In [54]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
from sklearn.preprocessing import MinMaxScaler
from sklearn.preprocessing import LabelEncoder
import matplotlib.pyplot as plt
import seaborn as sns
from keras.models import Sequential
from keras.layers import Dense,Dropout
from kerastuner.tuners import RandomSearch
from kerastuner.engine.hyperparameters import HyperParameters
import os
import warnings
from tensorflow import keras
from tensorflow.keras import layers
from kerastuner.tuners import RandomSearch
warnings.filterwarnings('ignore')
```

In [55]:
```
train_data = pd.read_csv('train.csv')
test_data = pd.read_csv('test.csv')

print(f'Shape of train data is: {train_data.shape}\nShape of test data is: {test_data.sh
```

```
Shape of train data is: (7352, 563)
Shape of test data is: (2947, 563)
```

In [56]:
```
train_data.shape
```

Out[56]:
```
(7352, 563)
```

In [57]:
```
pd.set_option("display.max_columns", None)
```

In [58]:
```
train_data.head()
```

Out[58]:

	tBodyAcc-mean()-X	tBodyAcc-mean()-Y	tBodyAcc-mean()-Z	tBodyAcc-std()-X	tBodyAcc-std()-Y	tBodyAcc-std()-Z	tBodyAcc-mad()-X	tBodyAcc-mad()-Y	tBodyAcc-mad()-Z	tB
0	0.288585	-0.020294	-0.132905	-0.995279	-0.983111	-0.913526	-0.995112	-0.983185	-0.923527	-
1	0.278419	-0.016411	-0.123520	-0.998245	-0.975300	-0.960322	-0.998807	-0.974914	-0.957686	-
2	0.279653	-0.019467	-0.113462	-0.995380	-0.967187	-0.978944	-0.996520	-0.963668	-0.977469	-
3	0.279174	-0.026201	-0.123283	-0.996091	-0.983403	-0.990675	-0.997099	-0.982750	-0.989302	-
4	0.276629	-0.016570	-0.115362	-0.998139	-0.980817	-0.990482	-0.998321	-0.979672	-0.990441	-

In [59]:
```
train_data.describe
```

Out[59]:

```
<bound method NDFrame.describe of      tBodyAcc-mean()-X  tBodyAcc-mean()-Y  tBodyAcc-mean()-Z  \
0              0.288585          -0.020294          -0.132905
1              0.278419          -0.016411          -0.123520
2              0.279653          -0.019467          -0.113462
3              0.279174          -0.026201          -0.123283
4              0.276629          -0.016570          -0.115362
...                 ...                ...                ...
7347           0.299665          -0.057193          -0.181233
7348           0.273853          -0.007749          -0.147468
7349           0.273387          -0.017011          -0.045022
7350           0.289654          -0.018843          -0.158281
7351           0.351503          -0.012423          -0.203867

      tBodyAcc-std()-X  tBodyAcc-std()-Y  tBodyAcc-std()-Z  tBodyAcc-mad()-X  \
0            -0.995279         -0.983111         -0.913526         -0.995112
1            -0.998245         -0.975300         -0.960322         -0.998807
2            -0.995380         -0.967187         -0.978944         -0.996520
3            -0.996091         -0.983403         -0.990675         -0.997099
4            -0.998139         -0.980817         -0.990482         -0.998321
...                ...               ...               ...               ...
7347         -0.195387          0.039905          0.077078         -0.282301
7348         -0.235309          0.004816          0.059280         -0.322552
7349         -0.218218         -0.103822          0.274533         -0.304515
7350         -0.219139         -0.111412          0.268893         -0.310487
7351         -0.269270         -0.087212          0.177404         -0.377404

      tBodyAcc-mad()-Y  tBodyAcc-mad()-Z  tBodyAcc-max()-X  tBodyAcc-max()-Y  \
0            -0.983185         -0.923527         -0.934724         -0.567378
1            -0.974914         -0.957686         -0.943068         -0.557851
2            -0.963668         -0.977469         -0.938692         -0.557851
3            -0.982750         -0.989302         -0.938692         -0.576159
4            -0.979672         -0.990441         -0.942469         -0.569174
...                ...               ...               ...               ...
7347          0.043616          0.060410          0.210795          0.029369
7348         -0.029456          0.080585          0.117440          0.029369
7349         -0.098913          0.332584          0.043999         -0.110405
7350         -0.068200          0.319473          0.101702         -0.149495
7351         -0.038678          0.229430          0.269013         -0.147028

      tBodyAcc-max()-Z  tBodyAcc-min()-X  tBodyAcc-min()-Y  tBodyAcc-min()-Z  \
0            -0.744413          0.852947          0.685845          0.814263
1            -0.818409          0.849308          0.685845          0.822637
2            -0.818409          0.843609          0.682401          0.839344
3            -0.829711          0.843609          0.682401          0.837869
4            -0.824705          0.849095          0.683250          0.837869
...                ...               ...               ...               ...
7347         -0.076700          0.273480          0.186626          0.266917
7348         -0.031966          0.282174          0.202880          0.266917
7349          0.055411          0.263175          0.202880          0.264670
7350          0.055411          0.234850          0.237784          0.264670
7351         -0.133749          0.234850          0.237784          0.301579

      tBodyAcc-sma()  tBodyAcc-energy()-X  tBodyAcc-energy()-Y  \
0          -0.965523            -0.999945            -0.999863
1          -0.981930            -0.999991            -0.999788
2          -0.983478            -0.999969            -0.999660
3          -0.986093            -0.999976            -0.999736
4          -0.992653            -0.999991            -0.999856
...              ...                  ...                  ...
7347        0.000698            -0.674986            -0.788077
7348       -0.041310            -0.706359            -0.804546
7349        0.008034            -0.693162            -0.844279
7350        0.020011            -0.693855            -0.846871
```

```
7351       -0.027958           -0.730624           -0.838478

      tBodyAcc-energy()-Z  tBodyAcc-iqr()-X  tBodyAcc-iqr()-Y  \
0               -0.994612         -0.994231         -0.987614
1               -0.998405         -0.999150         -0.977866
2               -0.999470         -0.997130         -0.964810
3               -0.999504         -0.997180         -0.983799
4               -0.999757         -0.998004         -0.981232
...                   ...               ...               ...
7347            -0.473463         -0.501092         -0.166197
7348            -0.495789         -0.520057         -0.279863
7349            -0.271194         -0.488620         -0.250723
7350            -0.279718         -0.488245         -0.196204
7351            -0.368309         -0.627128         -0.112288

      tBodyAcc-iqr()-Z  tBodyAcc-entropy()-X  tBodyAcc-entropy()-Y  \
0            -0.943220             -0.407747             -0.679338
1            -0.948225             -0.714892             -0.500930
2            -0.974675             -0.592235             -0.485821
3            -0.986007             -0.627446             -0.850930
4            -0.991325             -0.786553             -0.559477
...                ...                   ...                   ...
7347          0.034015              0.195643              0.140158
7348          0.026565              0.178138              0.293566
7349          0.334376              0.173131              0.276040
7350          0.239455              0.160333              0.246561
7351          0.262496              0.312180              0.333536

      tBodyAcc-entropy()-Z  tBodyAcc-arCoeff()-X,1  tBodyAcc-arCoeff()-X,2  \
0                -0.602122                0.929294               -0.853011
1                -0.570979                0.611627               -0.329549
2                -0.570979                0.273025               -0.086309
3                -0.911872                0.061436                0.074840
4                -0.761434                0.313276               -0.131208
...                    ...                     ...                     ...
7347             -0.082077               -0.561607                0.426433
7348             -0.051532               -0.361660                0.149854
7349              0.152003               -0.376773                0.200784
7350              0.021678               -0.475165                0.296546
7351             -0.099101               -0.442905                0.386497

      tBodyAcc-arCoeff()-X,3  tBodyAcc-arCoeff()-X,4  tBodyAcc-arCoeff()-Y,1  \
0                   0.359910               -0.058526                0.256892
1                   0.284213                0.284595                0.115705
2                   0.337202               -0.164739                0.017150
3                   0.198204               -0.264307                0.072545
4                   0.191161                0.086904                0.257615
...                      ...                     ...                     ...
7347               -0.078255               -0.056751               -0.094106
7348                0.206839               -0.154722                0.032725
7349                0.063584               -0.017019               -0.004323
7350                0.009588               -0.038354               -0.277801
7351               -0.230562                0.139282               -0.446446

      tBodyAcc-arCoeff()-Y,2  tBodyAcc-arCoeff()-Y,3  tBodyAcc-arCoeff()-Y,4  \
0                  -0.224848                0.264106               -0.095246
1                  -0.090963                0.294310               -0.281211
2                  -0.074507                0.342256               -0.332564
3                  -0.155320                0.323154               -0.170813
4                  -0.272505                0.434728               -0.315375
...                      ...                     ...                     ...
7347                0.099141               -0.119821                0.293112
7348               -0.057240                0.034260                0.239835
7349               -0.023053                0.119962                0.080689
```

```
7350                0.201032                0.101761               -0.108375
7351                0.391569               -0.156435                0.097870

      tBodyAcc-arCoeff()-Z,1  tBodyAcc-arCoeff()-Z,2  tBodyAcc-arCoeff()-Z,3  \
0                   0.278851               -0.465085                0.491936
1                   0.085988               -0.022153               -0.016657
2                   0.239281               -0.136204                0.173863
3                   0.294938               -0.306081                0.482148
4                   0.439744               -0.269069                0.179414
...                      ...                     ...                     ...
7347               -0.425386                0.267986               -0.205315
7348               -0.364480                0.121335                0.188717
7349               -0.420093                0.197763               -0.033780
7350               -0.438356                0.250837               -0.234309
7351               -0.405691                0.183340               -0.056556

      tBodyAcc-arCoeff()-Z,4  tBodyAcc-correlation()-X,Y  \
0                  -0.190884                   0.376314
1                  -0.220643                  -0.013429
2                  -0.299493                  -0.124698
3                  -0.470129                  -0.305693
4                  -0.088952                  -0.155804
...                      ...                        ...
7347                0.142117                  -0.211822
7348               -0.207505                  -0.198555
7349                0.016677                  -0.226826
7350                0.232444                  -0.257775
7351                0.054368                  -0.266442

      tBodyAcc-correlation()-X,Z  tBodyAcc-correlation()-Y,Z  \
0                       0.435129                   0.660790
1                      -0.072692                   0.579382
2                      -0.181105                   0.608900
3                      -0.362654                   0.507459
4                      -0.189763                   0.599213
...                          ...                        ...
7347                   -0.251582                  -0.283335
7348                   -0.225866                  -0.274504
7349                   -0.184700                  -0.198452
7350                   -0.231103                  -0.189915
7351                   -0.291113                  -0.200293

      tGravityAcc-mean()-X  tGravityAcc-mean()-Y  tGravityAcc-mean()-Z  \
0                 0.963396             -0.140840              0.115375
1                 0.966561             -0.141551              0.109379
2                 0.966878             -0.142010              0.101884
3                 0.967615             -0.143976              0.099850
4                 0.968224             -0.148750              0.094486
...                    ...                   ...                   ...
7347              0.923148             -0.222004             -0.039492
7348              0.918343             -0.242054             -0.039863
7349              0.919810             -0.236950             -0.026805
7350              0.922323             -0.233230             -0.004984
7351              0.918707             -0.233292             -0.020954

      tGravityAcc-std()-X  tGravityAcc-std()-Y  tGravityAcc-std()-Z  \
0               -0.985250            -0.981708            -0.877625
1               -0.997411            -0.989447            -0.931639
2               -0.999574            -0.992866            -0.992917
3               -0.996646            -0.981393            -0.978476
4               -0.998429            -0.988098            -0.978745
...                   ...                  ...                  ...
7347            -0.944438            -0.857541            -0.867414
7348            -0.953598            -0.929171            -0.869494
```

```
7349           -0.978445           -0.980606           -0.764150
7350           -0.974112           -0.972391           -0.853617
7351           -0.952415           -0.967850           -0.898465

      tGravityAcc-mad()-X  tGravityAcc-mad()-Y  tGravityAcc-mad()-Z  \
0              -0.985001           -0.984416           -0.894677
1              -0.997884           -0.989614           -0.933240
2              -0.999635           -0.992605           -0.992934
3              -0.996457           -0.980962           -0.978456
4              -0.998411           -0.988654           -0.978936
...                  ...                 ...                 ...
7347           -0.949128           -0.850830           -0.879996
7348           -0.959738           -0.938667           -0.878587
7349           -0.979325           -0.981400           -0.764068
7350           -0.974642           -0.974248           -0.865344
7351           -0.955758           -0.969766           -0.903300

      tGravityAcc-max()-X  tGravityAcc-max()-Y  tGravityAcc-max()-Z  \
0               0.892055           -0.161265            0.124660
1               0.892060           -0.161343            0.122586
2               0.892401           -0.163711            0.094566
3               0.893817           -0.163711            0.093425
4               0.893817           -0.166786            0.091682
...                  ...                 ...                 ...
7347            0.867718           -0.214233           -0.016391
7348            0.866116           -0.231477           -0.016391
7349            0.854641           -0.249134            0.024684
7350            0.855988           -0.244267            0.024684
7351            0.855988           -0.240956            0.003031

      tGravityAcc-min()-X  tGravityAcc-min()-Y  tGravityAcc-min()-Z  \
0               0.977436           -0.123213            0.056483
1               0.984520           -0.114893            0.102764
2               0.986770           -0.114893            0.102764
3               0.986821           -0.121336            0.095753
4               0.987434           -0.121834            0.094059
...                  ...                 ...                 ...
7347            0.920554           -0.234998           -0.071977
7348            0.920554           -0.234998           -0.068919
7349            0.933008           -0.216004           -0.068919
7350            0.933008           -0.210542           -0.040009
7351            0.916729           -0.212149           -0.047491

      tGravityAcc-sma()  tGravityAcc-energy()-X  tGravityAcc-energy()-Y  \
0             -0.375426               0.899469               -0.970905
1             -0.383430               0.907829               -0.970583
2             -0.401602               0.908668               -0.970368
3             -0.400278               0.910621               -0.969400
4             -0.400477               0.912235               -0.967051
...                 ...                    ...                     ...
7347          -0.405132               0.794766               -0.918375
7348          -0.358934               0.782407               -0.902880
7349          -0.377025               0.786085               -0.907561
7350          -0.440050               0.792538               -0.910648
7351          -0.432003               0.783342               -0.910579

      tGravityAcc-energy()-Z  tGravityAcc-iqr()-X  tGravityAcc-iqr()-Y  \
0                -0.975510           -0.984325           -0.988849
1                -0.978500           -0.999188           -0.990029
2                -0.981672           -0.999679           -0.992104
3                -0.982420           -0.995976           -0.980663
4                -0.984363           -0.998318           -0.990611
...                    ...                 ...                 ...
7347             -0.995193           -0.960008           -0.847151
```

```
7348              -0.995151           -0.973801           -0.952910
7349              -0.995450           -0.981850           -0.982357
7350              -0.998824           -0.974185           -0.978666
7351              -0.998144           -0.964068           -0.970548

      tGravityAcc-iqr()-Z  tGravityAcc-entropy()-X  tGravityAcc-entropy()-Y  \
0               -0.917743               -1.000000                     -1.0
1               -0.941685               -1.000000                     -1.0
2               -0.992619               -1.000000                     -1.0
3               -0.979779               -1.000000                     -1.0
4               -0.980412               -1.000000                     -1.0
...                   ...                     ...                      ...
7347            -0.908108               -0.097745                     -1.0
7348            -0.885260               -0.144103                     -1.0
7349            -0.758037               -0.420072                     -1.0
7350            -0.890623               -0.402564                     -1.0
7351            -0.919983               -0.232980                     -1.0

      tGravityAcc-entropy()-Z  tGravityAcc-arCoeff()-X,1  \
0                    0.113806                  -0.590425
1                   -0.210494                  -0.410056
2                   -0.926776                   0.002234
3                   -0.596101                  -0.064935
4                   -0.616578                  -0.257267
...                       ...                        ...
7347                -1.000000                  -0.623277
7348                -1.000000                  -0.625398
7349                -0.527859                  -0.595844
7350                -0.492578                  -0.628755
7351                -0.944046                  -0.612975

      tGravityAcc-arCoeff()-X,2  tGravityAcc-arCoeff()-X,3  \
0                      0.591146                  -0.591773
1                      0.413856                  -0.417567
2                      0.027481                  -0.056728
3                      0.075427                  -0.085823
4                      0.268918                  -0.280665
...                         ...                        ...
7347                   0.660477                  -0.697090
7348                   0.660353                  -0.694761
7349                   0.637481                  -0.677800
7350                   0.666204                  -0.702518
7351                   0.652535                  -0.691012

      tGravityAcc-arCoeff()-X,4  tGravityAcc-arCoeff()-Y,1  \
0                      0.592469                  -0.745449
1                      0.421325                  -0.196359
2                      0.085533                  -0.329023
3                      0.096208                  -0.295036
4                      0.292616                  -0.166693
...                         ...                        ...
7347                   0.733186                  -0.689028
7348                   0.728698                  -0.662997
7349                   0.716836                  -0.459707
7350                   0.737752                  -0.418440
7351                   0.728455                  -0.499666

      tGravityAcc-arCoeff()-Y,2  tGravityAcc-arCoeff()-Y,3  \
0                      0.720862                  -0.712372
1                      0.125345                  -0.105568
2                      0.270500                  -0.254490
3                      0.228310                  -0.206281
4                      0.089943                  -0.066327
...                         ...                        ...
```

```
7347                    0.684225                   -0.700438
7348                    0.654116                   -0.667777
7349                    0.448116                   -0.471838
7350                    0.404027                   -0.427343
7351                    0.481701                   -0.496321

      tGravityAcc-arCoeff()-Y,4  tGravityAcc-arCoeff()-Z,1  \
0                       0.711300                   -0.995112
1                       0.109090                   -0.833882
2                       0.257598                   -0.705039
3                       0.204801                   -0.385410
4                       0.067131                   -0.237474
...                          ...                         ...
7347                    0.725020                   -0.787143
7348                    0.690571                   -0.710545
7349                    0.509141                   -0.821631
7350                    0.465150                   -0.838582
7351                    0.523992                   -0.842003

      tGravityAcc-arCoeff()-Z,2  tGravityAcc-arCoeff()-Z,3  \
0                       0.995675                   -0.995668
1                       0.834271                   -0.834184
2                       0.714392                   -0.723299
3                       0.386373                   -0.387120
4                       0.239268                   -0.241012
...                          ...                         ...
7347                    0.802503                   -0.817217
7348                    0.721749                   -0.732199
7349                    0.835444                   -0.848732
7350                    0.858624                   -0.878153
7351                    0.861512                   -0.880484

      tGravityAcc-arCoeff()-Z,4  tGravityAcc-correlation()-X,Y  \
0                       0.991653                      0.570222
1                       0.830464                     -0.831284
2                       0.728755                     -0.181090
3                       0.385263                     -0.991309
4                       0.240569                     -0.408330
...                          ...                           ...
7347                    0.828104                      0.652568
7348                    0.738875                      0.856225
7349                    0.858278                      0.582621
7350                    0.893990                      0.758480
7351                    0.895630                      0.252823

      tGravityAcc-correlation()-X,Z  tGravityAcc-correlation()-Y,Z  \
0                          0.439027                      0.986913
1                         -0.865711                      0.974386
2                          0.337936                      0.643417
3                         -0.968821                      0.984256
4                         -0.184840                      0.964797
...                             ...                           ...
7347                      -0.390766                     -0.862406
7348                      -0.272643                     -0.639248
7349                      -0.119819                      0.132213
7350                      -0.506638                     -0.160352
7351                      -0.123117                      0.295220

      tBodyAccJerk-mean()-X  tBodyAccJerk-mean()-Y  tBodyAccJerk-mean()-Z  \
0                  0.077996               0.005001              -0.067831
1                  0.074007               0.005771               0.029377
2                  0.073636               0.003104              -0.009046
3                  0.077321               0.020058              -0.009865
4                  0.073444               0.019122               0.016780
```

