AB Symmetrie ellebogen 1 onderscheiden

December 26, 2020

```python
[1]: import sys
     sys.path.append("../")
     import pandas as pd
     from ortho_lib import *
     import os
     import matplotlib.pyplot as plt
     import numpy as np
```

```python
[2]: path_cats = ['..//transformed_data/Category_1/', '..//transformed_data/
     ↪Category_2/', '..//transformed_data/Category_3/', '..//transformed_data/
     ↪Category_4/']
     exercise = '/AB1'
     df = pd.DataFrame()


     def elleboogverschil(path_cat, df = pd.DataFrame()): #bij het aanroepen van de
     ↪functie het indexnummer voor de categorie uit path_cats
         patientID = os.listdir(path_cats[path_cat])

         for patient in patientID:
             path = path_cats[path_cat] + patient + exercise + '.txt'
             df_patient = exercise_to_df(path)
             df_patient['patientID'] = patient
             df = df.append([df_patient])

         df['sensor'] = df['sensor'].astype(int)
         frames_list = []
         frames_patnt_list = []

         for patient in patientID:
             dfpatient = df[df['patientID']==str(patient)]
             aantal_frames = dfpatient['frame'].iloc[-1] #per patient de laatste
     ↪frame geeft ook direct het aantal frames
             frame_patnt = ((aantal_frames, patient))
             frames_patnt_list.append(frame_patnt)
             frames_list.append(aantal_frames)
```

```python
    elbow_verschillen_df = pd.DataFrame() #nieuwe dataframe aanmaken om het
→gemiddelde aan verschillen per patient te bepalen
    elbow_verschillen_df['patientID'] = patientID #de lijst met patientID's
→wordt hier ook de kolom met patientID's
    elbow_verschillen_df = elbow_verschillen_df.set_index(
→['patientID'],drop=True, inplace=False) #patientID is nu de index, zodat de
→relatieve verschillen bepaald kunnen worden
    elbow_verschillen_df['aantal frames'] = frames_list #de list van frames
→staat in de goede volgorde om in z'n geheel aan de dataframe toe te voegen

    elbow_df = df[df['sensor'] != 2] #anker verwijderen uit de dataframe, dit
→datapunt is nooit nodig
    elbow_df = elbow_df.set_index( ['patientID', 'frame'], drop=True,
→inplace=False, verify_integrity=False)
    elbow_df = elbow_df.drop(columns=['x', 'y'])
    elbow_df = elbow_df[elbow_df['sensor'] != 3] #sensoren verwijderen die niet
→van belang zijn. Alleen de sensoren bewaren die vergeleken moeten worden.
    elbow_df = elbow_df[elbow_df['sensor'] != 4]
    elbow_df = elbow_df[elbow_df['sensor'] != 6]
    elbow_df = elbow_df[elbow_df['sensor'] != 7]
    elbow_df = elbow_df[elbow_df['sensor'] != 9]

    elbow5_df = elbow_df[elbow_df['sensor'] == 5]
    elbow5_df = elbow5_df.rename(columns= {'z': 'height sensor 5'})
    elbow5_df = elbow5_df.drop(columns='sensor')
    elbow8_df = elbow_df[elbow_df['sensor'] == 8]
    elbow8_df = elbow8_df.rename(columns= {'z': 'height sensor 8'})
    elbow8_df =  elbow8_df.drop(columns='sensor') #kolommen maken voor de te
→vergelijken hoogtes van de sensoren

    elbowheight_df = elbow5_df.join(elbow8_df)
    elbowheight_df['verschil'] = abs(elbowheight_df['height sensor 5'] -
→elbowheight_df['height sensor 8']) #absolute verschil per frame bepalen
    alle_verschillen = []
    elbowheight_df_resetindex = elbowheight_df.reset_index()

    for patient in patientID:
        per_patient =
→elbowheight_df_resetindex[elbowheight_df_resetindex['patientID']==patient]
→#subset maken waarbij er per een dataframe wordt getoond
        totaal_verschil = per_patient['verschil'].sum() #de kolom ['verschil']
→geeft het absolute verschil per frame dus als alles bij elkaar opgeteld
→wordt krijg je het totale verschil
        alle_verschillen.append(totaal_verschil)
```

```
    elbow_verschillen_df['som verschillen'] = alle_verschillen #nieuwe kolom in
↪de dataframe met de som van verschillen per patient
    elbow_verschillen_df['relatief verschil'] = elbow_verschillen_df['som
↪verschillen'] / elbow_verschillen_df['aantal frames'] #relatief verschil
↪bepalen door de som van de verschillen te delen op het aantal frames
    elbow_verschillen_df['category'] = path_cat + 1 #kolom met de categorie
↪toevoegen aan de dataframe. Dit is gelijka an de index + 1.

    return elbow_verschillen_df
```

