Drop some files out for test. Shuffle and split the rest data as 75% for training and 25% 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 0.997)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5548 | 14 |
| Actual others | 0 | 525 |

Valid (acc 0.990)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1829 | 11 |
| Actual others | 9 | 181 |

Test (acc 0.912)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 284 | 42 |
| Actual others | 4 | 197 |

Class 1 : 2 : 6

Train (acc 0.981)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 115 | 4 | 3 |
| Actual 2 | 1 | 255 | 1 |
| Actual 6 | 0 | 1 | 155 |

Valid (acc 0.893)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 26 | 2 | 3 |
| Actual 2 | 5 | 90 | 3 |
| Actual 6 | 5 | 1 | 44 |

Test (acc 0.756)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 44 | 5 | 3 |
| Actual 2 | 21 | 34 | 2 |
| Actual 6 | 17 | 1 | 74 |

Class 2 : 6

Train (acc 0.990)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 255 | 4 |
| Actual 6 | 0 | 161 |

Valid (acc 0.978)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 94 | 2 |
| Actual 6 | 1 | 44 |

Test (acc 0.932)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 53 | 4 |
| Actual 6 | 6 | 86 |

Class 1 : 6

Train (acc 0.947)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 113 | 9 |
| Actual 6 | 5 | 142 |

Valid (acc 0.888)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 28 | 3 |
| Actual 6 | 7 | 52 |

Test (acc 0.868)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 45 | 7 |
| Actual 6 | 12 | 80 |

Class 1 : 2

Train (acc 0.979)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 116 | 5 |
| Actual 2 | 3 | 257 |

Valid (acc 0.905)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 26 | 6 |
| Actual 2 | 6 | 89 |

Test (acc 0.788)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 47 | 5 |
| Actual 2 | 18 | 39 |

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

Class 0 : others

Train (acc 0.994)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5565 | 34 |
| Actual others | 0 | 437 |

Valid (acc 0.984)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1833 | 20 |
| Actual others | 12 | 147 |

Test (acc 0.983)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 274 | 2 |
| Actual others | 8 | 312 |

Class 1 : 2 : 6

Train (acc 0.984)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 60 | 3 | 1 |
| Actual 2 | 0 | 231 | 1 |
| Actual 6 | 0 | 2 | 149 |

Valid (acc 0.865)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 3 | 8 | 4 |
| Actual 2 | 2 | 88 | 5 |
| Actual 6 | 0 | 1 | 38 |

Test (acc 0.667)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 76 | 14 | 36 |
| Actual 2 | 29 | 45 | 11 |
| Actual 6 | 16 | 0 | 92 |

Class 2 : 6

Train (acc 0.971)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 238 | 6 |
| Actual 6 | 5 | 138 |

Valid (acc 0.938)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 79 | 4 |
| Actual 6 | 4 | 43 |

Test (acc 0.839)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 73 | 12 |
| Actual 6 | 19 | 89 |

Class 1 : 6

Train (acc 0.950)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 54 | 5 |
| Actual 6 | 5 | 137 |

Valid (acc 0.911)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 18 | 2 |
| Actual 6 | 4 | 44 |

Test (acc 0.662)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 74 | 52 |
| Actual 6 | 27 | 81 |

Class 1 : 2

Train (acc 0.927)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 36 | 22 |
| Actual 2 | 0 | 246 |

Valid (acc 0.882)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 10 | 11 |
| Actual 2 | 1 | 80 |

Test (acc 0.635)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 63 | 63 |
| Actual 2 | 14 | 71 |

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

Class 0 : others

Train (acc 0.995)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 5543 | 28 |
| Actual others | 0 | 591 |

Valid (acc 0.987)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 1832 | 14 |
| Actual others | 11 | 198 |

Test (acc 0.796)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 309 | 2 |
| Actual others | 85 | 31 |

Class 1 : 2 : 6

Train (acc 0.998)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 146 | 0 | 0 |
| Actual 2 | 0 | 297 | 0 |
| Actual 6 | 1 | 0 | 155 |

Valid (acc 0.870)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 36 | 7 | 3 |
| Actual 2 | 8 | 96 | 2 |
| Actual 6 | 5 | 1 | 42 |

Test (acc 0.612)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 0 | 11 | 2 |
| Actual 2 | 0 | 6 | 3 |
| Actual 6 | 0 | 29 | 65 |

Class 2 : 6

Train (acc 0.969)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 285 | 7 |
| Actual 6 | 7 | 156 |

Valid (acc 0.947)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 106 | 5 |
| Actual 6 | 3 | 38 |

Test (acc 0.330)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 6 | 3 |
| Actual 6 | 66 | 28 |

Class 1 : 6

Train (acc 0.922)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 138 | 7 |
| Actual 6 | 16 | 136 |

Valid (acc 0.838)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 38 | 9 |
| Actual 6 | 7 | 45 |

Test (acc 0.420)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 13 | 0 |
| Actual 6 | 62 | 32 |

Class 1 : 2

Train (acc 0.973)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 146 | 6 |
| Actual 2 | 6 | 288 |

Valid (acc 0.859)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 28 | 12 |
| Actual 2 | 9 | 100 |

Test (acc 0.363)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 0 | 13 |
| Actual 2 | 1 | 8 |

## Model:

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

learning\_rate=0.1,

n\_estimators=1000,

# scale\_pos\_weight = 5,

subsample=0.9,

reg\_lambda = 25,

)