Drop some files out for test. No shuffle and split the rest data as 80% for training and 20% for validation.

Features: [IEMG,SSI,WL,ZC,ku,SSC,skew,Acti,AR,MDF,MNF,mDWT]

Class weights for binary classification(0:others, scale\_pos\_weight = 5)

Feature selection: VarianceThreshold(threshold=0.01)

Feature scale: MinMaxScaler((0,1))

## Drop Files[6,30,31,32,33,34,35]:

Class 0 : others

Train (acc 0.992)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5809 | 49 |
| Actual others | 0 | 562 |

Valid (acc 0.952)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1538 | 6 |
| Actual others | 74 | 79 |

Test (acc 0.905)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 298 | 28 |
| Actual others | 22 | 179 |

Class 1 : 2 : 6

Train (acc 1.000)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 120 | 0 | 0 |
| Actual 2 | 0 | 278 | 0 |
| Actual 6 | 0 | 0 | 164 |

Valid (acc 0.782)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 7 | 5 | 21 |
| Actual 2 | 4 | 70 | 3 |
| Actual 6 | 0 | 0 | 42 |

Test (acc 0.681)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 30 | 4 | 18 |
| Actual 2 | 23 | 24 | 10 |
| Actual 6 | 8 | 1 | 83 |

Class 2 : 6

Train (acc 0.995)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 276 | 2 |
| Actual 6 | 0 | 164 |

Valid (acc 0.924)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 69 | 8 |
| Actual 6 | 1 | 41 |

Test (acc 0.899)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 43 | 14 |
| Actual 6 | 1 | 91 |

Class 1 : 6

Train (acc 0.908)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 105 | 15 |
| Actual 6 | 11 | 153 |

Valid (acc 0.773)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 18 | 15 |
| Actual 6 | 2 | 40 |

Test (acc 0.812)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 32 | 20 |
| Actual 6 | 7 | 85 |

Class 1 : 2

Train (acc 0.964)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 112 | 8 |
| Actual 2 | 6 | 272 |

Valid (acc 0.890)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 29 | 4 |
| Actual 2 | 8 | 69 |

Test (acc 0.743)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 46 | 6 |
| Actual 2 | 22 | 35 |

## Drop Files[7,30,31,32,33,34,35]:

Class 0 : others

Train (acc 0.983)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5809 | 89 |
| Actual others | 13 | 454 |

Valid (acc 0.952)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1538 | 16 |
| Actual others | 64 | 65 |

Test (acc 0.942)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 274 | 2 |
| Actual others | 32 | 288 |

Class 1 : 2 : 6

Train (acc 0.972)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 51 | 9 | 1 |
| Actual 2 | 0 | 252 | 3 |
| Actual 6 | 0 | 0 | 151 |

Valid (acc 0.790)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 3 | 7 | 8 |
| Actual 2 | 1 | 63 | 8 |
| Actual 6 | 1 | 2 | 36 |

Test (acc 0.589)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 44 | 15 | 67 |
| Actual 2 | 21 | 37 | 27 |
| Actual 6 | 1 | 0 | 107 |

Class 2 : 6

Train (acc 0.995)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 253 | 2 |
| Actual 6 | 0 | 151 |

Valid (acc 0.873)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 64 | 8 |
| Actual 6 | 6 | 33 |

Test (acc 0.808)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 48 | 37 |
| Actual 6 | 0 | 108 |

Class 1 : 6

Train (acc 0.966)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 56 | 5 |
| Actual 6 | 2 | 149 |

Valid (acc 0.789)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 14 | 4 |
| Actual 6 | 8 | 31 |

Test (acc 0.688)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 69 | 57 |
| Actual 6 | 16 | 92 |

Class 1 : 2

Train (acc 0.949)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 47 | 14 |
| Actual 2 | 2 | 253 |

Valid (acc 0.866)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 13 | 5 |
| Actual 2 | 7 | 65 |

Test (acc 0.729)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 108 | 18 |
| Actual 2 | 39 | 46 |

## Drop Files[5,30,31,32,33,34,35]:

Class 0 : others

Train (acc 0.995)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5811 | 59 |
| Actual others | 1 | 628 |

Valid (acc 0.987)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1543 | 4 |
| Actual others | 72 | 99 |

Test (acc 0.796)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 311 | 0 |
| Actual others | 111 | 5 |

Class 1 : 2 : 6

Train (acc 0.969)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 138 | 9 | 4 |
| Actual 2 | 3 | 312 | 1 |
| Actual 6 | 1 | 1 | 160 |

Valid (acc 0.852)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 25 | 4 | 12 |
| Actual 2 | 7 | 80 | 0 |
| Actual 6 | 0 | 2 | 40 |

Test (acc 0.612)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 2 | 8 | 3 |
| Actual 2 | 0 | 3 | 6 |
| Actual 6 | 2 | 26 | 66 |

Class 2 : 6

Train (acc 0.968)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 308 | 8 |
| Actual 6 | 7 | 155 |

Valid (acc 0.984)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 87 | 0 |
| Actual 6 | 2 | 40 |

Test (acc 0.368)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 8 | 1 |
| Actual 6 | 64 | 30 |

Class 1 : 6

Train (acc 0.936)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 140 | 11 |
| Actual 6 | 9 | 153 |

Valid (acc 0.843)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 30 | 11 |
| Actual 6 | 2 | 40 |

Test (acc 0.766)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 9 | 4 |
| Actual 6 | 21 | 73 |

Class 1 : 2

Train (acc 0.944)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 140 | 11 |
| Actual 2 | 15 | 301 |

Valid (acc 0.945)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 38 | 3 |
| Actual 2 | 4 | 83 |

Test (acc 0.409)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 0 | 13 |
| Actual 2 | 0 | 9 |

## Model:

model = xgb.XGBClassifier(max\_depth=3,

learning\_rate=0.1,

n\_estimators=1000,

# scale\_pos\_weight = 5,

subsample=0.9,

reg\_lambda = 25,

)