[3]:
```
df_ellebogen = pd.concat([elleboogverschil(0),elleboogverschil(1),
↪elleboogverschil(2), elleboogverschil(3)])
```

[4]:
```
del df_ellebogen['som verschillen'] #deze kolommen zijn niet meer van belang
del df_ellebogen['aantal frames']
```

[5]:
```
df_ellebogen
df_wel_1 = df_ellebogen[df_ellebogen['category']==1]
df_niet_1 = df_ellebogen[df_ellebogen['category']!=1]
df_niet_1['category'] = 0
df_ellebogen = pd.concat([df_wel_1, df_niet_1])
df_ellebogen
```

/opt/jupyterhub/anaconda/lib/python3.6/site-packages/ipykernel_launcher.py:4:
SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
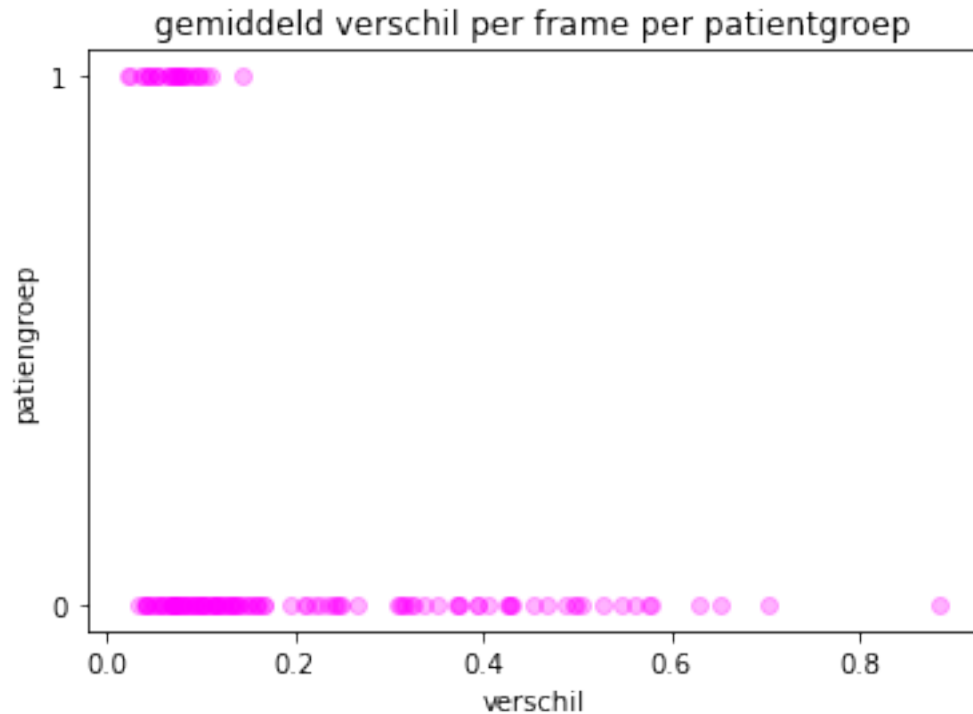 after removing the cwd from sys.path.

[5]:

patientID	relatief verschil	category
8	0.088154	1
3	0.070158	1
1	0.145582	1
14	0.052936	1
22	0.066597	1
...	...	...
5	0.628962	0
2	0.121478	0
4	0.452631	0
28	0.106036	0
24	0.265912	0

[139 rows x 2 columns]

```
[11]: plt.scatter(df_ellebogen['relatief verschil'], df_ellebogen['category'], alpha␣
       ↪= 0.3, color = 'magenta')
      plt.title('gemiddeld verschil per frame per patientgroep')
      plt.yticks([0,1])
      plt.xlabel('verschil')
      plt.ylabel('patiengroep')
```

[11]: Text(0, 0.5, 'patiengroep')


```
[12]: from sklearn.model_selection import train_test_split
      from sklearn.model_selection import StratifiedKFold
      import numpy as np
      from sklearn.linear_model import LogisticRegression

      #splitten test en train set
      X = np.asarray(df_ellebogen[['relatief verschil']])
      y = np.asarray(df_ellebogen[['category']])

      scores=[]

      loo = LeaveOneOut()
      for train, test in loo.split(X, y):
          X_train, X_test = X[train], X[test]
```

```
    y_train, y_test = y[train], y[test]
    logistic_reg = LogisticRegression()
    logistic_reg.fit(X_train,y_train)
    y_predict = logistic_reg.predict(X_test)
    score = logistic_reg.score(X_test, y_test)
    print(y_predict, score)
    scores.append(score)

print(np.mean(scores))
```

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