```
...                    ...                    ...                    ...
7347              -0.319227               0.111397              -0.169428
7348              -0.422605               0.357862               0.051456
7349               0.096541              -0.135003              -0.029136
7350              -0.025849              -0.025822              -0.032682
7351               0.075052               0.011401              -0.285681

      tBodyAccJerk-std()-X  tBodyAccJerk-std()-Y  tBodyAccJerk-std()-Z  \
0                -0.993519             -0.988360             -0.993575
1                -0.995548             -0.981064             -0.991846
2                -0.990743             -0.980956             -0.989687
3                -0.992697             -0.987553             -0.993498
4                -0.996420             -0.988359             -0.992455
...                    ...                   ...                   ...
7347             -0.299527             -0.356428             -0.650624
7348             -0.350932             -0.386212             -0.641773
7349             -0.345455             -0.378177             -0.643025
7350             -0.387107             -0.406063             -0.667881
7351             -0.320544             -0.469368             -0.712671

      tBodyAccJerk-mad()-X  tBodyAccJerk-mad()-Y  tBodyAccJerk-mad()-Z  \
0                -0.994488             -0.986207             -0.992818
1                -0.995632             -0.978938             -0.991277
2                -0.990933             -0.979300             -0.987238
3                -0.994266             -0.985717             -0.991483
4                -0.996597             -0.986537             -0.990686
...                    ...                   ...                   ...
7347             -0.354220             -0.325092             -0.634112
7348             -0.373408             -0.353584             -0.626633
7349             -0.333450             -0.361106             -0.615829
7350             -0.398157             -0.395983             -0.644665
7351             -0.413476             -0.447731             -0.680432

      tBodyAccJerk-max()-X  tBodyAccJerk-max()-Y  tBodyAccJerk-max()-Z  \
0                -0.985180             -0.991994             -0.993119
1                -0.994545             -0.979068             -0.992257
2                -0.987077             -0.979068             -0.992257
3                -0.987077             -0.991786             -0.989769
4                -0.996993             -0.991818             -0.989769
...                    ...                   ...                   ...
7347             -0.230761             -0.623154             -0.776570
7348             -0.534030             -0.608550             -0.815255
7349             -0.496593             -0.608550             -0.764300
7350             -0.326884             -0.599335             -0.764300
7351             -0.128388             -0.599335             -0.768898

      tBodyAccJerk-min()-X  tBodyAccJerk-min()-Y  tBodyAccJerk-min()-Z  \
0                 0.989835              0.991957              0.990519
1                 0.992577              0.991808              0.988539
2                 0.988390              0.991808              0.988539
3                 0.988390              0.992544              0.993218
4                 0.994303              0.992544              0.985609
...                    ...                   ...                   ...
7347              0.143533              0.421748              0.564525
7348              0.143533              0.546949              0.564525
7349              0.220907              0.546949              0.611070
7350              0.284201              0.462550              0.621398
7351              0.029112              0.462550              0.727527

      tBodyAccJerk-sma()  tBodyAccJerk-energy()-X  tBodyAccJerk-energy()-Y  \
0              -0.993522                -0.999935                -0.999820
1              -0.991394                -0.999960                -0.999640
2              -0.988148                -0.999894                -0.999636
3              -0.992868                -0.999924                -0.999803
```

```
4              -0.993832                -0.999969                -0.999820
...                  ...                      ...                      ...
7347           -0.408954                -0.751511                -0.788667
7348           -0.423324                -0.785945                -0.807161
7349           -0.403106                -0.783179                -0.802471
7350           -0.450685                -0.809596                -0.819588
7351           -0.484546                -0.766539                -0.855454

      tBodyAccJerk-energy()-Z  tBodyAccJerk-iqr()-X  tBodyAccJerk-iqr()-Y  \
0                   -0.999878             -0.994364             -0.986025
1                   -0.999845             -0.993863             -0.979435
2                   -0.999795             -0.987846             -0.980145
3                   -0.999883             -0.994678             -0.987033
4                   -0.999860             -0.995888             -0.986524
...                       ...                   ...                   ...
7347                -0.934667             -0.439171             -0.466283
7348                -0.931486             -0.381927             -0.479384
7349                -0.931949             -0.286234             -0.517189
7350                -0.940753             -0.364377             -0.535690
7351                -0.954972             -0.460572             -0.538950

      tBodyAccJerk-iqr()-Z  tBodyAccJerk-entropy()-X  \
0                -0.989234                -0.819949
1                -0.993384                -0.875096
2                -0.981911                -0.753629
3                -0.988896                -0.820804
4                -0.990572                -0.850744
...                    ...                      ...
7347             -0.639575                 0.470793
7348             -0.628551                 0.534431
7349             -0.577465                 0.657112
7350             -0.619416                 0.586116
7351             -0.615158                 0.524484

      tBodyAccJerk-entropy()-Y  tBodyAccJerk-entropy()-Z  \
0                   -0.793046                -0.888853
1                   -0.655362                -0.767381
2                   -0.673274                -0.747107
3                   -0.754968                -0.825279
4                   -0.746258                -0.796960
...                       ...                      ...
7347                 0.605462                 0.445862
7348                 0.608132                 0.552989
7349                 0.497936                 0.512438
7350                 0.501824                 0.379816
7351                 0.505438                 0.322317

      tBodyAccJerk-arCoeff()-X,1  tBodyAccJerk-arCoeff()-X,2  \
0                       1.000000                   -0.220747
1                       0.489662                    0.070997
2                       0.265225                    0.188395
3                       0.122893                    0.276419
4                       0.240904                    0.134912
...                          ...                         ...
7347                   -0.467921                    0.201995
7348                   -0.270274                   -0.047007
7349                   -0.313331                    0.058751
7350                   -0.385009                    0.084151
7351                   -0.393672                    0.295447

      tBodyAccJerk-arCoeff()-X,3  tBodyAccJerk-arCoeff()-X,4  \
0                       0.636831                    0.387644
1                       0.362714                    0.527303
2                       0.464583                    0.371718
```

```
3                      0.457445                      0.193414
4                      0.296903                      0.287185
...                         ...                           ...
7347                   0.221926                     -0.168717
7348                   0.263901                     -0.045610
7349                   0.093966                      0.034243
7350                   0.165817                     -0.086137
7351                  -0.041366                     -0.003617

      tBodyAccJerk-arCoeff()-Y,1  tBodyAccJerk-arCoeff()-Y,2  \
0                      0.241401                     -0.052253
1                      0.149396                      0.062925
2                      0.082665                     -0.004622
3                      0.102405                     -0.099103
4                      0.318970                     -0.143364
...                         ...                           ...
7347                  -0.131115                      0.140569
7348                  -0.015347                     -0.036589
7349                  -0.037542                     -0.005138
7350                  -0.276435                      0.118940
7351                  -0.472080                      0.322100

      tBodyAccJerk-arCoeff()-Y,3  tBodyAccJerk-arCoeff()-Y,4  \
0                      0.264177                      0.373439
1                      0.370493                      0.413548
2                      0.327470                      0.437623
3                      0.194679                      0.484244
4                      0.477454                      0.417966
...                         ...                           ...
7347                  -0.080322                      0.126940
7348                  -0.020136                      0.218178
7349                   0.102722                      0.236469
7350                   0.180158                      0.175288
7351                  -0.077490                      0.156481

      tBodyAccJerk-arCoeff()-Z,1  tBodyAccJerk-arCoeff()-Z,2  \
0                      0.341778                     -0.569791
1                      0.122216                      0.180613
2                      0.257891                      0.070030
3                      0.357657                     -0.187032
4                      0.389537                     -0.030309
...                         ...                           ...
7347                  -0.448491                      0.100100
7348                  -0.327139                     -0.108303
7349                  -0.393169                     -0.041687
7350                  -0.439943                      0.024245
7351                  -0.342625                     -0.112329

      tBodyAccJerk-arCoeff()-Z,3  tBodyAccJerk-arCoeff()-Z,4  \
0                      0.265399                     -0.477875
1                      0.047424                      0.166573
2                      0.186973                      0.246800
3                      0.298069                      0.451870
4                      0.163261                      0.180189
...                         ...                           ...
7347                  -0.349855                      0.003027
7348                  -0.065145                      0.042680
7349                  -0.214678                     -0.005115
7350                  -0.332076                     -0.117280
7351                  -0.050668                     -0.348724

      tBodyAccJerk-correlation()-X,Y  tBodyAccJerk-correlation()-X,Z  \
0                          -0.385300                       0.033644
1                          -0.208772                       0.084104
```

```
2                        -0.120105                       -0.110026
3                        -0.127495                       -0.083278
4                        -0.272884                        0.103065
...                            ...                             ...
7347                     -0.523499                       -0.263124
7348                     -0.460900                       -0.178567
7349                     -0.534302                       -0.102262
7350                     -0.551732                       -0.020034
7351                     -0.420532                       -0.166305

      tBodyAccJerk-correlation()-Y,Z  tBodyGyro-mean()-X  tBodyGyro-mean()-Y  \
0                          -0.126511          -0.006101           -0.031365
1                          -0.268554          -0.016112           -0.083894
2                          -0.039953          -0.031698           -0.102335
3                           0.457060          -0.043410           -0.091386
4                           0.064729          -0.033960           -0.074708
...                              ...                ...                 ...
7347                        0.333620          -0.035024           -0.093011
7348                        0.355012           0.118696           -0.095746
7349                        0.387323          -0.213192            0.039321
7350                        0.263609          -0.406205            0.068797
7351                        0.166394          -0.041810           -0.322506

      tBodyGyro-mean()-Z  tBodyGyro-std()-X  tBodyGyro-std()-Y  \
0               0.107725          -0.985310          -0.976623
1               0.100584          -0.983120          -0.989046
2               0.096127          -0.976292          -0.993552
3               0.085538          -0.991385          -0.992407
4               0.077392          -0.985184          -0.992378
...                  ...                ...                ...
7347            0.124412          -0.397334           0.084878
7348            0.033277          -0.478458           0.098249
7349            0.197982          -0.378252           0.185902
7350            0.177467          -0.529233           0.190360
7351            0.038252          -0.451233           0.022216

      tBodyGyro-std()-Z  tBodyGyro-mad()-X  tBodyGyro-mad()-Y  \
0              -0.992205          -0.984586          -0.976353
1              -0.989121          -0.986890          -0.989038
2              -0.986379          -0.974922          -0.994122
3              -0.987554          -0.991589          -0.993142
4              -0.987402          -0.986944          -0.992542
...                  ...                ...                ...
7347           -0.165717          -0.424144           0.065142
7348           -0.188467          -0.482782           0.091791
7349           -0.269979          -0.362980           0.170686
7350           -0.287925          -0.527824           0.178939
7351           -0.220107          -0.482819          -0.073681

      tBodyGyro-mad()-Z  tBodyGyro-max()-X  tBodyGyro-max()-Y  \
0              -0.992362          -0.867044          -0.933786
1              -0.989185          -0.864904          -0.953560
2              -0.985786          -0.864904          -0.959049
3              -0.989585          -0.885320          -0.956656
4              -0.988163          -0.870154          -0.953360
...                  ...                ...                ...
7347           -0.222117          -0.414164          -0.164220
7348           -0.222576          -0.414164          -0.289716
7349           -0.297107          -0.519895          -0.168730
7350           -0.333162          -0.685665          -0.168730
7351           -0.236129          -0.413553          -0.221076

      tBodyGyro-max()-Z  tBodyGyro-min()-X  tBodyGyro-min()-Y  \
0              -0.747566           0.847308           0.914895
```

```
1             -0.745870          0.833721          0.908110
2             -0.743277          0.833721          0.905753
3             -0.743277          0.834164          0.905753
4             -0.749780          0.839091          0.911184
...                 ...               ...               ...
7347          -0.015472          0.347141          0.396623
7348          -0.223612          0.518533          0.373761
7349          -0.176254          0.342910          0.373761
7350          -0.176254          0.342910          0.473542
7351          -0.262266          0.390388          0.452599

      tBodyGyro-min()-Z  tBodyGyro-sma()  tBodyGyro-energy()-X  \
0              0.830841        -0.967184             -0.999578
1              0.828935        -0.980613             -0.999756
2              0.828935        -0.976280             -0.999693
3              0.826634        -0.982296             -0.999793
4              0.821374        -0.985262             -0.999849
...                 ...              ...                   ...
7347           0.252652        -0.013158             -0.834173
7348           0.252652        -0.017942             -0.861977
7349           0.303386         0.064715             -0.801509
7350           0.294654         0.023376             -0.806782
7351           0.277442        -0.084958             -0.862321

      tBodyGyro-energy()-Y  tBodyGyro-energy()-Z  tBodyGyro-iqr()-X  \
0                -0.999354             -0.999763          -0.983438
1                -0.999897             -0.999822          -0.992833
2                -0.999828             -0.999822          -0.972354
3                -0.999902             -0.999877          -0.991031
4                -0.999952             -0.999844          -0.989813
...                    ...                   ...                ...
7347             -0.419947             -0.677083          -0.451959
7348             -0.405579             -0.693805          -0.402785
7349             -0.305023             -0.747991          -0.379257
7350             -0.298515             -0.761528          -0.519955
7351             -0.474331             -0.717200          -0.515291

      tBodyGyro-iqr()-Y  tBodyGyro-iqr()-Z  tBodyGyro-entropy()-X  \
0             -0.978614          -0.992966               0.082632
1             -0.989345          -0.990240               0.007469
2             -0.995144          -0.986831              -0.260943
3             -0.994165          -0.994582              -0.930551
4             -0.993337          -0.991155              -0.628861
...                 ...                ...                    ...
7347           0.019043          -0.419986               0.195518
7348           0.023374          -0.426086               0.535505
7349           0.073383          -0.467602              -0.107501
7350           0.042519          -0.538320              -0.605100
7351          -0.370964          -0.347919               0.086563

      tBodyGyro-entropy()-Y  tBodyGyro-entropy()-Z  tBodyGyro-arCoeff()-X,1  \
0                  0.202268              -0.168757                 0.096323
1                 -0.531157              -0.177445                -0.387681
2                 -1.000000              -0.248371                -0.437156
3                 -0.826618              -0.543422                -0.165885
4                 -0.467808              -0.650852                -0.212690
...                     ...                    ...                      ...
7347              -0.253113               0.533292                -0.670977
7348              -0.175116               0.493243                -0.413432
7349              -0.255790               0.580409                -0.238479
7350              -0.383583               0.541667                -0.270602
7351              -0.427175               0.387879                -0.311687

      tBodyGyro-arCoeff()-X,2  tBodyGyro-arCoeff()-X,3  \
```

```
0                  -0.274985                  0.498644
1                   0.179138                  0.210789
2                   0.238981                  0.145238
3                  -0.012881                  0.320055
4                   0.002111                  0.388099
...                      ...                       ...
7347                0.491003                 -0.081592
7348                0.260839                  0.009703
7349                0.130116                  0.043146
7350                0.105734                  0.261849
7351                0.115744                  0.285134

      tBodyGyro-arCoeff()-X,4  tBodyGyro-arCoeff()-Y,1  \
0                   -0.220317                 1.000000
1                   -0.140260                -0.047032
2                   -0.113917                 0.032312
3                   -0.165114                 0.044553
4                   -0.233271                -0.163221
...                       ...                      ...
7347                -0.010736                -0.597783
7348                 0.067793                -0.523845
7349                 0.039547                -0.570098
7350                -0.257165                -0.803952
7351                -0.246244                -0.714992

      tBodyGyro-arCoeff()-Y,2  tBodyGyro-arCoeff()-Y,3  \
0                   -0.972971                 0.316655
1                   -0.064949                 0.117687
2                   -0.127879                 0.114924
3                   -0.125193                 0.078321
4                    0.186460                -0.434916
...                       ...                      ...
7347                 0.539229                -0.560237
7348                 0.433227                -0.382945
7349                 0.484806                -0.461952
7350                 0.767857                -0.779873
7351                 0.672619                -0.694842

      tBodyGyro-arCoeff()-Y,4  tBodyGyro-arCoeff()-Z,1  \
0                   0.375726                  0.723399
1                   0.081691                  0.042364
2                   0.125398                  0.112092
3                   0.177028                  0.193402
4                   0.650137                  0.239950
...                      ...                       ...
7347                0.524652                 -0.726561
7348                0.385617                 -0.570301
7349                0.446822                 -0.576864
7350                0.592788                 -0.704251
7351                0.562732                 -0.720933

