Window size:1024

Stride: 512

Raw data with detrend(lambda:300)

Lowpass filter(300Hz)

Use all channels

Use rectified signal. No shuffle and split data into 20% for test, 20% for validation and 60% for training.

kernel\_size=11

reg=regularizers.l2(1e-4)

drop\_rate = 0.2

kernel\_initializer = 'glorot\_normal'

mo = 0.8

st = 1

model = keras.models.Sequential()

model.add(layers.InputLayer(input\_shape=X[:,:,:].shape[1:]))

model.add(layers.Bidirectional(layers.LSTM(32,return\_sequences=True,

#kernel\_regularizer=reg,

recurrent\_regularizer=reg)))

model.add(layers.Conv1D(filters=32, kernel\_size=kernel\_size,strides=st,

padding='same',

kernel\_regularizer=reg,

kernel\_initializer=kernel\_initializer

))

model.add(layers.BatchNormalization(momentum=mo))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(drop\_rate))

model.add(layers.Conv1D(filters=16, kernel\_size=kernel\_size,strides=st,

padding='same',

kernel\_regularizer=reg,

kernel\_initializer=kernel\_initializer

))

model.add(layers.BatchNormalization(momentum=mo))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(drop\_rate))

model.add(layers.Conv1D(filters=8, kernel\_size=kernel\_size,strides=st,

padding='same',

kernel\_regularizer=reg,

kernel\_initializer=kernel\_initializer

))

model.add(layers.BatchNormalization(momentum=mo))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(drop\_rate))

model.add(layers.Conv1D(filters=4, kernel\_size=kernel\_size,strides=st,

padding='same',

kernel\_regularizer=reg,

kernel\_initializer=kernel\_initializer

))

model.add(layers.BatchNormalization(momentum=mo))

model.add(layers.ELU())

model.add(layers.GlobalAveragePooling1D())

model.add(layers.Dropout(drop\_rate))

model.add(layers.Dense(2,activation='softmax',kernel\_regularizer=reg))

Train (acc 0.988)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 125 | 0 | 1 |
| Actual 2 | 2 | 291 | 0 |
| Actual 6 | 2 | 2 | 180 |

Valid (acc 0.841)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 33 | 8 | 2 |
| Actual 2 | 7 | 89 | 7 |
| Actual 6 | 7 | 2 | 53 |

Test (acc 0.783)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Predicted 1 | Predicted 2 | Predicted 6 |
| Actual 1 | 28 | 7 | 10 |
| Actual 2 | 8 | 94 | 6 |
| Actual 6 | 7 | 9 | 48 |

Class 2:6

Train (acc 0.991)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 293 | 0 |
| Actual 6 | 4 | 180 |

Valid (acc 0.957)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 98 | 5 |
| Actual 6 | 2 | 60 |

Test (acc 0.912)

|  |  |  |
| --- | --- | --- |
|  | Predicted 2 | Predicted 6 |
| Actual 2 | 105 | 3 |
| Actual 6 | 12 | 52 |

Class 1:6

Train (acc 0.970)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 118 | 8 |
| Actual 6 | 1 | 183 |

Valid (acc 0.866)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 29 | 14 |
| Actual 6 | 0 | 62 |

Test (acc 0.669)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 6 |
| Actual 1 | 20 | 25 |
| Actual 6 | 11 | 53 |

Class 1:2

Train (acc 0.961)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 110 | 16 |
| Actual 2 | 0 | 293 |

Valid (acc 0.863)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 28 | 15 |
| Actual 2 | 5 | 98 |

Test (acc 0.836)

|  |  |  |
| --- | --- | --- |
|  | Predicted 1 | Predicted 2 |
| Actual 1 | 35 | 10 |
| Actual 2 | 15 | 93 |