ms/step - loss: 0.1318 - accuracy: 0.9545 - val_loss: 0.1070 - val_

def plot_accuracy(history):

    plt.plot(history.history['accuracy'],label='train accuracy')
    plt.plot(history.history['val_accuracy'],label='validation accuracy')
    plt.title('Model accuracy')
    plt.ylabel('Accuracy')
    plt.xlabel('Epoch')
    plt.legend(loc='best')
    plt.savefig('Accuracy_v1_model_inceptionv3')
    plt.show()

def plot_loss(history):

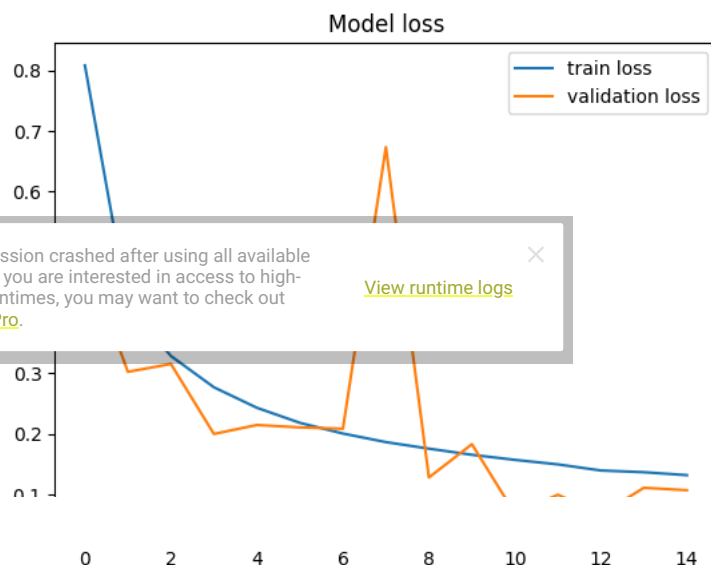
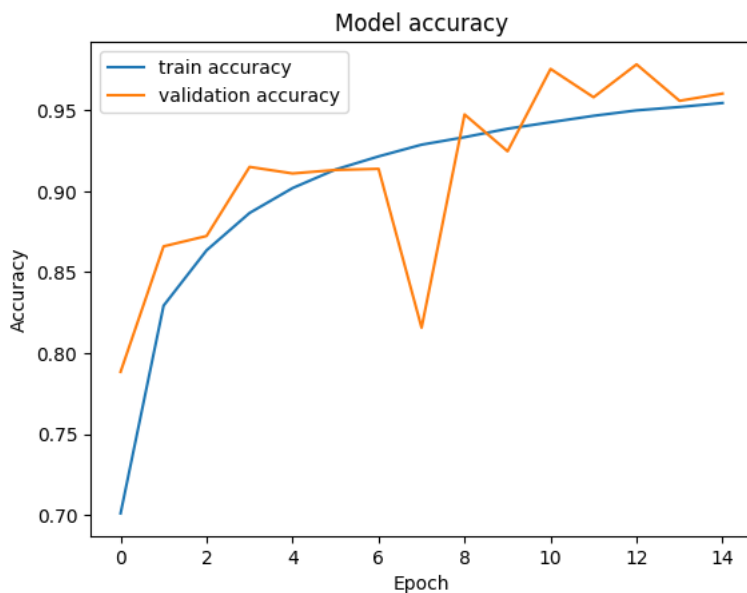
    plt.plot(history.history['loss'],label="train loss")
    plt.plot(history.history['val_loss'],label="validation loss")
    plt.title('Model loss')
    plt.ylabel('Loss')
    plt.xlabel('Epoch')
    plt.legend(loc='best')
    plt.savefig('Loss_v1_model_inceptionv3')
    plt.show()

plot_accuracy(model_fit)
plot_loss(model_fit)

```

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```
model.save('/content/drive/MyDrive/Capstone/model_exercise.h5')
```

```
# Convert the model.
```

```
converter = tf.lite.TFLiteConverter.from_keras_model(model)
```

```
tflite_model = converter.convert()
```

```
# Save the model.
```

```
with open('/content/drive/MyDrive/Capstone/model_exercise.tflite', 'wb') as f:
    f.write(tflite_model)
```