      tBodyGyro-arCoeff()-Z,2  tBodyGyro-arCoeff()-Z,3  \
0                   -0.771112                 0.690213
1                   -0.149928                 0.292619
2                   -0.165645                 0.134554
3                   -0.207189                 0.112457
4                   -0.339529                 0.132537
...                       ...                      ...
7347                 0.630344                -0.408967
7348                 0.503451                -0.425226
7349                 0.561700                -0.508370
7350                 0.716187                -0.688256
7351                 0.644250                -0.496967
```

	tBodyGyro-arCoeff()-Z,4	tBodyGyro-correlation()-X,Y	\
0	-0.331831	0.709584	
1	-0.149429	0.046721	
2	0.184349	-0.010130	
3	0.202092	0.210194	
4	0.473251	-0.142001	
...	...	...	
7347	0.274684	-0.283000	
7348	0.401478	-0.469019	
7349	0.418805	-0.685956	
7350	0.553195	-0.662923	
7351	0.412934	-0.347923	

	tBodyGyro-correlation()-X,Z	tBodyGyro-correlation()-Y,Z	\
0	0.134873	0.301099	
1	-0.256929	0.169395	
2	0.043312	-0.350646	
3	0.141101	-0.725301	
4	0.484419	-0.724558	
...	...	...	
7347	-0.502502	0.337338	
7348	-0.376754	0.406319	
7349	-0.521585	0.483839	
7350	-0.607480	0.376823	
7351	-0.325131	0.188922	

	tBodyGyroJerk-mean()-X	tBodyGyroJerk-mean()-Y	tBodyGyroJerk-mean()-Z	\
0	-0.099167	-0.055517	-0.061986	
1	-0.110503	-0.044819	-0.059243	
2	-0.108486	-0.042410	-0.055829	
3	-0.091170	-0.036333	-0.060465	
4	-0.090770	-0.037633	-0.058289	
...	...	...	...	
7347	0.040906	0.078160	-0.110838	
7348	-0.144067	0.027440	-0.140135	
7349	-0.231529	-0.071713	-0.080983	
7350	-0.079919	-0.058149	-0.071218	
7351	0.263048	0.095666	-0.215790	

	tBodyGyroJerk-std()-X	tBodyGyroJerk-std()-Y	tBodyGyroJerk-std()-Z	\
0	-0.992111	-0.992519	-0.992055	
1	-0.989873	-0.997293	-0.993851	
2	-0.988462	-0.995632	-0.991532	
3	-0.991119	-0.996641	-0.993329	
4	-0.991354	-0.996473	-0.994511	
...	...	...	...	
7347	-0.593029	-0.629293	-0.584001	
7348	-0.632075	-0.629363	-0.626007	
7349	-0.661110	-0.632762	-0.598050	
7350	-0.657647	-0.659675	-0.602006	
7351	-0.695455	-0.692349	-0.611923	

	tBodyGyroJerk-mad()-X	tBodyGyroJerk-mad()-Y	tBodyGyroJerk-mad()-Z	\
0	-0.992165	-0.994942	-0.992619	
1	-0.989876	-0.997492	-0.993778	
2	-0.987868	-0.995725	-0.991596	
3	-0.991241	-0.996958	-0.994019	
4	-0.992882	-0.996541	-0.994383	
...	...	...	...	
7347	-0.533656	-0.635146	-0.588617	
7348	-0.609540	-0.618629	-0.605505	
7349	-0.662918	-0.626685	-0.585050	
7350	-0.645452	-0.673795	-0.601073	
7351	-0.688840	-0.702838	-0.598341	

	tBodyGyroJerk-max()-X	tBodyGyroJerk-max()-Y	tBodyGyroJerk-max()-Z
0	-0.990156	-0.986743	-0.992042
1	-0.991947	-0.997717	-0.994921
2	-0.993359	-0.993800	-0.988963
3	-0.993676	-0.993800	-0.988963
4	-0.979846	-0.997509	-0.993420
...	...	...	...
7347	-0.712812	-0.718953	-0.632547
7348	-0.712812	-0.746591	-0.731855
7349	-0.663154	-0.656511	-0.623142
7350	-0.663154	-0.656511	-0.623142
7351	-0.750287	-0.778500	-0.697817

	tBodyGyroJerk-min()-X	tBodyGyroJerk-min()-Y	tBodyGyroJerk-min()-Z
0	0.994429	0.991756	0.989352
1	0.990486	0.997122	0.994503
2	0.989290	0.997122	0.994143
3	0.989290	0.998130	0.994143
4	0.993685	0.997453	0.996528
...	...	...	...
7347	0.758696	0.773060	0.693708
7348	0.738344	0.704021	0.797938
7349	0.716540	0.704021	0.699691
7350	0.716540	0.784606	0.699691
7351	0.800635	0.780836	0.691663

	tBodyGyroJerk-sma()	tBodyGyroJerk-energy()-X	tBodyGyroJerk-energy()-Y
0	-0.994453	-0.999938	-0.999954
1	-0.995298	-0.999908	-0.999990
2	-0.993415	-0.999887	-0.999980
3	-0.995496	-0.999925	-0.999986
4	-0.995878	-0.999928	-0.999985
...	...	...	...
7347	-0.596747	-0.915791	-0.930540
7348	-0.612456	-0.931108	-0.930582
7349	-0.625921	-0.941360	-0.931847
7350	-0.648894	-0.940264	-0.941410
7351	-0.674413	-0.951895	-0.952018

	tBodyGyroJerk-energy()-Z	tBodyGyroJerk-iqr()-X	tBodyGyroJerk-iqr()-Y
0	-0.999923	-0.992300	-0.996939
1	-0.999946	-0.990742	-0.997301
2	-0.999916	-0.987130	-0.995428
3	-0.999940	-0.990909	-0.997078
4	-0.999954	-0.994513	-0.996718
...	...	...	...
7347	-0.911578	-0.425268	-0.692972
7348	-0.928302	-0.616001	-0.563513
7349	-0.917378	-0.690924	-0.590829
7350	-0.918975	-0.620461	-0.714618
7351	-0.922827	-0.669905	-0.711695

	tBodyGyroJerk-iqr()-Z	tBodyGyroJerk-entropy()-X
0	-0.992243	-0.589851
1	-0.993808	-0.600945
2	-0.992776	-0.543635
3	-0.995405	-0.562031
4	-0.993969	-0.617738
...	...	...
7347	-0.613713	0.605324
7348	-0.570171	0.505409
7349	-0.564854	0.343624
7350	-0.630660	0.408222

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7351              -0.616909                    0.660454

      tBodyGyroJerk-entropy()-Y  tBodyGyroJerk-entropy()-Z  \
0                     -0.688459                  -0.572107
1                     -0.748247                  -0.608932
2                     -0.672957                  -0.588410
3                     -0.731332                  -0.661434
4                     -0.683093                  -0.632927
...                         ...                        ...
7347                   0.336177                   0.604438
7348                   0.544101                   0.561441
7349                   0.635745                   0.581092
7350                   0.402244                   0.664552
7351                   0.449856                   0.633836

      tBodyGyroJerk-arCoeff()-X,1  tBodyGyroJerk-arCoeff()-X,2  \
0                        0.292376                    -0.361998
1                       -0.193308                    -0.067406
2                       -0.241151                    -0.011377
3                        0.009895                    -0.137571
4                       -0.025679                    -0.188139
...                           ...                          ...
7347                    -0.481534                     0.171751
7348                    -0.290617                     0.131640
7349                    -0.055431                    -0.000159
7350                    -0.058701                    -0.065699
7351                    -0.105204                    -0.090816

      tBodyGyroJerk-arCoeff()-X,3  tBodyGyroJerk-arCoeff()-X,4  \
0                        0.405543                    -0.039007
1                        0.185619                     0.041522
2                        0.116134                     0.089630
3                        0.125965                     0.316120
4                        0.230950                     0.200258
...                           ...                          ...
7347                     0.040139                     0.012844
7348                    -0.206573                     0.423253
7349                     0.073736                     0.112213
7350                     0.281998                     0.035247
7351                     0.236935                     0.089444

      tBodyGyroJerk-arCoeff()-Y,1  tBodyGyroJerk-arCoeff()-Y,2  \
0                        0.989284                    -0.414560
1                        0.072353                    -0.035378
2                        0.095986                     0.009604
3                        0.094333                     0.026171
4                       -0.149400                     0.271977
...                           ...                          ...
7347                    -0.588145                     0.488759
7348                    -0.488355                     0.376845
7349                    -0.544809                     0.422994
7350                    -0.782038                     0.649168
7351                    -0.626978                     0.442610

      tBodyGyroJerk-arCoeff()-Y,3  tBodyGyroJerk-arCoeff()-Y,4  \
0                        0.391603                     0.282251
1                        0.177606                     0.027498
2                        0.095126                     0.252887
3                        0.069661                     0.246653
4                       -0.271515                    -0.009937
...                           ...                          ...
7347                    -0.412979                     0.120250
7348                    -0.279813                     0.110892
7349                    -0.345579                     0.102999
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7350                    -0.490334                     0.030051
7351                    -0.192165                    -0.350341

      tBodyGyroJerk-arCoeff()-Z,1  tBodyGyroJerk-arCoeff()-Z,2  \
0                        0.927270                    -0.572370
1                        0.182703                    -0.167457
2                        0.181649                    -0.169308
3                        0.257355                    -0.136809
4                        0.235128                    -0.340967
...                           ...                          ...
7347                    -0.678586                     0.344019
7348                    -0.496483                     0.276320
7349                    -0.524271                     0.396049
7350                    -0.680087                     0.532643
7351                    -0.726012                     0.446266

      tBodyGyroJerk-arCoeff()-Z,3  tBodyGyroJerk-arCoeff()-Z,4  \
0                        0.691619                     0.468290
1                        0.253251                     0.132334
2                        0.132009                     0.008197
3                        0.087316                     0.149096
4                       -0.085713                     0.163957
...                           ...                          ...
7347                    -0.017132                    -0.292010
7348                    -0.121248                    -0.214919
7349                    -0.167227                    -0.214367
7350                    -0.286550                    -0.211197
7351                    -0.291600                    -0.074667

      tBodyGyroJerk-correlation()-X,Y  tBodyGyroJerk-correlation()-X,Z  \
0                           -0.131077                       -0.087160
1                            0.293855                       -0.018075
2                            0.193329                        0.073718
3                            0.196657                        0.140452
4                            0.120590                        0.107489
...                               ...                             ...
7347                         0.114046                        0.009960
7348                         0.028023                        0.194021
7349                        -0.121339                        0.173096
7350                        -0.052486                        0.018243
7351                         0.052878                       -0.230671

      tBodyGyroJerk-correlation()-Y,Z  tBodyAccMag-mean()  tBodyAccMag-std()  \
0                            0.336247          -0.959434          -0.950551
1                           -0.343337          -0.979289          -0.976057
2                           -0.314858          -0.983703          -0.988020
3                           -0.305898          -0.986542          -0.986421
4                           -0.282589          -0.992827          -0.991275
...                               ...                ...                ...
7347                         0.048060          -0.031719          -0.093688
7348                         0.016300          -0.065256          -0.148539
7349                        -0.013715          -0.003936          -0.158701
7350                        -0.128467          -0.002445          -0.185720
7351                        -0.225998          -0.049090          -0.229157

      tBodyAccMag-mad()  tBodyAccMag-max()  tBodyAccMag-min()  \
0             -0.957993          -0.946305          -0.992556
1             -0.978247          -0.978711          -0.995333
2             -0.988327          -0.986496          -0.995333
3             -0.986431          -0.986496          -0.997045
4             -0.991170          -0.990962          -0.997045
...                 ...                ...                ...
7347          -0.236437           0.000026          -0.689787
7348          -0.276128          -0.069568          -0.595919
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7349          -0.277493          -0.083233          -0.595919
7350          -0.300750          -0.098052          -0.471725
7351          -0.345732          -0.051914          -0.625539

      tBodyAccMag-sma()  tBodyAccMag-energy()  tBodyAccMag-iqr()  \
0             -0.959434             -0.998493          -0.957637
1             -0.979289             -0.999488          -0.981248
2             -0.983703             -0.999682          -0.985767
3             -0.986542             -0.999737          -0.983509
4             -0.992827             -0.999881          -0.989608
...                 ...                   ...                ...
7347          -0.031719             -0.501338          -0.487036
7348          -0.065256             -0.539787          -0.444159
7349          -0.003936             -0.492239          -0.416528
7350          -0.002445             -0.496421          -0.516613
7351          -0.049090             -0.542874          -0.517738

      tBodyAccMag-entropy()  tBodyAccMag-arCoeff()1  tBodyAccMag-arCoeff()2  \
0                 -0.232582              -0.173179              -0.022897
1                 -0.441876               0.081569              -0.109366
2                 -0.599939               0.038049              -0.074212
3                 -0.589006              -0.092856               0.046396
4                 -0.704599               0.180441              -0.277657
...                     ...                    ...                    ...
7347               0.814509              -0.617906               0.653662
7348               0.836935              -0.468825               0.465193
7349               0.844283              -0.492911               0.463193
7350               0.779385              -0.526184               0.450578
7351               0.753464              -0.392873               0.389824

      tBodyAccMag-arCoeff()3  tBodyAccMag-arCoeff()4  tGravityAccMag-mean()  \
0                   0.094832               0.191817              -0.959434
1                   0.311758              -0.411675              -0.979289
2                   0.254076              -0.296130              -0.983703
3                  -0.000466               0.037143              -0.986542
4                   0.515562              -0.355851              -0.992827
...                      ...                    ...                    ...
7347               -0.803065               0.524863              -0.031719
7348               -0.723034               0.678550              -0.065256
7349               -0.671517               0.637480              -0.003936
7350               -0.478786               0.421441              -0.002445
7351               -0.574277               0.499568              -0.049090

      tGravityAccMag-std()  tGravityAccMag-mad()  tGravityAccMag-max()  \
0                -0.950551             -0.957993             -0.946305
1                -0.976057             -0.978247             -0.978711
2                -0.988020             -0.988327             -0.986496
3                -0.986421             -0.986431             -0.986496
4                -0.991275             -0.991170             -0.990962
...                    ...                   ...                   ...
7347             -0.093688             -0.236437              0.000026
7348             -0.148539             -0.276128             -0.069568
7349             -0.158701             -0.277493             -0.083233
7350             -0.185720             -0.300750             -0.098052
7351             -0.229157             -0.345732             -0.051914

      tGravityAccMag-min()  tGravityAccMag-sma()  tGravityAccMag-energy()  \
0                -0.992556             -0.959434                -0.998493
1                -0.995333             -0.979289                -0.999488
2                -0.995333             -0.983703                -0.999682
3                -0.997045             -0.986542                -0.999737
4                -0.997045             -0.992827                -0.999881
...                    ...                   ...                      ...
7347             -0.689787             -0.031719                -0.501338
```

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7348            -0.595919            -0.065256            -0.539787
7349            -0.595919            -0.003936            -0.492239
7350            -0.471725            -0.002445            -0.496421
7351            -0.625539            -0.049090            -0.542874

      tGravityAccMag-iqr()  tGravityAccMag-entropy()  \
0               -0.957637                -0.232582
1               -0.981248                -0.441876
2               -0.985767                -0.599939
3               -0.983509                -0.589006
4               -0.989608                -0.704599
...                   ...                      ...
7347            -0.487036                 0.814509
7348            -0.444159                 0.836935
7349            -0.416528                 0.844283
7350            -0.516613                 0.779385
7351            -0.517738                 0.753464

      tGravityAccMag-arCoeff()1  tGravityAccMag-arCoeff()2  \
0                     -0.173179                 -0.022897
1                      0.081569                 -0.109366
2                      0.038049                 -0.074212
3                     -0.092856                  0.046396
4                      0.180441                 -0.277657
...                         ...                      ...
7347                  -0.617906                  0.653662
7348                  -0.468825                  0.465193
7349                  -0.492911                  0.463193
7350                  -0.526184                  0.450578
7351                  -0.392873                  0.389824

      tGravityAccMag-arCoeff()3  tGravityAccMag-arCoeff()4  \
0                      0.094832                  0.191817
1                      0.311758                 -0.411675
2                      0.254076                 -0.296130
3                     -0.000466                  0.037143
4                      0.515562                 -0.355851
...                         ...                      ...
7347                  -0.803065                  0.524863
7348                  -0.723034                  0.678550
7349                  -0.671517                  0.637480
7350                  -0.478786                  0.421441
7351                  -0.574277                  0.499568

      tBodyAccJerkMag-mean()  tBodyAccJerkMag-std()  tBodyAccJerkMag-mad()  \
0                  -0.993306              -0.994336              -0.994500
1                  -0.991253              -0.991694              -0.992716
2                  -0.988531              -0.990397              -0.990650
3                  -0.993078              -0.993381              -0.993195
4                  -0.993480              -0.995854              -0.996107
...                      ...                    ...                    ...
7347               -0.413920              -0.276903              -0.354896
7348               -0.434071              -0.338034              -0.398508
7349               -0.411072              -0.378001              -0.414505
7350               -0.444878              -0.418804              -0.481059
7351               -0.475778              -0.313272              -0.437618

      tBodyAccJerkMag-max()  tBodyAccJerkMag-min()  tBodyAccJerkMag-sma()  \
0                  -0.992784              -0.991208              -0.993306
1                  -0.988661              -0.991208              -0.991253
2                  -0.988661              -0.993012              -0.988531
3                  -0.993402              -0.993012              -0.993078
4                  -0.993283              -0.981325              -0.993480
...                      ...                    ...                    ...
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7347              -0.323735              -0.570186              -0.413920
7348              -0.336287              -0.450596              -0.434071
7349              -0.349166              -0.470315              -0.411072
7350              -0.336197              -0.470315              -0.444878
7351              -0.276148              -0.651609              -0.475778

      tBodyAccJerkMag-energy()  tBodyAccJerkMag-iqr()  \
0                    -0.999892              -0.992934
1                    -0.999845              -0.993485
2                    -0.999790              -0.989984
3                    -0.999884              -0.991736
4                    -0.999902              -0.996846
...                        ...                    ...
7347                 -0.792620              -0.476306
7348                 -0.813519              -0.509196
7349                 -0.811124              -0.510809
7350                 -0.832614              -0.598058
7351                 -0.825558              -0.601808

      tBodyAccJerkMag-entropy()  tBodyAccJerkMag-arCoeff()1  \
0                     -0.863415                    0.283085
1                     -0.819928                    0.458812
2                     -0.794884                    0.649704
3                     -0.792321                    0.661603
4                     -0.850026                    0.311604
...                         ...                         ...
7347                   0.603926                   -0.055845
7348                   0.612144                   -0.113549
7349                   0.621533                   -0.053292
7350                   0.584586                   -0.313833
7351                   0.589458                   -0.447969

      tBodyAccJerkMag-arCoeff()2  tBodyAccJerkMag-arCoeff()3  \
0                     -0.237309                   -0.105432
1                     -0.244941                    0.056139
2                     -0.260088                   -0.128416
3                     -0.247451                   -0.230315
4                     -0.170121                    0.134370
...                         ...                         ...
7347                   0.328720                   -0.369401
7348                   0.378067                   -0.203167
7349                   0.284414                   -0.095663
7350                   0.552156                   -0.329516
7351                   0.482137                   -0.401443

      tBodyAccJerkMag-arCoeff()4  tBodyGyroMag-mean()  tBodyGyroMag-std()  \
0                     -0.038212            -0.968959           -0.964335
1                     -0.458346            -0.980683           -0.983754
2                     -0.520541            -0.976317           -0.986051
3                     -0.436459            -0.982060           -0.987351
4                     -0.458299            -0.985204           -0.989063
...                         ...                  ...                 ...
7347                  -0.088273            -0.020433           -0.113894
7348                  -0.276209            -0.027246           -0.165314
7349                  -0.350740             0.042887           -0.047836
7350                  -0.104819             0.028740           -0.012314
7351                   0.378059            -0.100373           -0.095705

      tBodyGyroMag-mad()  tBodyGyroMag-max()  tBodyGyroMag-min()  \
0              -0.957245           -0.975060           -0.991554
1              -0.982003           -0.984715           -0.991554
2              -0.984458           -0.984715           -0.966193
3              -0.985632           -0.990029           -0.981686
4              -0.989613           -0.987029           -0.981686
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...                  ...                  ...                  ...
7347           -0.007572           -0.168719           -0.412453
7348           -0.017793           -0.323441           -0.259805
7349            0.045633           -0.146058           -0.331518
7350            0.024373           -0.146058           -0.411585
7351           -0.023755           -0.186847           -0.720564

      tBodyGyroMag-sma()  tBodyGyroMag-energy()  tBodyGyroMag-iqr()  \
0              -0.968959              -0.999286           -0.949766
1              -0.980683              -0.999725           -0.982857
2              -0.976317              -0.999641           -0.983454
3              -0.982060              -0.999768           -0.983966
4              -0.985204              -0.999829           -0.992338
...                  ...                    ...                 ...
7347           -0.020433              -0.490014           -0.029710
7348           -0.027246              -0.507023            0.051126
7349            0.042887              -0.420111            0.063950
7350            0.028740              -0.423689           -0.192310
7351           -0.100373              -0.549552           -0.104859

      tBodyGyroMag-entropy()  tBodyGyroMag-arCoeff()1  \
0                   0.072579                 0.572511
1                  -0.192899                -0.225317
2                  -0.222829                -0.226831
3                  -0.240719                -0.201985
4                  -0.338699                -0.236993
...                      ...                      ...
7347                0.129442                -0.618764
7348                0.117365                -0.438537
7349                0.111972                -0.417557
7350                0.230122                -0.720347
7351                0.448410                -0.704471

      tBodyGyroMag-arCoeff()2  tBodyGyroMag-arCoeff()3  \
0                   -0.738602                 0.212578
1                   -0.017060                 0.155777
2                    0.059681                 0.061476
3                    0.054712                 0.110072
4                    0.093820                 0.023333
...                       ...                      ...
7347                 0.621335                -0.567442
7348                 0.366275                -0.297760
7349                 0.344982                -0.284315
7350                 0.746947                -0.690907
7351                 0.736825                -0.738624

      tBodyGyroMag-arCoeff()4  tBodyGyroJerkMag-mean()  \
0                   0.433405                -0.994248
1                   0.082575                -0.995123
2                   0.041702                -0.993403
3                  -0.079423                -0.995502
4                   0.039039                -0.995808
...                      ...                      ...
7347                0.388506                -0.593824
7348                0.260214                -0.606110
7349                0.247719                -0.617073
7350                0.453708                -0.641840
7351                0.541437                -0.671625

      tBodyGyroJerkMag-std()  tBodyGyroJerkMag-mad()  tBodyGyroJerkMag-max()  \
0                  -0.991368              -0.993143               -0.988936
1                  -0.996102              -0.995839               -0.996545
2                  -0.995091              -0.994859               -0.995360
3                  -0.995267              -0.995305               -0.995360
```

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4                  -0.995258                -0.996307                -0.992389
...                      ...                      ...                      ...
7347               -0.689806                -0.697858                -0.732647
7348               -0.709534                -0.723974                -0.692068
7349               -0.694443                -0.713780                -0.675459
7350               -0.692713                -0.714395                -0.675459
7351               -0.719871                -0.740047                -0.765228

      tBodyGyroJerkMag-min()  tBodyGyroJerkMag-sma()  \
0                  -0.993486                -0.994248
1                  -0.992006                -0.995123
2                  -0.997652                -0.993403
3                  -0.997652                -0.995502
4                  -0.992193                -0.995808
...                      ...                      ...
7347               -0.449061                -0.593824
7348               -0.603286                -0.606110
7349               -0.603286                -0.617073
7350               -0.704795                -0.641840
7351               -0.704795                -0.671625

      tBodyGyroJerkMag-energy()  tBodyGyroJerkMag-iqr()  \
0                     -0.999949               -0.994547
1                     -0.999970               -0.994819
2                     -0.999955               -0.993988
3                     -0.999970               -0.995001
4                     -0.999972               -0.996484
...                         ...                     ...
7347                  -0.924651               -0.713429
7348                  -0.930133               -0.726714
7349                  -0.931610               -0.714809
7350                  -0.937912               -0.755630
7351                  -0.947851               -0.786388

      tBodyGyroJerkMag-entropy()  tBodyGyroJerkMag-arCoeff()1  \
0                      -0.619768                     0.292840
1                      -0.730722                     0.209334
2                      -0.662914                     0.328031
3                      -0.683016                     0.595371
4                      -0.720171                     0.331858
...                          ...                          ...
7347                    0.845933                    -0.004185
7348                    0.824828                     0.281659
7349                    0.821966                     0.246129
7350                    0.716043                    -0.004562
7351                    0.756298                     0.035308

      tBodyGyroJerkMag-arCoeff()2  tBodyGyroJerkMag-arCoeff()3  \
0                      -0.176889                    -0.145779
1                      -0.178113                    -0.103084
2                      -0.154560                    -0.220587
3                      -0.264569                    -0.315723
4                      -0.260562                    -0.145665
...                          ...                          ...
7347                    0.106814                    -0.347551
7348                   -0.193206                    -0.234273
7349                   -0.028065                    -0.349269
7350                    0.111688                    -0.337531
7351                   -0.021885                    -0.024399

      tBodyGyroJerkMag-arCoeff()4  fBodyAcc-mean()-X  fBodyAcc-mean()-Y  \
0                      -0.124072          -0.994783          -0.982984
1                      -0.043824          -0.997451          -0.976852
2                      -0.107514          -0.993594          -0.972511
```

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3                    -0.163826          -0.995491          -0.983570
4                    -0.007368          -0.997286          -0.982301
...                        ...                ...                ...
7347                  0.009469          -0.131366          -0.089074
7348                  0.016488          -0.159077          -0.079059
7349                 -0.083648          -0.345767          -0.246135
7350                 -0.001105          -0.400368          -0.306872
7351                 -0.175386          -0.265262          -0.220389

      fBodyAcc-mean()-Z  fBodyAcc-std()-X  fBodyAcc-std()-Y  fBodyAcc-std()-Z  \
0             -0.939269         -0.995422         -0.983133         -0.906165
1             -0.973523         -0.998680         -0.974930         -0.955438
2             -0.983304         -0.996313         -0.965506         -0.977049
3             -0.991080         -0.996312         -0.983244         -0.990229
4             -0.988369         -0.998606         -0.980129         -0.991915
...                 ...               ...               ...               ...
7347          -0.256771         -0.221989          0.037820          0.152445
7348          -0.275053         -0.267430         -0.015951          0.135648
7349          -0.287270         -0.173212         -0.091859          0.418568
7350          -0.353796         -0.158192         -0.077606          0.429876
7351          -0.272801         -0.270794         -0.080105          0.289410

      fBodyAcc-mad()-X  fBodyAcc-mad()-Y  fBodyAcc-mad()-Z  fBodyAcc-max()-X  \
0             -0.996889         -0.984519         -0.932082         -0.993756
1             -0.997890         -0.976924         -0.968377         -0.999372
2             -0.994097         -0.971687         -0.982169         -0.998158
3             -0.994547         -0.982824         -0.989007         -0.997404
4             -0.997725         -0.982353         -0.990915         -0.999277
...                 ...               ...               ...               ...
7347          -0.050748         -0.002175         -0.031134         -0.318185
7348          -0.177661         -0.098526         -0.009020         -0.332146
7349          -0.249486         -0.260378          0.008496         -0.160368
7350          -0.247028         -0.245934         -0.043177         -0.147421
7351          -0.114475         -0.088146         -0.015190         -0.417612

      fBodyAcc-max()-Y  fBodyAcc-max()-Z  fBodyAcc-min()-X  fBodyAcc-min()-Y  \
0             -0.983163         -0.885054         -0.993962         -0.993446
1             -0.973770         -0.948777         -0.998281         -0.992721
2             -0.963072         -0.968596         -0.997094         -0.989924
3             -0.987275         -0.987754         -0.994432         -0.990259
4             -0.980848         -0.989116         -0.994968         -0.991788
...                 ...               ...               ...               ...
7347          -0.224135          0.254376         -0.807368         -0.931933
7348          -0.261767          0.242269         -0.279056         -0.603788
7349          -0.263932          0.669205         -0.931473         -0.823976
7350          -0.262225          0.706851         -0.927369         -0.964000
7351          -0.276242          0.449687         -0.916774         -0.971773

      fBodyAcc-min()-Z  fBodyAcc-sma()  fBodyAcc-energy()-X  \
0             -0.923428       -0.974733            -0.999968
1             -0.989514       -0.985812            -0.999991
2             -0.990886       -0.985821            -0.999969
3             -0.996578       -0.992812            -0.999975
4             -0.974494       -0.992423            -0.999990
...                 ...             ...                  ...
7347          -0.737696       -0.028449            -0.674230
7348          -0.983928       -0.045731            -0.705580
7349          -0.958898       -0.196488            -0.692379
7350          -0.982807       -0.265529            -0.693098
7351          -0.836444       -0.142554            -0.731037

      fBodyAcc-energy()-Y  fBodyAcc-energy()-Z  fBodyAcc-iqr()-X  \
0               -0.999689            -0.994891         -0.995926
1               -0.999450            -0.998569         -0.994865
```

```
2              -0.999137           -0.999434        -0.988569
3              -0.999697           -0.999803        -0.990443
4              -0.999625           -0.999798        -0.993760
...                  ...                 ...              ...
7347           -0.454284           -0.411714         0.121098
7348           -0.490120           -0.430719        -0.149641
7349           -0.593455           -0.180134        -0.389377
7350           -0.600245           -0.187280        -0.708451
7351           -0.578424           -0.298830        -0.251465

      fBodyAcc-iqr()-Y  fBodyAcc-iqr()-Z  fBodyAcc-entropy()-X  \
0            -0.989709         -0.987991             -0.946357
1            -0.980784         -0.985775             -1.000000
2            -0.977242         -0.981302             -1.000000
3            -0.991902         -0.988061             -1.000000
4            -0.988180         -0.986359             -1.000000
...                ...               ...                   ...
7347         -0.395202         -0.629046              0.675244
7348         -0.547702         -0.640677              0.608926
7349         -0.588790         -0.645899              0.530763
7350         -0.548936         -0.773352              0.402511
7351         -0.409732         -0.711725              0.588926

      fBodyAcc-entropy()-Y  fBodyAcc-entropy()-Z  fBodyAcc-maxInds-X  \
0                -0.904748             -0.591302           -1.000000
1                -0.904748             -0.758409            0.096774
2                -0.815786             -0.813513           -0.935484
3                -0.870398             -0.944190           -1.000000
4                -0.870398             -0.944190            0.096774
...                    ...                   ...                 ...
7347              0.542797              0.384238           -0.806452
7348              0.379367              0.386248           -0.806452
7349              0.440417              0.283594           -0.806452
7350              0.327352              0.210077           -0.806452
7351              0.453066              0.227718           -0.806452

      fBodyAcc-maxInds-Y  fBodyAcc-maxInds-Z  fBodyAcc-meanFreq()-X  \
0              -1.000000           -1.000000               0.252483
1              -1.000000           -1.000000               0.271309
2              -1.000000           -1.000000               0.124531
3              -1.000000           -1.000000               0.029044
4              -1.000000           -1.000000               0.181090
...                  ...                 ...                    ...
7347           -0.933333           -0.923077              -0.422453
7348           -0.933333           -0.923077              -0.207111
7349           -0.800000           -0.923077              -0.481581
7350           -0.800000           -0.923077              -0.469017
7351           -0.933333           -0.923077              -0.566132

      fBodyAcc-meanFreq()-Y  fBodyAcc-meanFreq()-Z  fBodyAcc-skewness()-X  \
0                  0.131836              -0.052050               0.142051
1                  0.042864              -0.014310              -0.692541
2                 -0.064611               0.082677              -0.727227
3                  0.080302               0.185695              -0.599118
4                  0.057988               0.559786              -0.676997
...                     ...                    ...                    ...
7347              -0.294103              -0.482376              -0.154387
7348              -0.046979              -0.663644              -0.053694
7349               0.030257              -0.684817               0.363110
7350              -0.200268              -0.701537               0.382837
7351              -0.422407              -0.586409              -0.243589

      fBodyAcc-kurtosis()-X  fBodyAcc-skewness()-Y  fBodyAcc-kurtosis()-Y  \
0                 -0.150682              -0.220547              -0.558739
```

```
1                -0.954047              -0.049709              -0.331974
2                -0.965419               0.163063              -0.092153
3                -0.908449              -0.460915              -0.813057
4                -0.951371              -0.180383              -0.533726
...                    ...                    ...                    ...
7347             -0.499507              -0.261258              -0.645448
7348             -0.405790              -0.173447              -0.576894
7349              0.108325              -0.008127              -0.425003
7350              0.127666              -0.035782              -0.450794
7351             -0.633039              -0.246851              -0.606449

      fBodyAcc-skewness()-Z  fBodyAcc-kurtosis()-Z  \
0                  0.246769              -0.007416
1                  0.056675              -0.289001
2                 -0.044937              -0.288366
3                 -0.566835              -0.771246
4                 -0.585517              -0.790433
...                     ...                    ...
7347               0.076713              -0.205947
7348               0.068615              -0.195216
7349               0.390981               0.178067
7350               0.484828               0.286622
7351               0.228258              -0.040952

      fBodyAcc-bandsEnergy()-1,8  fBodyAcc-bandsEnergy()-9,16  \
0                      -0.999963                    -0.999987
1                      -0.999996                    -0.999982
2                      -0.999989                    -0.999962
3                      -0.999989                    -0.999977
4                      -0.999994                    -0.999986
...                          ...                          ...
7347                   -0.684177                    -0.723509
7348                   -0.726986                    -0.736531
7349                   -0.655263                    -0.829381
7350                   -0.643425                    -0.870654
7351                   -0.709495                    -0.865732

      fBodyAcc-bandsEnergy()-17,24  fBodyAcc-bandsEnergy()-25,32  \
0                       -0.999979                     -0.999962
1                       -0.999944                     -0.999970
2                       -0.999815                     -0.999847
3                       -0.999834                     -0.999871
4                       -0.999936                     -0.999945
...                           ...                           ...
7347                    -0.690812                     -0.868657
7348                    -0.718378                     -0.769270
7349                    -0.818196                     -0.949110
7350                    -0.787967                     -0.944597
7351                    -0.713330                     -0.829585

      fBodyAcc-bandsEnergy()-33,40  fBodyAcc-bandsEnergy()-41,48  \
0                       -0.999932                     -0.999725
1                       -0.999919                     -0.999866
2                       -0.999939                     -0.999922
3                       -0.999992                     -0.999949
4                       -0.999969                     -0.999935
...                           ...                           ...
7347                    -0.947156                     -0.903057
7348                    -0.858659                     -0.727820
7349                    -0.902131                     -0.883053
7350                    -0.942927                     -0.895088
7351                    -0.912911                     -0.905157

      fBodyAcc-bandsEnergy()-49,56  fBodyAcc-bandsEnergy()-57,64  \
```

```
0                      -0.999670                      -0.999986
1                      -0.999965                      -0.999999
2                      -0.999923                      -0.999997
3                      -0.999964                      -0.999996
4                      -0.999970                      -0.999986
...                          ...                            ...
7347                   -0.859455                      -0.844731
7348                   -0.814973                      -0.778839
7349                   -0.966414                      -0.999302
7350                   -0.971360                      -0.987954
7351                   -0.968546                      -0.998973

      fBodyAcc-bandsEnergy()-1,16  fBodyAcc-bandsEnergy()-17,32  \
0                      -0.999969                      -0.999977
1                      -0.999994                      -0.999949
2                      -0.999983                      -0.999802
3                      -0.999986                      -0.999825
4                      -0.999993                      -0.999935
...                          ...                            ...
7347                   -0.666429                      -0.695492
7348                   -0.704444                      -0.689477
7349                   -0.674515                      -0.828813
7350                   -0.677215                      -0.801527
7351                   -0.728519                      -0.703150

      fBodyAcc-bandsEnergy()-33,48  fBodyAcc-bandsEnergy()-49,64  \
0                      -0.999870                      -0.999776
1                      -0.999914                      -0.999977
2                      -0.999948                      -0.999948
3                      -0.999991                      -0.999975
4                      -0.999972                      -0.999975
...                          ...                            ...
7347                   -0.930640                      -0.854519
7348                   -0.809627                      -0.802862
7349                   -0.894994                      -0.977437
7350                   -0.925009                      -0.976921
7351                   -0.910019                      -0.978745

      fBodyAcc-bandsEnergy()-1,24  fBodyAcc-bandsEnergy()-25,48  \
0                      -0.999971                      -0.999919
1                      -0.999992                      -0.999946
2                      -0.999972                      -0.999875
3                      -0.999977                      -0.999912
4                      -0.999991                      -0.999956
...                          ...                            ...
7347                   -0.668164                      -0.872887
7348                   -0.705435                      -0.743731
7349                   -0.684729                      -0.913171
7350                   -0.685088                      -0.924387
7351                   -0.727441                      -0.835077

      fBodyAcc-bandsEnergy()-1,8.1  fBodyAcc-bandsEnergy()-9,16.1  \
0                      -0.999657                      -0.999860
1                      -0.999417                      -0.999813
2                      -0.999006                      -0.999715
3                      -0.999719                      -0.999750
4                      -0.999564                      -0.999860
...                          ...                            ...
7347                   -0.329720                      -0.887561
7348                   -0.370166                      -0.898946
7349                   -0.508772                      -0.920096
7350                   -0.522315                      -0.905384
7351                   -0.473807                      -0.911091
```

```
      fBodyAcc-bandsEnergy()-17,24.1  fBodyAcc-bandsEnergy()-25,32.1  \
0                          -0.999867                       -0.999863
1                          -0.999569                       -0.999874
2                          -0.999658                       -0.999817
3                          -0.999944                       -0.999940
4                          -0.999863                       -0.999898
...                              ...                             ...
7347                       -0.887871                       -0.789397
7348                       -0.923392                       -0.818271
7349                       -0.880645                       -0.879480
7350                       -0.865939                       -0.921774
7351                       -0.914215                       -0.917836

      fBodyAcc-bandsEnergy()-33,40.1  fBodyAcc-bandsEnergy()-41,48.1  \
0                          -0.999738                       -0.999732
1                          -0.999549                       -0.999737
2                          -0.999636                       -0.999679
3                          -0.999553                       -0.999899
4                          -0.999650                       -0.999712
...                              ...                             ...
7347                       -0.807549                       -0.779590
7348                       -0.729071                       -0.504696
7349                       -0.715864                       -0.779420
7350                       -0.911160                       -0.914824
7351                       -0.919847                       -0.962298

      fBodyAcc-bandsEnergy()-49,56.1  fBodyAcc-bandsEnergy()-57,64.1  \
0                          -0.999493                       -0.999814
1                          -0.999566                       -0.999905
2                          -0.999616                       -0.999880
3                          -0.999512                       -0.999866
4                          -0.999516                       -0.999911
...                              ...                             ...
7347                       -0.893687                       -0.998022
7348                       -0.732354                       -0.839292
7349                       -0.874379                       -0.951075
7350                       -0.939467                       -0.999635
7351                       -0.962062                       -0.999703

      fBodyAcc-bandsEnergy()-1,16.1  fBodyAcc-bandsEnergy()-17,32.1  \
0                         -0.999682                      -0.999839
1                         -0.999474                      -0.999554
2                         -0.999108                      -0.999624
3                         -0.999673                      -0.999936
4                         -0.999610                      -0.999845
...                             ...                            ...
7347                      -0.428573                      -0.830784
7348                      -0.465422                      -0.873454
7349                      -0.582509                      -0.849840
7350                      -0.585317                      -0.847854
7351                      -0.551085                      -0.893365

      fBodyAcc-bandsEnergy()-33,48.1  fBodyAcc-bandsEnergy()-49,64.1  \
0                          -0.999738                       -0.999612
1                          -0.999602                       -0.999695
2                          -0.999643                       -0.999715
3                          -0.999667                       -0.999646
4                          -0.999667                       -0.999667
...                              ...                             ...
7347                       -0.774786                       -0.934268
7348                       -0.611947                       -0.768790
7349                       -0.707699                       -0.902667
7350                       -0.902411                       -0.962894
7351                       -0.926976                       -0.976716
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```
      fBodyAcc-bandsEnergy()-1,24.1  fBodyAcc-bandsEnergy()-25,48.1  \
0                         -0.999687                        -0.999839
1                         -0.999444                        -0.999804
2                         -0.999126                        -0.999775
3                         -0.999692                        -0.999873
4                         -0.999621                        -0.999842
...                             ...                              ...
7347                      -0.458005                        -0.774149
7348                      -0.497946                        -0.744853
7349                      -0.597410                        -0.819925
7350                      -0.597383                        -0.911788
7351                      -0.574613                        -0.916517

      fBodyAcc-bandsEnergy()-1,8.2  fBodyAcc-bandsEnergy()-9,16.2  \
0                        -0.993592                       -0.999476
1                        -0.998235                       -0.999769
2                        -0.999388                       -0.999725
3                        -0.999807                       -0.999775
4                        -0.999806                       -0.999834
...                            ...                             ...
7347                     -0.274644                       -0.917188
7348                     -0.310596                       -0.878852
7349                      0.034897                       -0.910385
7350                      0.040506                       -0.937684
7351                     -0.106766                       -0.939684

      fBodyAcc-bandsEnergy()-17,24.2  fBodyAcc-bandsEnergy()-25,32.2  \
0                          -0.999662                       -0.999642
1                          -0.999692                       -0.999875
2                          -0.999718                       -0.999798
3                          -0.999810                       -0.999929
4                          -0.999825                       -0.999786
...                              ...                             ...
7347                       -0.945389                       -0.984347
7348                       -0.952703                       -0.988607
7349                       -0.954783                       -0.987174
7350                       -0.973669                       -0.977970
7351                       -0.974275                       -0.979170

      fBodyAcc-bandsEnergy()-33,40.2  fBodyAcc-bandsEnergy()-41,48.2  \
0                          -0.999293                       -0.997892
1                          -0.999666                       -0.999448
2                          -0.999753                       -0.999629
3                          -0.999858                       -0.999666
4                          -0.999745                       -0.999656
...                              ...                             ...
7347                       -0.947524                       -0.926416
7348                       -0.978665                       -0.942005
7349                       -0.979556                       -0.946617
7350                       -0.985033                       -0.952506
7351                       -0.993395                       -0.945101

      fBodyAcc-bandsEnergy()-49,56.2  fBodyAcc-bandsEnergy()-57,64.2  \
0                          -0.995932                       -0.995146
1                          -0.998930                       -0.998754
2                          -0.999686                       -0.999912
3                          -0.999681                       -0.999984
4                          -0.999026                       -0.999436
...                              ...                             ...
7347                       -0.960191                       -0.897381
7348                       -0.963047                       -0.999712
7349                       -0.969011                       -0.997527
7350                       -0.973937                       -0.996037
```

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7351                      -0.905322                      -0.863659

      fBodyAcc-bandsEnergy()-1,16.2  fBodyAcc-bandsEnergy()-17,32.2  \
0                         -0.994740                      -0.999688
1                         -0.998546                      -0.999792
2                         -0.999453                      -0.999781
3                         -0.999804                      -0.999887
4                         -0.999823                      -0.999844
...                             ...                            ...
7347                      -0.393471                      -0.959535
7348                      -0.409850                      -0.965742
7349                      -0.143827                      -0.966550
7350                      -0.148146                      -0.975260
7351                      -0.266521                      -0.976081

      fBodyAcc-bandsEnergy()-33,48.2  fBodyAcc-bandsEnergy()-49,64.2  \
0                          -0.998925                      -0.995671
1                          -0.999631                      -0.998878
2                          -0.999749                      -0.999760
3                          -0.999844                      -0.999778
4                          -0.999750                      -0.999150
...                              ...                            ...
7347                       -0.938355                      -0.941029
7348                       -0.967661                      -0.973735
7349                       -0.969583                      -0.977306
7350                       -0.975556                      -0.980351
7351                       -0.980410                      -0.892033

      fBodyAcc-bandsEnergy()-1,24.2  fBodyAcc-bandsEnergy()-25,48.2  \
0                         -0.994877                      -0.999454
1                         -0.998553                      -0.999822
2                         -0.999434                      -0.999801
3                         -0.999792                      -0.999922
4                         -0.999812                      -0.999793
...                             ...                            ...
7347                      -0.403800                      -0.971249
7348                      -0.421114                      -0.982651
7349                      -0.165022                      -0.982174
7350                      -0.173110                      -0.977298
7351                      -0.287385                      -0.979540

      fBodyAccJerk-mean()-X  fBodyAccJerk-mean()-Y  fBodyAccJerk-mean()-Z  \
0                 -0.992332              -0.987170              -0.989696
1                 -0.995032              -0.981311              -0.989740
2                 -0.990994              -0.981642              -0.987566
3                 -0.994447              -0.988727              -0.991354
4                 -0.996292              -0.988790              -0.990624
...                     ...                    ...                    ...
7347              -0.277608              -0.340391              -0.605485
7348              -0.352629              -0.347117              -0.604110
7349              -0.395901              -0.367945              -0.620807
7350              -0.470140              -0.458305              -0.670969
7351              -0.356768              -0.482739              -0.684938

      fBodyAccJerk-std()-X  fBodyAccJerk-std()-Y  fBodyAccJerk-std()-Z  \
0                -0.995821             -0.990936             -0.997052
1                -0.996652             -0.982084             -0.992627
2                -0.991249             -0.981415             -0.990416
3                -0.991378             -0.986927             -0.994391
4                -0.996903             -0.988607             -0.992907
...                    ...                   ...                    ...
7347             -0.390942             -0.424776             -0.695224
7348             -0.408547             -0.485915             -0.677839
7349             -0.350557             -0.437071             -0.662749
```