WARNING:absl:Found untraced functions such as _update_step_xla while saving (showing 1 of 1). These functions will not be

```
predict_x = model.predict(x_test)
```

```
classes_x = np.argmax(predict_x,axis=1)
```

```
#y_pred_class = model.predict_classes(x_test)
```

```
y_pred = model.predict(x_test)
```

```
y_test_class = np.argmax(y_test, axis=1)
```

```
confusion_matrix = confusion_matrix(y_test_class, classes_x)
```

```
9056/9056 [=====] - 21s 2ms/step
```

```
9056/9056 [=====] - 18s 2ms/step
```

```
print(classification_report(y_test_class, classes_x))
```

	precision	recall	f1-score	support
0	0.88	1.00	0.93	1170
1	0.96	0.89	0.93	1160
2	0.99	0.93	0.96	1182
3	0.95	0.99	0.97	1155
4	0.99	0.97	0.98	1171
5	0.97	0.97	0.97	1189
6	0.81	0.96	0.88	1142
7	0.96	0.77	0.85	1126
8	0.98	0.93	0.95	1178

9	0.94	0.99	0.97	1204
10	1.00	0.98	0.99	1122
11	0.89	1.00	0.94	1167
12	0.98	0.89	0.93	1203
13	0.97	0.96	0.96	1181
14	0.92	1.00	0.96	1182
15	0.90	0.92	0.91	1143
16	0.96	0.84	0.90	1177
17	0.87	0.94	0.90	1169
18	1.00	0.73	0.84	1192
19	0.84	0.97	0.90	1155
20	0.99	1.00	0.99	1147
21	0.96	0.99	0.98	1200
22	0.99	1.00	1.00	1129
23	1.00	0.96	0.98	1177
24	0.98	1.00	0.99	1183
25	0.97	1.00	0.99	1166
26	1.00	0.97	0.99	1091
27	0.98	0.99	0.99	1207
28	0.99	1.00	0.99	1156
29	1.00	0.94	0.97	1187
30	0.95	0.96	0.96	1152
31	0.98	0.84	0.90	1109
32	0.85	1.00	0.92	1180
33	1.00	0.93	0.97	1161
34	0.94	0.98	0.96	1120
35	0.98	1.00	0.99	1159
36	1.00	1.00	1.00	1151
37	1.00	0.97	0.98	1215
38	0.96	1.00	0.98	1144
39	0.97	0.99	0.98	1119
40	1.00	0.96	0.98	1135
41	0.83	1.00	0.90	1165
42	0.89	0.93	0.91	1138
43	0.95	0.99	0.97	1150
44	0.87	0.74	0.80	1198