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7350            -0.357949             -0.387895             -0.663616
7351            -0.342471             -0.491211             -0.738585

      fBodyAccJerk-mad()-X  fBodyAccJerk-mad()-Y  fBodyAccJerk-mad()-Z  \
0                -0.993805             -0.990519             -0.996993
1                -0.994977             -0.982929             -0.991641
2                -0.987751             -0.981091             -0.987723
3                -0.989431             -0.987145             -0.993790
4                -0.996091             -0.988867             -0.991673
...                    ...                   ...                   ...
7347             -0.201188             -0.369551             -0.650976
7348             -0.271975             -0.452306             -0.644324
7349             -0.295135             -0.425311             -0.644735
7350             -0.294189             -0.437944             -0.656521
7351             -0.184756             -0.460940             -0.719444

      fBodyAccJerk-max()-X  fBodyAccJerk-max()-Y  fBodyAccJerk-max()-Z  \
0                -0.996737             -0.991975             -0.993242
1                -0.997425             -0.984923             -0.993187
2                -0.995163             -0.985351             -0.993912
3                -0.993402             -0.987874             -0.994201
4                -0.997009             -0.990373             -0.995142
...                    ...                   ...                   ...
7347             -0.581040             -0.614001             -0.775057
7348             -0.534744             -0.613520             -0.707359
7349             -0.482657             -0.626141             -0.702757
7350             -0.498131             -0.542854             -0.696337
7351             -0.478104             -0.640580             -0.771900

      fBodyAccJerk-min()-X  fBodyAccJerk-min()-Y  fBodyAccJerk-min()-Z  \
0                -0.998349             -0.991108             -0.959885
1                -0.997917             -0.982519             -0.986838
2                -0.997482             -0.998571             -0.997554
3                -0.997903             -0.999767             -0.965381
4                -0.995796             -0.996113             -0.995979
...                    ...                   ...                   ...
7347             -0.636136             -0.528502             -0.756442
7348             -0.423067             -0.765882             -0.770722
7349             -0.992566             -0.784185             -0.821076
7350             -0.960978             -0.832749             -0.885959
7351             -0.806431             -0.910006             -0.941567

      fBodyAccJerk-sma()  fBodyAccJerk-energy()-X  fBodyAccJerk-energy()-Y  \
0              -0.990515                -0.999935                -0.999820
1              -0.989851                -0.999960                -0.999640
2              -0.987237                -0.999894                -0.999637
3              -0.992657                -0.999923                -0.999803
4              -0.993259                -0.999969                -0.999821
...                  ...                      ...                      ...
7347           -0.294349                -0.751552                -0.788697
7348           -0.331085                -0.786336                -0.807537
7349           -0.364629                -0.782778                -0.802544
7350           -0.448573                -0.809277                -0.819601
7351           -0.409106                -0.766104                -0.855462

      fBodyAccJerk-energy()-Z  fBodyAccJerk-iqr()-X  fBodyAccJerk-iqr()-Y  \
0                   -0.999884             -0.993026             -0.991373
1                   -0.999847             -0.992843             -0.985221
2                   -0.999795             -0.981817             -0.984765
3                   -0.999883             -0.991776             -0.990685
4                   -0.999860             -0.996141             -0.992408
...                       ...                   ...                   ...
7347                -0.934694             -0.213471             -0.399531
7348                -0.931486             -0.302911             -0.454480
```

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7349               -0.931942             -0.479782             -0.485479
7350               -0.940752             -0.539867             -0.640460
7351               -0.955082             -0.234959             -0.518716

      fBodyAccJerk-iqr()-Z  fBodyAccJerk-entropy()-X  \
0                -0.996240                -1.000000
1                -0.991049                -1.000000
2                -0.982364                -1.000000
3                -0.993288                -1.000000
4                -0.986179                -1.000000
...                    ...                      ...
7347             -0.638643                 0.546273
7348             -0.674345                 0.372223
7349             -0.671477                 0.465329
7350             -0.715351                 0.417495
7351             -0.740248                 0.551807

      fBodyAccJerk-entropy()-Y  fBodyAccJerk-entropy()-Z  \
0                   -1.000000                -1.000000
1                   -1.000000                -1.000000
2                   -1.000000                -1.000000
3                   -1.000000                -1.000000
4                   -1.000000                -1.000000
...                       ...                      ...
7347                 0.455341                 0.173712
7348                 0.357697                 0.187539
7349                 0.422191                 0.163524
7350                 0.346965                 0.113978
7351                 0.340934                 0.075315

      fBodyAccJerk-maxInds-X  fBodyAccJerk-maxInds-Y  fBodyAccJerk-maxInds-Z  \
0                       1.00                   -0.24                   -1.00
1                      -0.32                   -0.12                   -0.32
2                      -0.16                   -0.48                   -0.28
3                      -0.12                   -0.56                   -0.28
4                      -0.32                   -0.08                    0.04
...                      ...                     ...                     ...
7347                   -0.44                   -0.48                   -0.96
7348                   -0.56                   -0.48                   -0.40
7349                   -0.88                   -0.88                   -0.96
7350                   -0.88                   -0.40                   -0.96
7351                   -0.32                   -0.40                   -0.96

      fBodyAccJerk-meanFreq()-X  fBodyAccJerk-meanFreq()-Y  \
0                      0.870385                   0.210697
1                      0.608514                  -0.053676
2                      0.115434                  -0.193436
3                      0.035798                  -0.093036
4                      0.273350                   0.079135
...                         ...                        ...
7347                  -0.454932                  -0.220375
7348                  -0.318822                  -0.246424
7349                  -0.290853                  -0.155120
7350                  -0.336376                  -0.364090
7351                  -0.315566                  -0.633820

      fBodyAccJerk-meanFreq()-Z  fBodyAccJerk-skewness()-X  \
0                      0.263708                  -0.703686
1                      0.063148                  -0.630305
2                      0.038254                  -0.594759
3                      0.168095                  -0.263851
4                      0.292384                  -0.522157
...                         ...                        ...
7347                  -0.511634                  -0.533345
```

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7348                  -0.651707                  -0.262410
7349                  -0.512503                  -0.085551
7350                  -0.598362                  -0.042273
7351                  -0.663801                  -0.276127

      fBodyAccJerk-kurtosis()-X  fBodyAccJerk-skewness()-Y  \
0                     -0.903743                  -0.582574
1                     -0.910394                  -0.414424
2                     -0.923541                  -0.528934
3                     -0.757229                  -0.396039
4                     -0.812987                  -0.496560
...                         ...                        ...
7347                  -0.884932                  -0.598286
7348                  -0.717864                  -0.691678
7349                  -0.607900                  -0.535788
7350                  -0.610674                  -0.243396
7351                  -0.739584                  -0.509259

      fBodyAccJerk-kurtosis()-Y  fBodyAccJerk-skewness()-Z  \
0                     -0.936310                  -0.507345
1                     -0.850586                  -0.655535
2                     -0.912985                  -0.803407
3                     -0.829635                  -0.577038
4                     -0.903908                  -0.764369
...                         ...                        ...
7347                  -0.952868                  -0.563941
7348                  -0.941907                  -0.459906
7349                  -0.911668                  -0.323748
7350                  -0.780117                  -0.255505
7351                  -0.913548                  -0.438051

      fBodyAccJerk-kurtosis()-Z  fBodyAccJerk-bandsEnergy()-1,8  \
0                     -0.805536                      -0.999986
1                     -0.915987                      -0.999996
2                     -0.980133                      -0.999994
3                     -0.893375                      -0.999998
4                     -0.966204                      -0.999995
...                         ...                            ...
7347                  -0.917485                      -0.839256
7348                  -0.822433                      -0.854278
7349                  -0.782784                      -0.815380
7350                  -0.727592                      -0.822905
7351                  -0.803673                      -0.834215

      fBodyAccJerk-bandsEnergy()-9,16  fBodyAccJerk-bandsEnergy()-17,24  \
0                           -0.999980                         -0.999975
1                           -0.999980                         -0.999949
2                           -0.999944                         -0.999827
3                           -0.999965                         -0.999843
4                           -0.999983                         -0.999947
...                               ...                               ...
7347                        -0.762201                         -0.748974
7348                        -0.759555                         -0.850650
7349                        -0.791132                         -0.818484
7350                        -0.844415                         -0.801750
7351                        -0.843882                         -0.735602

      fBodyAccJerk-bandsEnergy()-25,32  fBodyAccJerk-bandsEnergy()-33,40  \
0                           -0.999955                         -0.999919
1                           -0.999968                         -0.999910
2                           -0.999841                         -0.999922
3                           -0.999865                         -0.999996
4                           -0.999939                         -0.999962
...                               ...                               ...
```

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7347                          -0.868104                          -0.906692
7348                          -0.900006                          -0.912456
7349                          -0.941891                          -0.896504
7350                          -0.947502                          -0.948120
7351                          -0.815491                          -0.899869

      fBodyAccJerk-bandsEnergy()-41,48  fBodyAccJerk-bandsEnergy()-49,56  \
0                             -0.999640                          -0.999483
1                             -0.999814                          -0.999920
2                             -0.999906                          -0.999874
3                             -0.999930                          -0.999942
4                             -0.999929                          -0.999958
...                                 ...                                ...
7347                          -0.932186                          -0.913709
7348                          -0.904999                          -0.867256
7349                          -0.829978                          -0.942269
7350                          -0.861099                          -0.958217
7351                          -0.863806                          -0.945023

      fBodyAccJerk-bandsEnergy()-57,64  fBodyAccJerk-bandsEnergy()-1,16  \
0                             -0.999961                          -0.999982
1                             -0.999961                          -0.999987
2                             -0.999997                          -0.999963
3                             -0.999999                          -0.999978
4                             -0.999995                          -0.999988
...                                 ...                                ...
7347                          -0.982720                          -0.775736
7348                          -0.949992                          -0.780751
7349                          -0.999603                          -0.783616
7350                          -0.999502                          -0.821137
7351                          -0.994620                          -0.825848

      fBodyAccJerk-bandsEnergy()-17,32  fBodyAccJerk-bandsEnergy()-33,48  \
0                             -0.999971                          -0.999811
1                             -0.999956                          -0.999877
2                             -0.999804                          -0.999923
3                             -0.999827                          -0.999982
4                             -0.999941                          -0.999959
...                                 ...                                ...
7347                          -0.742794                          -0.909432
7348                          -0.837512                          -0.902114
7349                          -0.830408                          -0.860523
7350                          -0.819596                          -0.908000
7351                          -0.709043                          -0.876706

      fBodyAccJerk-bandsEnergy()-49,64  fBodyAccJerk-bandsEnergy()-1,24  \
0                             -0.999485                          -0.999981
1                             -0.999914                          -0.999974
2                             -0.999875                          -0.999909
3                             -0.999943                          -0.999927
4                             -0.999958                          -0.999975
...                                 ...                                ...
7347                          -0.911863                          -0.724214
7348                          -0.859887                          -0.767363
7349                          -0.943192                          -0.757269
7350                          -0.958845                          -0.780800
7351                          -0.944935                          -0.759098

      fBodyAccJerk-bandsEnergy()-25,48  fBodyAccJerk-bandsEnergy()-1,8.1  \
0                             -0.999852                          -0.999933
1                             -0.999906                          -0.999861
2                             -0.999843                          -0.999820
3                             -0.999901                          -0.999895
4                             -0.999939                          -0.999925
```

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...                                ...                                ...
7347                          -0.841775                          -0.684532
7348                          -0.860409                          -0.715969
7349                          -0.863381                          -0.664626
7350                          -0.899429                          -0.689422
7351                          -0.780940                          -0.700751

      fBodyAccJerk-bandsEnergy()-9,16.1  fBodyAccJerk-bandsEnergy()-17,24.1  \
0                             -0.999900                          -0.999824
1                             -0.999827                          -0.999456
2                             -0.999744                          -0.999559
3                             -0.999797                          -0.999888
4                             -0.999877                          -0.999810
...                                 ...                                ...
7347                          -0.904576                          -0.881384
7348                          -0.900900                          -0.894124
7349                          -0.911263                          -0.853475
7350                          -0.885092                          -0.835729
7351                          -0.905898                          -0.897545

      fBodyAccJerk-bandsEnergy()-25,32.1  fBodyAccJerk-bandsEnergy()-33,40.1  \
0                             -0.999860                          -0.999728
1                             -0.999830                          -0.999609
2                             -0.999839                          -0.999667
3                             -0.999906                          -0.999681
4                             -0.999932                          -0.999728
...                                 ...                                ...
7347                          -0.772943                          -0.798259
7348                          -0.835120                          -0.835057
7349                          -0.872204                          -0.792151
7350                          -0.916987                          -0.914429
7351                          -0.914990                          -0.923946

      fBodyAccJerk-bandsEnergy()-41,48.1  fBodyAccJerk-bandsEnergy()-49,56.1  \
0                             -0.999729                          -0.999567
1                             -0.999685                          -0.999576
2                             -0.999627                          -0.999704
3                             -0.999846                          -0.999693
4                             -0.999769                          -0.999503
...                                 ...                                ...
7347                          -0.710347                          -0.854304
7348                          -0.649963                          -0.826948
7349                          -0.735664                          -0.872915
7350                          -0.891365                          -0.927842
7351                          -0.950993                          -0.955351

      fBodyAccJerk-bandsEnergy()-57,64.1  fBodyAccJerk-bandsEnergy()-1,16.1  \
0                             -0.999765                          -0.999900
1                             -0.999937                          -0.999817
2                             -0.999993                          -0.999732
3                             -1.000000                          -0.999798
4                             -0.999992                          -0.999878
...                                 ...                                ...
7347                          -0.952997                          -0.839183
7348                          -0.987268                          -0.843252
7349                          -0.991038                          -0.840560
7350                          -0.994695                          -0.822665
7351                          -0.998010                          -0.844201

      fBodyAccJerk-bandsEnergy()-17,32.1  fBodyAccJerk-bandsEnergy()-33,48.1  \
0                             -0.999815                          -0.999710
1                             -0.999532                          -0.999595
2                             -0.999611                          -0.999618
3                             -0.999883                          -0.999722
```

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4                                -0.999839                                -0.999728
...                                    ...                                      ...
7347                             -0.806402                                -0.712223
7348                             -0.845013                                -0.716371
7349                             -0.832836                                -0.718065
7350                             -0.841000                                -0.884037
7351                             -0.885166                                -0.917245

      fBodyAccJerk-bandsEnergy()-49,64.1  fBodyAccJerk-bandsEnergy()-1,24.1  \
0                                -0.999596                                -0.999852
1                                -0.999626                                -0.999630
2                                -0.999744                                -0.999613
3                                -0.999736                                -0.999806
4                                -0.999568                                -0.999830
...                                    ...                                      ...
7347                             -0.866758                                -0.830798
7348                             -0.847177                                -0.839367
7349                             -0.887820                                -0.819509
7350                             -0.936279                                -0.798679
7351                             -0.960736                                -0.841564

      fBodyAccJerk-bandsEnergy()-25,48.1  fBodyAccJerk-bandsEnergy()-1,8.2  \
0                                -0.999822                               -0.999400
1                                -0.999759                               -0.999859
2                                -0.999773                               -0.999871
3                                -0.999856                               -0.999885
4                                -0.999874                               -0.999845
...                                    ...                                     ...
7347                             -0.746475                               -0.714479
7348                             -0.787089                               -0.725265
7349                             -0.811011                               -0.658937
7350                             -0.903174                               -0.652902
7351                             -0.914740                               -0.772610

      fBodyAccJerk-bandsEnergy()-9,16.2  fBodyAccJerk-bandsEnergy()-17,24.2  \
0                               -0.999766                                -0.999958
1                               -0.999846                                -0.999795
2                               -0.999784                                -0.999740
3                               -0.999724                                -0.999841
4                               -0.999853                                -0.999890
...                                   ...                                      ...
7347                            -0.918070                                -0.956612
7348                            -0.878160                                -0.956817
7349                            -0.909565                                -0.957155
7350                            -0.936716                                -0.974066
7351                            -0.949577                                -0.976030

      fBodyAccJerk-bandsEnergy()-25,32.2  fBodyAccJerk-bandsEnergy()-33,40.2  \
0                                -0.999950                                -0.999838
1                                -0.999801                                -0.999819
2                                -0.999787                                -0.999772
3                                -0.999943                                -0.999869
4                                -0.999818                                -0.999760
...                                    ...                                      ...
7347                             -0.982996                                -0.961243
7348                             -0.987930                                -0.978913
7349                             -0.985799                                -0.979160
7350                             -0.977223                                -0.984690
7351                             -0.978895                                -0.993489

      fBodyAccJerk-bandsEnergy()-41,48.2  fBodyAccJerk-bandsEnergy()-49,56.2  \
0                                -0.999814                                -0.998781
1                                -0.999769                                -0.999637
2                                -0.999626                                -0.999487
```

```
3                                -0.999735                                -0.999204
4                                -0.999688                                -0.999169
...                                    ...                                      ...
7347                             -0.949816                                -0.975114
7348                             -0.937821                                -0.945024
7349                             -0.944449                                -0.941242
7350                             -0.948743                                -0.957940
7351                             -0.952608                                -0.972608

      fBodyAccJerk-bandsEnergy()-57,64.2  fBodyAccJerk-bandsEnergy()-1,16.2  \
0                                -0.998578                                -0.999620
1                                -0.999954                                -0.999852
2                                -0.999996                                -0.999803
3                                -0.999662                                -0.999756
4                                -0.999982                                -0.999853
...                                    ...                                      ...
7347                             -0.920742                                -0.828551
7348                             -0.982719                                -0.798232
7349                             -0.953456                                -0.801553
7350                             -0.996428                                -0.822642
7351                             -0.998224                                -0.876151

      fBodyAccJerk-bandsEnergy()-17,32.2  fBodyAccJerk-bandsEnergy()-33,48.2  \
0                                -0.999984                                -0.999828
1                                -0.999827                                -0.999800
2                                -0.999792                                -0.999721
3                                -0.999920                                -0.999828
4                                -0.999884                                -0.999730
...                                    ...                                      ...
7347                             -0.969541                                -0.955200
7348                             -0.972058                                -0.965088
7349                             -0.971189                                -0.967280
7350                             -0.975639                                -0.972807
7351                             -0.977460                                -0.980705

      fBodyAccJerk-bandsEnergy()-49,64.2  fBodyAccJerk-bandsEnergy()-1,24.2  \
0                                -0.998681                                -0.999844
1                                -0.999651                                -0.999835
2                                -0.999514                                -0.999775
3                                -0.999207                                -0.999824
4                                -0.999211                                -0.999900
...                                    ...                                      ...
7347                             -0.967310                                -0.894291
7348                             -0.945857                                -0.880989
7349                             -0.938917                                -0.882693
7350                             -0.959682                                -0.903632
7351                             -0.973806                                -0.928703

      fBodyAccJerk-bandsEnergy()-25,48.2  fBodyGyro-mean()-X  \
0                                -0.999928           -0.986574
1                                -0.999827           -0.977387
2                                -0.999787           -0.975433
3                                -0.999924           -0.987110
4                                -0.999809           -0.982446
...                                    ...                 ...
7347                             -0.972102           -0.334216
7348                             -0.978982           -0.429959
7349                             -0.978549           -0.434122
7350                             -0.975514           -0.562069
7351                             -0.979632           -0.347220

      fBodyGyro-mean()-Y  fBodyGyro-mean()-Z  fBodyGyro-std()-X  \
0              -0.981762           -0.989515          -0.985033
1              -0.992530           -0.989606          -0.984904
```

```
2              -0.993715          -0.986756          -0.976642
3              -0.993602          -0.987191          -0.992810
4              -0.992984          -0.988666          -0.985982
...                  ...                ...                ...
7347           -0.203302          -0.303093          -0.420143
7348           -0.287440          -0.309675          -0.496589
7349           -0.306459          -0.357041          -0.373464
7350           -0.375290          -0.411176          -0.527553
7351           -0.287512          -0.308877          -0.484777

      fBodyGyro-std()-Y  fBodyGyro-std()-Z  fBodyGyro-mad()-X  \
0             -0.973886          -0.994035          -0.986531
1             -0.987168          -0.989785          -0.979361
2             -0.993399          -0.987328          -0.975609
3             -0.991646          -0.988678          -0.989671
4             -0.991956          -0.987944          -0.982581
...                 ...                ...                ...
7347           0.222126          -0.201584          -0.289938
7348           0.272171          -0.226623          -0.370069
7349           0.398326          -0.310258          -0.440166
7350           0.424128          -0.316932          -0.536760
7351           0.166383          -0.264330          -0.425698

      fBodyGyro-mad()-Y  fBodyGyro-mad()-Z  fBodyGyro-max()-X  \
0             -0.983616          -0.992352          -0.980498
1             -0.991837          -0.987965          -0.987354
2             -0.993707          -0.985030          -0.972901
3             -0.993461          -0.986526          -0.994518
4             -0.993343          -0.986461          -0.987950
...                 ...                ...                ...
7347          -0.084331          -0.139064          -0.462685
7348          -0.152900          -0.191393          -0.531515
7349          -0.190569          -0.296001          -0.226544
7350          -0.170534          -0.299769          -0.387787
7351          -0.120246          -0.212452          -0.399145

      fBodyGyro-max()-Y  fBodyGyro-max()-Z  fBodyGyro-min()-X  \
0             -0.972271          -0.994944          -0.997569
1             -0.984786          -0.990151          -0.986892
2             -0.994986          -0.991283          -0.988312
3             -0.991801          -0.992281          -0.989701
4             -0.993228          -0.991444          -0.993738
...                 ...                ...                ...
7347           0.248460          -0.405139          -0.838492
7348           0.362340          -0.466513          -0.971251
7349           0.582228          -0.446471          -0.870053
7350           0.546073          -0.505009          -0.975016
7351           0.075958          -0.457982          -0.892933

      fBodyGyro-min()-Y  fBodyGyro-min()-Z  fBodyGyro-sma()  \
0             -0.984085          -0.994335       -0.985276
1             -0.999054          -0.994414       -0.986869
2             -0.997233          -0.993636       -0.986009
3             -0.994344          -0.993144       -0.990344
4             -0.993725          -0.994835       -0.988706
...                 ...                ...             ...
7347          -0.862090          -0.952669       -0.223417
7348          -0.891962          -0.986631       -0.298720
7349          -0.909978          -0.989534       -0.320389
7350          -0.968435          -0.922208       -0.411943
7351          -0.647386          -0.842122       -0.268214

      fBodyGyro-energy()-X  fBodyGyro-energy()-Y  fBodyGyro-energy()-Z  \
0                -0.999864             -0.999666             -0.999935
```

```
1               -0.999825              -0.999911              -0.999892
2               -0.999673              -0.999962              -0.999846
3               -0.999946              -0.999951              -0.999867
4               -0.999862              -0.999951              -0.999864
...                   ...                    ...                    ...
7347            -0.817573              -0.410224              -0.649794
7348            -0.863246              -0.395638              -0.668534
7349            -0.805874              -0.295567              -0.731445
7350            -0.888488              -0.290273              -0.744408
7351            -0.848623              -0.476234              -0.693730

      fBodyGyro-iqr()-X  fBodyGyro-iqr()-Y  fBodyGyro-iqr()-Z  \
0             -0.990344          -0.994836          -0.994412
1             -0.987099          -0.995564          -0.987254
2             -0.985536          -0.995392          -0.992551
3             -0.992878          -0.996289          -0.990224
4             -0.990464          -0.996123          -0.997426
...                 ...                ...                ...
7347          -0.553390          -0.503385          -0.482814
7348          -0.615143          -0.617957          -0.408563
7349          -0.622268          -0.541557          -0.468655
7350          -0.651015          -0.717575          -0.496417
7351          -0.704615          -0.629969          -0.599074

      fBodyGyro-entropy()-X  fBodyGyro-entropy()-Y  fBodyGyro-entropy()-Z  \
0                 -0.712402              -0.644842              -0.838993
1                 -0.611112              -0.764603              -0.751080
2                 -0.590987              -0.808287              -0.751080
3                 -0.723666              -0.803754              -0.817286
4                 -0.652617              -0.827212              -0.737458
...                     ...                    ...                    ...
7347               0.380363               0.609508               0.360604
7348               0.512370               0.610281               0.419184
7349               0.355355               0.600799               0.408862
7350               0.404255               0.445817               0.309545
7351               0.478811               0.466683               0.358268

      fBodyGyro-maxInds-X  fBodyGyro-maxInds-Y  fBodyGyro-maxInds-Z  \
0               -1.000000            -1.000000            -1.000000
1               -1.000000            -1.000000            -1.000000
2               -1.000000            -0.870968            -1.000000
3               -1.000000            -1.000000            -0.793103
4               -1.000000            -0.806452            -1.000000
...                   ...                  ...                  ...
7347            -1.000000            -0.935484            -0.793103
7348            -0.933333            -0.935484            -0.931034
7349            -0.933333            -0.935484            -0.931034
7350            -0.933333            -0.935484            -0.793103
7351            -1.000000            -0.935484            -0.793103

      fBodyGyro-meanFreq()-X  fBodyGyro-meanFreq()-Y  fBodyGyro-meanFreq()-Z  \
0                  -0.257549                0.097947                0.547151
1                  -0.048167               -0.401608               -0.068178
2                  -0.216685               -0.017264               -0.110720
3                   0.216862               -0.135245               -0.049728
4                  -0.153343               -0.088403               -0.162230
...                      ...                     ...                     ...
7347               -0.434780               -0.633189               -0.568724
7348               -0.516570               -0.638588               -0.585016
7349               -0.289537               -0.675091               -0.450284
7350               -0.362980               -0.793528               -0.474388
7351                0.002108               -0.738125               -0.347200

      fBodyGyro-skewness()-X  fBodyGyro-kurtosis()-X  fBodyGyro-skewness()-Y  \
```

```
0                0.377311               0.134092               0.273372
1               -0.458553              -0.797014               0.387569
2                0.090519              -0.244691              -0.429272
3               -0.572088              -0.873618              -0.135118
4               -0.339597              -0.722628              -0.265471
...                   ...                    ...                    ...
7347            -0.205744              -0.588955               0.208299
7348            -0.213016              -0.587630               0.410296
7349             0.418267               0.156507               0.647881
7350             0.511094               0.354254               0.533738
7351             0.102479              -0.202375               0.037459

      fBodyGyro-kurtosis()-Y  fBodyGyro-skewness()-Z  fBodyGyro-kurtosis()-Z  \
0                  -0.091262               -0.484347               -0.782851
1                   0.148665               -0.156909               -0.451776
2                  -0.812639               -0.391991               -0.767482
3                  -0.542238               -0.379353               -0.756548
4                  -0.689988               -0.267996               -0.659208
...                      ...                    ...                    ...
7347               -0.101680               -0.082433               -0.485884
7348                0.152159               -0.148077               -0.584945
7349                0.492508                0.010221               -0.379371
7350                0.297519               -0.040648               -0.454762
7351               -0.371616               -0.069539               -0.483253

      fBodyGyro-bandsEnergy()-1,8  fBodyGyro-bandsEnergy()-9,16  \
0                       -0.999865                     -0.999932
1                       -0.999851                     -0.999794
2                       -0.999680                     -0.999828
3                       -0.999964                     -0.999891
4                       -0.999870                     -0.999912
...                           ...                           ...
7347                    -0.818556                     -0.919316
7348                    -0.866443                     -0.921392
7349                    -0.801291                     -0.952590
7350                    -0.890578                     -0.954082
7351                    -0.856793                     -0.920044

      fBodyGyro-bandsEnergy()-17,24  fBodyGyro-bandsEnergy()-25,32  \
0                        -0.999973                      -0.999970
1                        -0.999913                      -0.999918
2                        -0.999915                      -0.999932
3                        -0.999946                      -0.999973
4                        -0.999926                      -0.999941
...                            ...                            ...
7347                     -0.948601                      -0.977184
7348                     -0.967841                      -0.984055
7349                     -0.949852                      -0.970943
7350                     -0.937204                      -0.984101
7351                     -0.920475                      -0.954334

      fBodyGyro-bandsEnergy()-33,40  fBodyGyro-bandsEnergy()-41,48  \
0                        -0.999930                      -0.999959
1                        -0.999896                      -0.999885
2                        -0.999848                      -0.999842
3                        -0.999877                      -0.999903
4                        -0.999936                      -0.999887
...                            ...                            ...
7347                     -0.956831                      -0.987834
7348                     -0.962062                      -0.966923
7349                     -0.929621                      -0.953221
7350                     -0.964794                      -0.978337
7351                     -0.869765                      -0.862001
```

```
      fBodyGyro-bandsEnergy()-49,56  fBodyGyro-bandsEnergy()-57,64  \
0                         -0.999929                      -0.999985
1                         -0.999784                      -0.999782
2                         -0.999864                      -0.999862
3                         -0.999833                      -0.999893
4                         -0.999900                      -0.999917
...                             ...                            ...
7347                      -0.964412                      -0.973807
7348                      -0.991708                      -0.999693
7349                      -0.942676                      -0.957917
7350                      -0.976777                      -0.999712
7351                      -0.813696                      -0.790248

      fBodyGyro-bandsEnergy()-1,16  fBodyGyro-bandsEnergy()-17,32  \
0                        -0.999863                      -0.999968
1                        -0.999830                      -0.999899
2                        -0.999674                      -0.999906
3                        -0.999950                      -0.999948
4                        -0.999865                      -0.999918
...                            ...                            ...
7347                     -0.817429                      -0.949351
7348                     -0.862806                      -0.967630
7349                     -0.806039                      -0.947810
7350                     -0.890299                      -0.943006
7351                     -0.853526                      -0.917405

      fBodyGyro-bandsEnergy()-33,48  fBodyGyro-bandsEnergy()-49,64  \
0                         -0.999936                      -0.999954
1                         -0.999883                      -0.999783
2                         -0.999831                      -0.999863
3                         -0.999877                      -0.999860
4                         -0.999911                      -0.999908
...                             ...                            ...
7347                      -0.965115                      -0.968569
7348                      -0.960227                      -0.995241
7349                      -0.932155                      -0.949420
7350                      -0.966770                      -0.986925
7351                      -0.853508                      -0.803321

      fBodyGyro-bandsEnergy()-1,24  fBodyGyro-bandsEnergy()-25,48  \
0                        -0.999864                      -0.999961
1                        -0.999828                      -0.999908
2                        -0.999676                      -0.999903
3                        -0.999948                      -0.999946
4                        -0.999864                      -0.999933
...                            ...                            ...
7347                     -0.817755                      -0.973452
7348                     -0.863404                      -0.977004
7349                     -0.806629                      -0.959430
7350                     -0.888753                      -0.978925
7351                     -0.851698                      -0.924731

      fBodyGyro-bandsEnergy()-1,8.1  fBodyGyro-bandsEnergy()-9,16.1  \
0                         -0.999454                      -0.999978
1                         -0.999856                      -0.999988
2                         -0.999954                      -0.999988
3                         -0.999931                      -0.999989
4                         -0.999926                      -0.999993
...                             ...                            ...
7347                      -0.053258                      -0.914777
7348                      -0.029411                      -0.908143
7349                       0.161404                      -0.917293
7350                       0.193585                      -0.937461
7351                      -0.129277                      -0.955381
```

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      fBodyGyro-bandsEnergy()-17,24.1  fBodyGyro-bandsEnergy()-25,32.1  \
0                           -0.999992                        -0.999990
1                           -0.999996                        -0.999994
2                           -0.999990                        -0.999994
3                           -0.999992                        -0.999993
4                           -0.999996                        -0.999988
...                               ...                              ...
7347                        -0.980748                        -0.970885
7348                        -0.986555                        -0.967204
7349                        -0.988072                        -0.972419
7350                        -0.987714                        -0.980693
7351                        -0.978933                        -0.980204

      fBodyGyro-bandsEnergy()-33,40.1  fBodyGyro-bandsEnergy()-41,48.1  \
0                           -0.999969                        -0.999807
1                           -0.999986                        -0.999985
2                           -0.999973                        -0.999943
3                           -0.999986                        -0.999954
4                           -0.999967                        -0.999974
...                               ...                              ...
7347                        -0.974455                        -0.957627
7348                        -0.973552                        -0.976760
7349                        -0.980096                        -0.974409
7350                        -0.993624                        -0.988340
7351                        -0.988988                        -0.982459

      fBodyGyro-bandsEnergy()-49,56.1  fBodyGyro-bandsEnergy()-57,64.1  \
0                           -0.998346                        -0.998961
1                           -0.999980                        -0.999990
2                           -0.999987                        -0.999993
3                           -0.999990                        -0.999988
4                           -0.999974                        -0.999972
...                               ...                              ...
7347                        -0.961764                        -0.957294
7348                        -0.979081                        -0.994704
7349                        -0.988678                        -0.998525
7350                        -0.994498                        -0.999797
7351                        -0.971475                        -0.976012

      fBodyGyro-bandsEnergy()-1,16.1  fBodyGyro-bandsEnergy()-17,32.1  \
0                          -0.999619                       -0.999989
1                          -0.999897                       -0.999994
2                          -0.999962                       -0.999989
3                          -0.999947                       -0.999991
4                          -0.999946                       -0.999993
...                              ...                             ...
7347                       -0.307101                       -0.973177
7348                       -0.286728                       -0.977496
7349                       -0.164197                       -0.980494
7350                       -0.155644                       -0.982663
7351                       -0.384693                       -0.974299

      fBodyGyro-bandsEnergy()-33,48.1  fBodyGyro-bandsEnergy()-49,64.1  \
0                           -0.999935                        -0.998388
1                           -0.999986                        -0.999982
2                           -0.999967                        -0.999988
3                           -0.999980                        -0.999988
4                           -0.999968                        -0.999970
...                               ...                              ...
7347                        -0.970738                        -0.954623
7348                        -0.973941                        -0.983004
7349                        -0.978725                        -0.991404
7350                        -0.992474                        -0.996046
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7351                          -0.987535                          -0.969559

      fBodyGyro-bandsEnergy()-1,24.1  fBodyGyro-bandsEnergy()-25,48.1  \
0                          -0.999643                          -0.999973
1                          -0.999903                          -0.999992
2                          -0.999961                          -0.999986
3                          -0.999948                          -0.999988
4                          -0.999949                          -0.999982
...                              ...                                ...
7347                       -0.347510                          -0.968582
7348                       -0.331390                          -0.966775
7349                       -0.218370                          -0.972258
7350                       -0.210258                          -0.982891
7351                       -0.418669                          -0.980969

      fBodyGyro-bandsEnergy()-1,8.2  fBodyGyro-bandsEnergy()-9,16.2  \
0                         -0.999955                         -0.999976
1                         -0.999909                         -0.999959
2                         -0.999870                         -0.999935
3                         -0.999877                         -0.999969
4                         -0.999871                         -0.999955
...                             ...                               ...
7347                      -0.670343                         -0.909395
7348                      -0.675695                         -0.952946
7349                      -0.746424                         -0.946230
7350                      -0.761275                         -0.936395
7351                      -0.709914                         -0.931382

      fBodyGyro-bandsEnergy()-17,24.2  fBodyGyro-bandsEnergy()-25,32.2  \
0                          -0.999906                          -0.999985
1                          -0.999928                          -0.999966
2                          -0.999935                          -0.999957
3                          -0.999957                          -0.999956
4                          -0.999996                          -0.999986
...                              ...                                ...
7347                       -0.948445                          -0.984596
7348                       -0.944314                          -0.983830
7349                       -0.937004                          -0.973180
7350                       -0.949989                          -0.976694
7351                       -0.953783                          -0.975695

      fBodyGyro-bandsEnergy()-33,40.2  fBodyGyro-bandsEnergy()-41,48.2  \
0                          -0.999937                          -0.999751
1                          -0.999985                          -0.999926
2                          -0.999952                          -0.999909
3                          -0.999949                          -0.999880
4                          -0.999940                          -0.999907
...                              ...                                ...
7347                       -0.993334                          -0.991587
7348                       -0.984907                          -0.984832
7349                       -0.985161                          -0.978772
7350                       -0.990389                          -0.990702
7351                       -0.976892                          -0.958603

      fBodyGyro-bandsEnergy()-49,56.2  fBodyGyro-bandsEnergy()-57,64.2  \
0                          -0.999072                          -0.999928
1                          -0.999961                          -0.999983
2                          -0.999889                          -0.999989
3                          -0.999879                          -0.999950
4                          -0.999921                          -0.999981
...                              ...                                ...
7347                       -0.985771                          -0.995548
7348                       -0.991106                          -0.999764
7349                       -0.991696                          -0.999964
```