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51	0.99	0.98	0.98	1171
52	0.96	0.98	0.97	1205
53	0.67	0.91	0.77	1167
54	1.00	0.94	0.97	1166
55	1.00	0.99	0.99	1211

```
report = classification_report(y_test_class, classes_x, output_dict=True, zero_division=0)
```

```
# Extract the metrics
precision = report['macro avg']['precision']
recall = report['macro avg']['recall']
f1_score = report['macro avg']['f1-score']
support = report['macro avg']['support']
accuracy = report['accuracy']
```

```
print("accuracy:", accuracy)
print("Precision:", precision)
print("Recall:", recall)
print("F1-score:", f1_score)
print("support" , support)
```

```
accuracy: 0.9603090791126572
Precision: 0.9660990410937471
Recall: 0.9608365246358126
F1-score: 0.9592716520206644
support 289764
```

```
def plot_confusion_matrix(matrix, labels, title='Confusion matrix'):
    fig, ax = plt.subplots()
    ax.set_xticks([x for x in range(len(labels))])
    ax.set_yticks([y for y in range(len(labels))])
    # Place labels on minor ticks
    ax.set_xticks([x + 0.5 for x in range(len(labels))], minor=True)
    ax.set_xticklabels(labels, rotation='90', fontsize=10, minor=True)
    ax.set_yticks([y + 0.5 for y in range(len(labels))], minor=True)
    ax.set_yticklabels(labels[::-1], fontsize=10, minor=True)
    # Hide major tick labels
    ax.tick_params(which='major', labelbottom='off', labelleft='off')
    # Finally, hide minor tick marks
    ax.tick_params(which='minor', width=0)

    # Plot heat map
    proportions = [1. * row / sum(row) for row in matrix]
```

```

ax.pcolor(np.array(proportions[:::-1]), cmap=plt.cm.Blues)

# Plot counts as text
for row in range(len(matrix)):
    for col in range(len(matrix[row])):
        confusion = matrix[:::-1][row][col]
        if confusion != 0:
            ax.text(col + 0.5, row + 0.5, confusion, fontsize=9,
                    horizontalalignment='center',
                    verticalalignment='center')

# Add finishing touches
ax.grid(True, linestyle=':')
ax.set_title(title)
fig.tight_layout()
plt.show()

#print(type(confusion_matrix(y_test_class, classes_x)))
#print(y_test_class)
#print(y_test)
#print(len(y_test_class))

dict_activity = dict(enumerate(df_new['activity'].cat.categories))
df_new['activity_code'] = df_new['activity'].cat.codes
print(df_new['activity_code'])
print(dict_activity)
df_new['activity_reversed'] = df_new['activity_code'].map(dict_activity)
df_y_test_class = pd.DataFrame(y_test_class, columns = ['activity_class'])
df_y_test_class['activity_class_reversed'] = df_y_test_class['activity_class'].map(dict_activity)
print(df_y_test_class)

0          61
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Colab Pro.
1448811      73
1448812      40
1448813     207
1448814     232
1448815     208
Name: activity_code, Length: 1448816, dtype: int16
{0: 'Aerobics, general', 1: 'Aerobics, high impact', 2: 'Aerobics, low impact', 3: 'Aerobics, step aerobics', 4: 'Archery',
  activity_class      activity_class_reversed
0          135      Riding, snow blower
1           33      Carrying infant, level ground
2          112      Martial arts, judo, karate, jujitsu
3          123      Playing paddleball
4           54          Curling
...          ...
289759       199      Swimming laps, freestyle, slow
289760        71      Frisbee, ultimate frisbee
289761        72      Gardening, general
289762       203      Swimming, treading water, fast, vigorous
289763       218      Walk / run, playing with animals

[289764 rows x 2 columns]

#cm_display = metrics.ConfusionMatrixDisplay(confusion_matrix = confusion_matrix)
#cm_display.plot()
#plt.show()

```




```
#import seaborn as sns
#sns.heatmap(confusion_matrix,figsize=(200,200), annot=True)
```



```
from sklearn.metrics import confusion_matrix
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

```
df_cm = pd.DataFrame(confusion_matrix(y_test_class, classes_x), columns=np.unique(y_test_class), index=np.unique(classes_x))
df_cm.index.name = 'Actual'
df_cm.columns.name = 'Predicted'
```

```
f, ax = plt.subplots(figsize=(500, 500))
cmap = sns.cubehelix_palette(light=1, as_cmap=True)
```

```
sns.heatmap(df_cm, cbar=False, annot=True, cmap=cmap, square=True, fmt='.0f',
            annot_kws={'size': 10})
plt.title('Actuals vs Predicted')
plt.show()
```

NameError Traceback (most recent call last)

<ipython-input-1-32b9e77ce9e7> in <cell line: 6>()

4 get_ipython().run_line_magic('matplotlib', 'inline')

5

class, classes_x), columns=np.unique(y_test_class), index=np.unique

Your session crashed after using all available
RAM. If you are interested in access to high-
RAM runtimes, you may want to check out
[Colab Pro](#).

[View runtime logs](#)

SEARCH STACK OVERFLOW