```
7350                         -0.990917                          -0.998193
7351                         -0.936971                          -0.937116

      fBodyGyro-bandsEnergy()-1,16.2  fBodyGyro-bandsEnergy()-17,32.2  \
0                          -0.999952                         -0.999906
1                          -0.999902                         -0.999918
2                          -0.999856                         -0.999920
3                          -0.999875                         -0.999940
4                          -0.999864                         -0.999992
...                              ...                               ...
7347                       -0.656017                         -0.943384
7348                       -0.675698                         -0.939074
7349                       -0.740740                         -0.926947
7350                       -0.751574                         -0.941031
7351                       -0.701031                         -0.944165

      fBodyGyro-bandsEnergy()-33,48.2  fBodyGyro-bandsEnergy()-49,64.2  \
0                          -0.999893                         -0.999444
1                          -0.999975                         -0.999971
2                          -0.999946                         -0.999933
3                          -0.999936                         -0.999910
4                          -0.999937                         -0.999947
...                              ...                               ...
7347                       -0.992846                         -0.990022
7348                       -0.984839                         -0.994870
7349                       -0.983393                         -0.995290
7350                       -0.990445                         -0.994081
7351                       -0.971886                         -0.937034

      fBodyGyro-bandsEnergy()-1,24.2  fBodyGyro-bandsEnergy()-25,48.2  \
0                          -0.999941                         -0.999959
1                          -0.999894                         -0.999971
2                          -0.999850                         -0.999956
3                          -0.999871                         -0.999952
4                          -0.999866                         -0.999973
...                              ...                               ...
7347                       -0.650710                         -0.987158
7348                       -0.669743                         -0.984145
7349                       -0.733496                         -0.976350
7350                       -0.746024                         -0.980963
7351                       -0.696229                         -0.974515

      fBodyAccMag-mean()  fBodyAccMag-std()  fBodyAccMag-mad()  \
0              -0.952155          -0.956134          -0.948870
1              -0.980857          -0.975866          -0.975777
2              -0.987795          -0.989015          -0.985594
3              -0.987519          -0.986742          -0.983524
4              -0.993591          -0.990063          -0.992324
...                  ...                ...                ...
7347           -0.097106          -0.232600          -0.007392
7348           -0.158161          -0.275373          -0.172448
7349           -0.298654          -0.220288          -0.216074
7350           -0.346795          -0.234539          -0.220443
7351           -0.240038          -0.342670          -0.146649

      fBodyAccMag-max()  fBodyAccMag-min()  fBodyAccMag-sma()  \
0              -0.974321          -0.925722          -0.952155
1              -0.978226          -0.986911          -0.980857
2              -0.993062          -0.989836          -0.987795
3              -0.990230          -0.998185          -0.987519
4              -0.990506          -0.987805          -0.993591
...                  ...                ...                ...
7347           -0.401674          -0.861014          -0.097106
7348           -0.410577          -0.449474          -0.158161
```

```
7349          -0.362904          -0.887969          -0.298654
7350          -0.397687          -0.902798          -0.346795
7351          -0.620014          -0.928594          -0.240038

      fBodyAccMag-energy()  fBodyAccMag-iqr()  fBodyAccMag-entropy()  \
0                -0.998285          -0.973273              -0.646376
1                -0.999472          -0.984479              -0.816674
2                -0.999807          -0.989237              -0.907014
3                -0.999770          -0.983215              -0.907014
4                -0.999873          -0.997343              -0.907014
...                    ...                ...                    ...
7347             -0.584282          -0.101796               0.492474
7348             -0.632536          -0.363379               0.427792
7349             -0.641170          -0.444155               0.466101
7350             -0.663579          -0.533311               0.390648
7351             -0.698087          -0.215984               0.574078

      fBodyAccMag-maxInds  fBodyAccMag-meanFreq()  fBodyAccMag-skewness()  \
0               -0.793103               -0.088436              -0.436471
1               -1.000000               -0.044150              -0.122040
2               -0.862069                0.257899              -0.618725
3               -1.000000                0.073581              -0.468422
4               -1.000000                0.394310              -0.112663
...                   ...                     ...                    ...
7347            -0.793103               -0.214925              -0.406732
7348            -0.793103                0.004845              -0.252514
7349            -0.793103               -0.234475              -0.030299
7350            -0.793103               -0.232783              -0.093485
7351            -0.931034               -0.214978              -0.572757

      fBodyAccMag-kurtosis()  fBodyBodyAccJerkMag-mean()  \
0                  -0.796840                   -0.993726
1                  -0.449522                   -0.990335
2                  -0.879685                   -0.989280
3                  -0.756494                   -0.992769
4                  -0.481805                   -0.995523
...                      ...                         ...
7347               -0.659000                   -0.271514
7348               -0.557042                   -0.353037
7349               -0.382002                   -0.424909
7350               -0.463398                   -0.455183
7351               -0.861620                   -0.337990

      fBodyBodyAccJerkMag-std()  fBodyBodyAccJerkMag-mad()  \
0                     -0.993755                  -0.991976
1                     -0.991960                  -0.989732
2                     -0.990867                  -0.987274
3                     -0.991700                  -0.989055
4                     -0.994389                  -0.993305
...                         ...                        ...
7347                  -0.287553                  -0.221443
7348                  -0.323372                  -0.258246
7349                  -0.326302                  -0.347359
7350                  -0.378077                  -0.336879
7351                  -0.287227                  -0.191078

      fBodyBodyAccJerkMag-max()  fBodyBodyAccJerkMag-min()  \
0                     -0.993365                  -0.988175
1                     -0.994489                  -0.989549
2                     -0.993179                  -0.999890
3                     -0.994455                  -0.995562
4                     -0.995485                  -0.982177
...                         ...                        ...
7347                  -0.351858                  -0.937302
```

```
7348                  -0.410824                  -0.805086
7349                  -0.316546                  -0.786822
7350                  -0.423830                  -0.694837
7351                  -0.549929                  -0.837677

      fBodyBodyAccJerkMag-sma()  fBodyBodyAccJerkMag-energy()  \
0                     -0.993726                     -0.999918
1                     -0.990335                     -0.999867
2                     -0.989280                     -0.999845
3                     -0.992769                     -0.999895
4                     -0.995523                     -0.999941
...                         ...                           ...
7347                  -0.271514                     -0.732995
7348                  -0.353037                     -0.775857
7349                  -0.424909                     -0.801702
7350                  -0.455183                     -0.826289
7351                  -0.337990                     -0.759097

      fBodyBodyAccJerkMag-iqr()  fBodyBodyAccJerkMag-entropy()  \
0                     -0.991364                      -1.000000
1                     -0.991134                      -1.000000
2                     -0.986658                      -1.000000
3                     -0.988055                      -1.000000
4                     -0.994169                      -1.000000
...                         ...                           ...
7347                  -0.303590                       0.354983
7348                  -0.373955                       0.361739
7349                  -0.489794                       0.189903
7350                  -0.559787                       0.240644
7351                  -0.434679                       0.298694

      fBodyBodyAccJerkMag-maxInds  fBodyBodyAccJerkMag-meanFreq()  \
0                       -0.936508                       0.346989
1                       -0.841270                       0.532061
2                       -0.904762                       0.660795
3                        1.000000                       0.678921
4                       -1.000000                       0.559058
...                           ...                            ...
7347                    -0.904762                      -0.066650
7348                    -0.904762                      -0.193946
7349                    -0.904762                       0.007099
7350                    -0.904762                      -0.109902
7351                    -0.904762                      -0.242448

      fBodyBodyAccJerkMag-skewness()  fBodyBodyAccJerkMag-kurtosis()  \
0                         -0.516080                       -0.802760
1                         -0.624871                       -0.900160
2                         -0.724697                       -0.928539
3                         -0.701131                       -0.909639
4                         -0.528901                       -0.858933
...                             ...                             ...
7347                      -0.076714                       -0.426588
7348                      -0.151879                       -0.509448
7349                       0.331457                        0.083984
7350                       0.038175                       -0.305554
7351                      -0.321950                       -0.768542

      fBodyBodyGyroMag-mean()  fBodyBodyGyroMag-std()  fBodyBodyGyroMag-mad()  \
0                   -0.980135               -0.961309               -0.973653
1                   -0.988296               -0.983322               -0.982659
2                   -0.989255               -0.986028               -0.984274
3                   -0.989413               -0.987836               -0.986850
4                   -0.991433               -0.989059               -0.987744
...                       ...                     ...                     ...
```

```
7347               -0.332753              -0.129727               -0.128549
7348               -0.357992              -0.187114               -0.210320
7349               -0.351948              -0.032290               -0.193130
7350               -0.415004               0.039199               -0.171131
7351               -0.330780              -0.106002               -0.106450

      fBodyBodyGyroMag-max()  fBodyBodyGyroMag-min()  fBodyBodyGyroMag-sma()  \
0                  -0.952264               -0.989498               -0.980135
1                  -0.986321               -0.991829               -0.988296
2                  -0.990979               -0.995703               -0.989255
3                  -0.986749               -0.996199               -0.989413
4                  -0.991462               -0.998353               -0.991433
...                      ...                     ...                     ...
7347               -0.251258               -0.995117               -0.332753
7348               -0.131733               -0.916112               -0.357992
7349                0.167388               -0.972099               -0.351948
7350                0.115989               -0.959329               -0.415004
7351               -0.090538               -0.779153               -0.330780

      fBodyBodyGyroMag-energy()  fBodyBodyGyroMag-iqr()  \
0                     -0.999240               -0.992656
1                     -0.999811               -0.993979
2                     -0.999854               -0.993238
3                     -0.999876               -0.989136
4                     -0.999902               -0.989321
...                         ...                     ...
7347                  -0.605727               -0.292601
7348                  -0.649987               -0.427577
7349                  -0.545002               -0.241789
7350                  -0.510548               -0.513205
7351                  -0.589429               -0.290645

      fBodyBodyGyroMag-entropy()  fBodyBodyGyroMag-maxInds  \
0                      -0.701291                 -1.000000
1                      -0.720683                 -0.948718
2                      -0.736521                 -0.794872
3                      -0.720891                 -1.000000
4                      -0.763372                 -0.897436
...                          ...                       ...
7347                    0.577573                 -0.897436
7348                    0.620646                 -0.846154
7349                    0.584816                 -0.846154
7350                    0.445207                 -0.846154
7351                    0.436453                 -0.846154

      fBodyBodyGyroMag-meanFreq()  fBodyBodyGyroMag-skewness()  \
0                       -0.128989                     0.586156
1                       -0.271958                    -0.336310
2                       -0.212728                    -0.535352
3                       -0.035684                    -0.230091
4                       -0.273582                    -0.510282
...                           ...                          ...
7347                    -0.376234                    -0.170845
7348                    -0.296176                     0.019626
7349                    -0.320249                     0.490169
7350                    -0.412332                     0.308105
7351                    -0.389084                    -0.057581

      fBodyBodyGyroMag-kurtosis()  fBodyBodyGyroJerkMag-mean()  \
0                        0.374605                    -0.991990
1                       -0.720015                    -0.995854
2                       -0.871914                    -0.995031
3                       -0.511217                    -0.995221
4                       -0.830702                    -0.995093
```

```
...                          ...                          ...
7347                    -0.551898                    -0.681097
7348                    -0.277183                    -0.682756
7349                     0.313280                    -0.685851
7350                    -0.042502                    -0.712131
7351                    -0.387956                    -0.715588

      fBodyBodyGyroJerkMag-std()  fBodyBodyGyroJerkMag-mad()  \
0                       -0.990697                   -0.989941
1                       -0.996399                   -0.995442
2                       -0.995127                   -0.994640
3                       -0.995237                   -0.995722
4                       -0.995465                   -0.995279
...                           ...                         ...
7347                    -0.723951                   -0.647418
7348                    -0.771183                   -0.727039
7349                    -0.726372                   -0.724976
7350                    -0.689421                   -0.702221
7351                    -0.745120                   -0.697404

      fBodyBodyGyroJerkMag-max()  fBodyBodyGyroJerkMag-min()  \
0                       -0.992448                   -0.991048
1                       -0.996866                   -0.994440
2                       -0.996060                   -0.995866
3                       -0.995273                   -0.995732
4                       -0.995609                   -0.997418
...                           ...                         ...
7347                    -0.799450                   -0.925241
7348                    -0.779350                   -0.761880
7349                    -0.709270                   -0.692582
7350                    -0.694807                   -0.886154
7351                    -0.783571                   -0.758685

      fBodyBodyGyroJerkMag-sma()  fBodyBodyGyroJerkMag-energy()  \
0                       -0.991990                     -0.999937
1                       -0.995854                     -0.999981
2                       -0.995031                     -0.999973
3                       -0.995221                     -0.999974
4                       -0.995093                     -0.999974
...                           ...                           ...
7347                    -0.681097                     -0.951092
7348                    -0.682756                     -0.957032
7349                    -0.685851                     -0.952309
7350                    -0.712131                     -0.951972
7351                    -0.715588                     -0.959988

      fBodyBodyGyroJerkMag-iqr()  fBodyBodyGyroJerkMag-entropy()  \
0                       -0.990458                      -0.871306
1                       -0.994544                      -1.000000
2                       -0.993755                      -1.000000
3                       -0.995226                      -0.955696
4                       -0.995487                      -1.000000
...                           ...                            ...
7347                    -0.599074                       0.310836
7348                    -0.670062                       0.207930
7349                    -0.696373                       0.158936
7350                    -0.760044                       0.210070
7351                    -0.677185                       0.202026

      fBodyBodyGyroJerkMag-maxInds  fBodyBodyGyroJerkMag-meanFreq()  \
0                        -1.000000                        -0.074323
1                        -1.000000                         0.158075
2                        -0.555556                         0.414503
3                        -0.936508                         0.404573
```

```
4                      -0.936508                       0.087753
...                          ...                            ...
7347                   -0.904762                      -0.070157
7348                   -0.904762                       0.165259
7349                   -0.904762                       0.195034
7350                   -0.904762                       0.013865
7351                   -0.904762                      -0.058402

      fBodyBodyGyroJerkMag-skewness()  fBodyBodyGyroJerkMag-kurtosis()  \
0                           -0.298676                        -0.710304
1                           -0.595051                        -0.861499
2                           -0.390748                        -0.760104
3                           -0.117290                        -0.482845
4                           -0.351471                        -0.699205
...                               ...                              ...
7347                        -0.588433                        -0.880324
7348                        -0.390738                        -0.680744
7349                         0.025145                        -0.304029
7350                         0.063907                        -0.344314
7351                        -0.387052                        -0.740738

      angle(tBodyAccMean,gravity)  angle(tBodyAccJerkMean),gravityMean)  \
0                       -0.112754                             0.030400
1                        0.053477                            -0.007435
2                       -0.118559                             0.177899
3                       -0.036788                            -0.012892
4                        0.123320                             0.122542
...                           ...                                  ...
7347                    -0.190437                             0.829718
7348                     0.064907                             0.875679
7349                     0.052806                            -0.266724
7350                    -0.101360                             0.700740
7351                    -0.280088                            -0.007739

      angle(tBodyGyroMean,gravityMean)  angle(tBodyGyroJerkMean,gravityMean)  \
0                            -0.464761                            -0.018446
1                            -0.732626                             0.703511
2                             0.100699                             0.808529
3                             0.640011                            -0.485366
4                             0.693578                            -0.615971
...                                ...                                  ...
7347                          0.206972                            -0.425619
7348                         -0.879033                             0.400219
7349                          0.864404                             0.701169
7350                          0.936674                            -0.589479
7351                         -0.056088                            -0.616956

      angle(X,gravityMean)  angle(Y,gravityMean)  angle(Z,gravityMean)  \
0                -0.841247              0.179941             -0.058627
1                -0.844788              0.180289             -0.054317
2                -0.848933              0.180637             -0.049118
3                -0.848649              0.181935             -0.047663
4                -0.847865              0.185151             -0.043892
...                    ...                   ...                   ...
7347             -0.791883              0.238604              0.049819
7348             -0.771840              0.252676              0.050053
7349             -0.779133              0.249145              0.040811
7350             -0.785181              0.246432              0.025339
7351             -0.783267              0.246809              0.036695

      subject          Activity
0           1          STANDING
1           1          STANDING
2           1          STANDING
```

```
3           1          STANDING
4           1          STANDING
...       ...               ...
7347       30  WALKING_UPSTAIRS
7348       30  WALKING_UPSTAIRS
7349       30  WALKING_UPSTAIRS
7350       30  WALKING_UPSTAIRS
7351       30  WALKING_UPSTAIRS

[7352 rows x 563 columns]>
```

In [60]:
```
train_data.columns
```

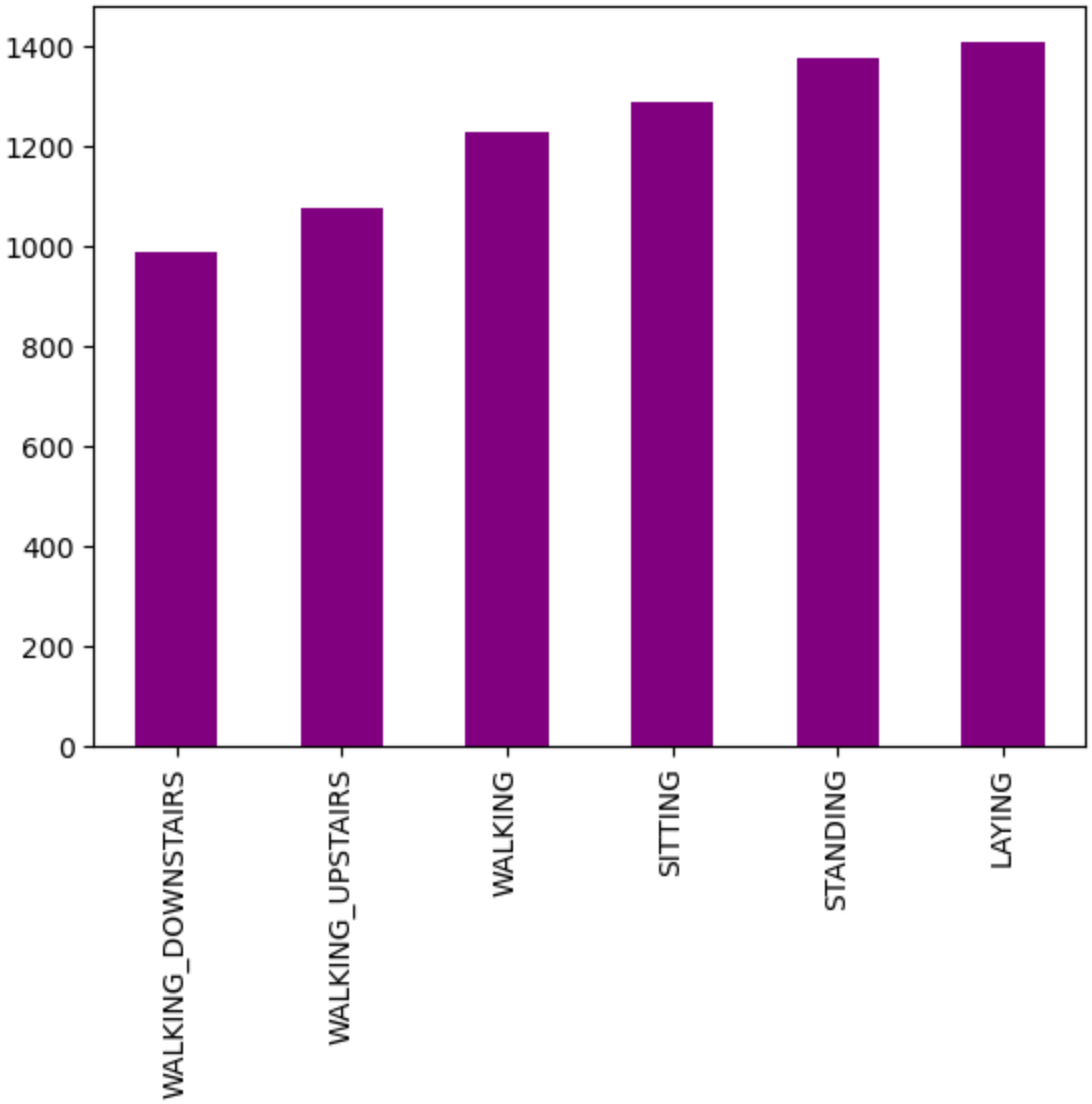
Out[60]:
```
Index(['tBodyAcc-mean()-X', 'tBodyAcc-mean()-Y', 'tBodyAcc-mean()-Z',
       'tBodyAcc-std()-X', 'tBodyAcc-std()-Y', 'tBodyAcc-std()-Z',
       'tBodyAcc-mad()-X', 'tBodyAcc-mad()-Y', 'tBodyAcc-mad()-Z',
       'tBodyAcc-max()-X',
       ...
       'fBodyBodyGyroJerkMag-kurtosis()', 'angle(tBodyAccMean,gravity)',
       'angle(tBodyAccJerkMean),gravityMean)',
       'angle(tBodyGyroMean,gravityMean)',
       'angle(tBodyGyroJerkMean,gravityMean)', 'angle(X,gravityMean)',
       'angle(Y,gravityMean)', 'angle(Z,gravityMean)', 'subject', 'Activity'],
      dtype='object', length=563)
```

In [61]:
```
train_data['Activity'].unique()
```

Out[61]:
```
array(['STANDING', 'SITTING', 'LAYING', 'WALKING', 'WALKING_DOWNSTAIRS',
       'WALKING_UPSTAIRS'], dtype=object)
```

In [62]:
```
train_data['Activity'].value_counts().sort_values().plot(kind = 'bar', color = 'purple')
```

Out[62]:
```
<AxesSubplot: >
```



In [63]:
```
x_train, y_train = train_data.iloc[:, :-2], train_data.iloc[:, -1:]
x_test, y_test = test_data.iloc[:, :-2], test_data.iloc[:, -1:]
x_train.shape, y_train.shape
```

Out[63]:
```
((7352, 561), (7352, 1))
```

In [64]:
```
x_test, y_test = test_data.iloc[:, :-2], test_data.iloc[:, -1:]
x_test.shape, y_test.shape
```

Out[64]:
```
((2947, 561), (2947, 1))
```

In [65]:
```
le = LabelEncoder()
y_train = le.fit_transform(y_train)
y_test = le.fit_transform(y_test)
```

In [66]:
```
x_test.shape, y_test.shape, x_train.shape, y_train.shape
```

Out[66]:
```
((2947, 561), (2947,), (7352, 561), (7352,))
```

In [67]:
```
scaling_data = MinMaxScaler()
x_train = scaling_data.fit_transform(x_train)
x_test = scaling_data.transform(x_test)
```

In [68]:
```
model = Sequential()
model.add(Dense(units=64,kernel_initializer='normal',activation='sigmoid',input_dim=x_tr
model.add(Dropout(0.2))
```

```
model.add(Dense(units=6,kernel_initializer='normal',activation='softmax'))
model.compile(optimizer='adam',loss='sparse_categorical_crossentropy',metrics=['accuracy
history = model.fit(x_train, y_train, batch_size = 64, epochs= 10,validation_data = (x_t
```

```
Epoch 1/10
115/115 [==============================] - 4s 7ms/step - loss: 1.3070 - accuracy: 0.4589
- val_loss: 1.0522 - val_accuracy: 0.7445
Epoch 2/10
115/115 [==============================] - 0s 3ms/step - loss: 0.9017 - accuracy: 0.7093
- val_loss: 0.7547 - val_accuracy: 0.7927
Epoch 3/10
115/115 [==============================] - 0s 3ms/step - loss: 0.6317 - accuracy: 0.8173
- val_loss: 0.5633 - val_accuracy: 0.8480
Epoch 4/10
115/115 [==============================] - 0s 3ms/step - loss: 0.4782 - accuracy: 0.8521
- val_loss: 0.4287 - val_accuracy: 0.8887
Epoch 5/10
115/115 [==============================] - 0s 3ms/step - loss: 0.3777 - accuracy: 0.8890
- val_loss: 0.3566 - val_accuracy: 0.8989
Epoch 6/10
115/115 [==============================] - 0s 2ms/step - loss: 0.3203 - accuracy: 0.9004
- val_loss: 0.3101 - val_accuracy: 0.8968
Epoch 7/10
115/115 [==============================] - 0s 3ms/step - loss: 0.2723 - accuracy: 0.9119
- val_loss: 0.2677 - val_accuracy: 0.9192
Epoch 8/10
115/115 [==============================] - 0s 3ms/step - loss: 0.2425 - accuracy: 0.9232
- val_loss: 0.2384 - val_accuracy: 0.9226
Epoch 9/10
115/115 [==============================] - 0s 2ms/step - loss: 0.2146 - accuracy: 0.9298
- val_loss: 0.2270 - val_accuracy: 0.9226
Epoch 10/10
115/115 [==============================] - 0s 2ms/step - loss: 0.1975 - accuracy: 0.9339
- val_loss: 0.2215 - val_accuracy: 0.9165
```

In [24]:

```
def build_model(hp):
    model = keras.Sequential()
    for i in range(hp.Int('num_layers', 2, 25)):
        model.add(layers.Dense(units = hp.Int('units' + str(i), min_value=32, max_value=
                               kernel_initializer= hp.Choice('initializer', ['uniform',
                               activation= hp.Choice('activation', ['relu', 'sigmoid', '
    model.add(layers.Dense(6, kernel_initializer= hp.Choice('initializer', ['uniform', '
    model.add(
            Dropout(0.2))
    model.compile(
        optimizer = 'adam',
        loss='sparse_categorical_crossentropy',
        metrics=['accuracy'])
    return model


tuner = RandomSearch(
    build_model,
    objective='val_accuracy',
    max_trials= 5,
    executions_per_trial=3,
    directory='project', project_name = 'Human_activity_recognition')

tuner.search_space_summary()
```

```
Search space summary
Default search space size: 5
num_layers (Int)
{'default': None, 'conditions': [], 'min_value': 2, 'max_value': 25, 'step': 1, 'samplin
g': None}
units0 (Int)
{'default': None, 'conditions': [], 'min_value': 32, 'max_value': 512, 'step': 32, 'samp
ling': None}
initializer (Choice)
{'default': 'uniform', 'conditions': [], 'values': ['uniform', 'normal'], 'ordered': Fal
se}
activation (Choice)
{'default': 'relu', 'conditions': [], 'values': ['relu', 'sigmoid', 'tanh'], 'ordered':
False}
units1 (Int)
{'default': None, 'conditions': [], 'min_value': 32, 'max_value': 512, 'step': 32, 'samp
ling': None}
```

In [25]:
```
tuner.search(x_train, y_train,
             epochs= 10,
             validation_data=(x_test, y_test))
```

```
Trial 5 Complete [00h 03m 31s]
val_accuracy: 0.29227463404337567

Best val_accuracy So Far: 0.4360366463661194
Total elapsed time: 00h 11m 42s
INFO:tensorflow:Oracle triggered exit
```

In [26]:
```
tuner.results_summary()
```

```
Results summary
Results in project\Human_activity_recognition
Showing 10 best trials
<keras_tuner.engine.objective.Objective object at 0x00000229214192E0>
Trial summary
Hyperparameters:
num_layers: 16
units0: 352
initializer: normal
activation: relu
units1: 32
units2: 64
units3: 256
units4: 320
units5: 256
units6: 480
units7: 320
units8: 64
units9: 320
units10: 32
units11: 64
units12: 384
units13: 256
units14: 416
units15: 160
units16: 384
Score: 0.4360366463661194
Trial summary
Hyperparameters:
num_layers: 24
units0: 256
initializer: normal
activation: relu
units1: 416
units2: 192
units3: 288
units4: 128
units5: 192
units6: 96
units7: 352
units8: 32
units9: 480
units10: 160
units11: 288
units12: 512
units13: 192
units14: 448
units15: 256
units16: 32
units17: 512
units18: 416
units19: 224
units20: 224
units21: 288
units22: 32
units23: 32
Score: 0.36047958334287006
Trial summary
Hyperparameters:
num_layers: 22
units0: 96
initializer: normal
activation: tanh
units1: 288
```

```
units2: 416
units3: 480
units4: 64
units5: 384
units6: 384
units7: 288
units8: 160
units9: 160
units10: 288
units11: 160
units12: 448
units13: 160
units14: 128
units15: 288
units16: 224
units17: 224
units18: 384
units19: 128
units20: 448
units21: 512
units22: 320
units23: 128
Score: 0.29227463404337567
Trial summary
Hyperparameters:
num_layers: 17
units0: 448
initializer: uniform
activation: relu
units1: 160
units2: 32
units3: 32
units4: 32
units5: 32
units6: 32
units7: 32
units8: 32
units9: 32
units10: 32
units11: 32
units12: 32
units13: 32
units14: 32
units15: 32
units16: 32
Score: 0.18221920728683472
Trial summary
Hyperparameters:
num_layers: 22
units0: 96
initializer: uniform
activation: relu
units1: 352
units2: 224
units3: 96
units4: 160
units5: 128
units6: 64
units7: 288
units8: 32
units9: 96
units10: 288
units11: 224
units12: 352
```

```
units13: 448
units14: 128
units15: 64
units16: 448
units17: 32
units18: 32
units19: 32
units20: 32
units21: 32
Score: 0.18221920728683472
```

In [27]:

```
model=tuner.get_best_models(num_models=1)[0]
history = model.fit(x_train,y_train, epochs=51, validation_data=(x_test,y_test))
```

```
Epoch 1/51
230/230 [==============================] - 8s 21ms/step - loss: 6.2913 - accuracy: 0.461
1 - val_loss: 10.0557 - val_accuracy: 0.1598
Epoch 2/51
230/230 [==============================] - 4s 17ms/step - loss: 8.5936 - accuracy: 0.249
7 - val_loss: 8.8823 - val_accuracy: 0.3186
Epoch 3/51
230/230 [==============================] - 4s 17ms/step - loss: 8.4147 - accuracy: 0.260
9 - val_loss: 9.6029 - val_accuracy: 0.2915
Epoch 4/51
230/230 [==============================] - 4s 17ms/step - loss: 8.5174 - accuracy: 0.286
6 - val_loss: 8.8151 - val_accuracy: 0.3451
Epoch 5/51
230/230 [==============================] - 4s 17ms/step - loss: 8.4471 - accuracy: 0.307
8 - val_loss: 9.2132 - val_accuracy: 0.3987
Epoch 6/51
230/230 [==============================] - 4s 17ms/step - loss: 8.1910 - accuracy: 0.324
0 - val_loss: 9.3281 - val_accuracy: 0.4007
Epoch 7/51
230/230 [==============================] - 4s 17ms/step - loss: 8.0448 - accuracy: 0.332
7 - val_loss: 9.3114 - val_accuracy: 0.4065
Epoch 8/51
230/230 [==============================] - 4s 17ms/step - loss: 7.9058 - accuracy: 0.340
3 - val_loss: 9.3504 - val_accuracy: 0.4055
Epoch 9/51
230/230 [==============================] - 4s 17ms/step - loss: 7.8960 - accuracy: 0.342
6 - val_loss: 9.0604 - val_accuracy: 0.4293
Epoch 10/51
230/230 [==============================] - 4s 17ms/step - loss: 7.7982 - accuracy: 0.347
4 - val_loss: 9.0386 - val_accuracy: 0.4313
Epoch 11/51
230/230 [==============================] - 4s 17ms/step - loss: 7.7343 - accuracy: 0.351
7 - val_loss: 9.0742 - val_accuracy: 0.4259
Epoch 12/51
230/230 [==============================] - 4s 17ms/step - loss: 8.6792 - accuracy: 0.296
0 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 13/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0664 - accuracy: 0.16
85 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 14/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0557 - accuracy: 0.17
46 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 15/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1102 - accuracy: 0.17
03 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 16/51
230/230 [==============================] - 4s 17ms/step - loss: 11.2103 - accuracy: 0.16
81 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 17/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1292 - accuracy: 0.16
88 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 18/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1019 - accuracy: 0.16
55 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 19/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0944 - accuracy: 0.17
68 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 20/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1521 - accuracy: 0.16
87 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 21/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1068 - accuracy: 0.17
52 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 22/51
```

```
230/230 [==============================] - 4s 17ms/step - loss: 11.0842 - accuracy: 0.17
02 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 23/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1587 - accuracy: 0.16
69 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 24/51
230/230 [==============================] - 4s 17ms/step - loss: 11.2120 - accuracy: 0.17
03 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 25/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1246 - accuracy: 0.17
04 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 26/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0445 - accuracy: 0.17
30 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 27/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1083 - accuracy: 0.17
51 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 28/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1141 - accuracy: 0.17
15 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 29/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0771 - accuracy: 0.16
77 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 30/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1212 - accuracy: 0.17
12 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 31/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0949 - accuracy: 0.17
33 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 32/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1068 - accuracy: 0.17
36 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 33/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0851 - accuracy: 0.17
23 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 34/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1438 - accuracy: 0.16
57 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 35/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0954 - accuracy: 0.17
87 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 36/51
230/230 [==============================] - 4s 16ms/step - loss: 11.0851 - accuracy: 0.16
81 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 37/51
230/230 [==============================] - 4s 16ms/step - loss: 11.2510 - accuracy: 0.17
11 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 38/51
230/230 [==============================] - 4s 17ms/step - loss: 11.1429 - accuracy: 0.16
89 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 39/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1434 - accuracy: 0.16
93 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 40/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0754 - accuracy: 0.17
27 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 41/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1392 - accuracy: 0.16
89 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 42/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1049 - accuracy: 0.17
86 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 43/51
230/230 [==============================] - 4s 16ms/step - loss: 11.0993 - accuracy: 0.17
```

```
49 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 44/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1804 - accuracy: 0.17
29 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 45/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1475 - accuracy: 0.17
04 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 46/51
230/230 [==============================] - 4s 16ms/step - loss: 11.0905 - accuracy: 0.17
27 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 47/51
230/230 [==============================] - 4s 16ms/step - loss: 11.0903 - accuracy: 0.17
12 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 48/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0464 - accuracy: 0.17
18 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 49/51
230/230 [==============================] - 4s 16ms/step - loss: 11.1275 - accuracy: 0.17
10 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 50/51
230/230 [==============================] - 4s 17ms/step - loss: 11.0045 - accuracy: 0.17
17 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 51/51
230/230 [==============================] - 4s 16ms/step - loss: 11.0323 - accuracy: 0.17
37 - val_loss: 13.4053 - val_accuracy: 0.1683
```

In [28]:

```
model.summary()
import tensorflow as tf

from tensorflow import keras

Callback = tf.keras.callbacks.EarlyStopping(monitor='accuracy', patience=3)
mo_fitt = model.fit(x_train,y_train, epochs=200, validation_data=(x_test,y_test), callba
```

```
Model: "sequential"
_________________________________________________________________
 Layer (type)                Output Shape              Param #
=================================================================
 dense (Dense)               (None, 352)               197824

 dense_1 (Dense)             (None, 32)                11296

 dense_2 (Dense)             (None, 64)                2112

 dense_3 (Dense)             (None, 256)               16640

 dense_4 (Dense)             (None, 320)               82240

 dense_5 (Dense)             (None, 256)               82176

 dense_6 (Dense)             (None, 480)               123360

 dense_7 (Dense)             (None, 320)               153920

 dense_8 (Dense)             (None, 64)                20544

 dense_9 (Dense)             (None, 320)               20800

 dense_10 (Dense)            (None, 32)                10272

 dense_11 (Dense)            (None, 64)                2112

 dense_12 (Dense)            (None, 384)               24960

 dense_13 (Dense)            (None, 256)               98560

 dense_14 (Dense)            (None, 416)               106912

 dense_15 (Dense)            (None, 160)               66720

 dense_16 (Dense)            (None, 6)                 966

 dropout (Dropout)           (None, 6)                 0

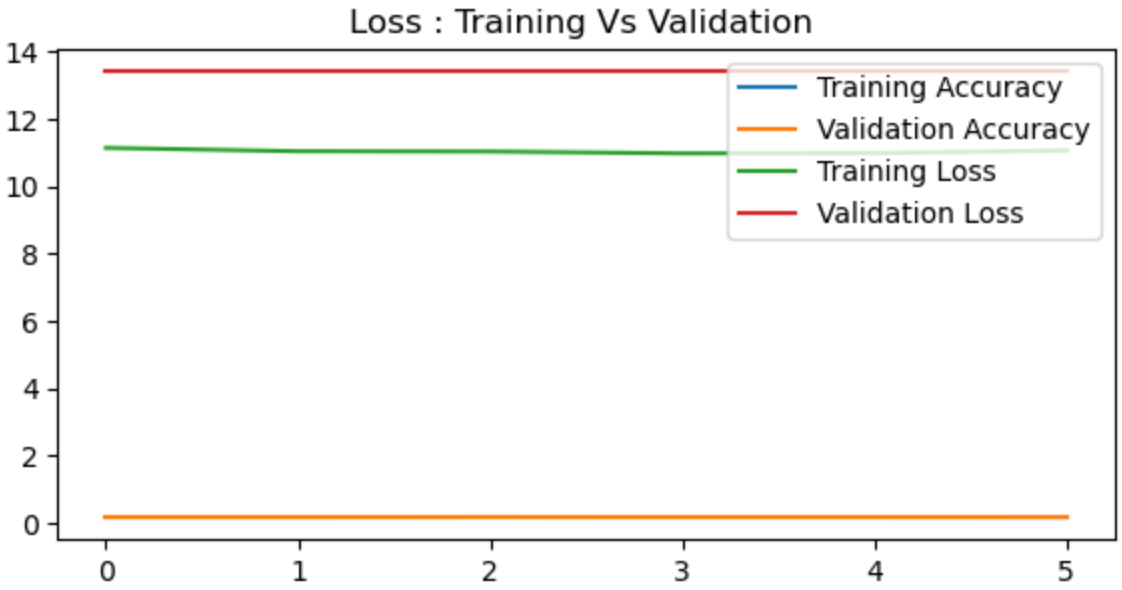
=================================================================
Total params: 1,021,414
Trainable params: 1,021,414
Non-trainable params: 0
_________________________________________________________________
Epoch 1/200
230/230 [==============================] - 2s 10ms/step - loss: 11.1451 - accuracy: 0.17
30 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 2/200
230/230 [==============================] - 3s 11ms/step - loss: 11.0447 - accuracy: 0.17
29 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 3/200
230/230 [==============================] - 2s 10ms/step - loss: 11.0374 - accuracy: 0.17
52 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 4/200
230/230 [==============================] - 2s 9ms/step - loss: 10.9819 - accuracy: 0.173
6 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 5/200
230/230 [==============================] - 2s 9ms/step - loss: 10.9887 - accuracy: 0.173
7 - val_loss: 13.4053 - val_accuracy: 0.1683
Epoch 6/200
230/230 [==============================] - 2s 10ms/step - loss: 11.0683 - accuracy: 0.17
14 - val_loss: 13.4053 - val_accuracy: 0.1683
```

In [72]:
```
accuracy = mo_fitt.history['accuracy']
loss = mo_fitt.history['loss']
validation_loss = mo_fitt.history['val_loss']
validation_accuracy = mo_fitt.history['val_accuracy']


plt.figure(figsize=(15, 7))
plt.subplot(2, 2, 2)
plt.plot(range(6), accuracy, label='Training Accuracy')
plt.plot(range(6), validation_accuracy, label='Validation Accuracy')
plt.legend(loc='upper left')
plt.title('Accuracy : Training Vs Validation ')



plt.subplot(2, 2, 2)
plt.plot(range(6), loss, label='Training Loss')
plt.plot(range(6), validation_loss, label='Validation Loss')
plt.title('Loss : Training Vs Validation ')
plt.legend(loc='upper right')
plt.show()
```



In [ ]: