Window size:1024

Stride: 1024

Use all data and all channels

No scale on raw signal. Shuffle and split data to 20% for test. Shuffle and split the rest to 80% for training and 20% for validation.

model = keras.models.Sequential()

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

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

recurrent\_regularizer=reg)))

model.add(layers.Conv1D(filters=32, kernel\_size=kernel\_size,strides=1,padding='same',kernel\_regularizer=reg))

model.add(layers.BatchNormalization(momentum=0.8))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(0.5))

model.add(layers.Conv1D(filters=16, kernel\_size=kernel\_size,strides=1,padding='same',kernel\_regularizer=reg))

model.add(layers.BatchNormalization(momentum=0.8))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(0.5))

model.add(layers.Conv1D(filters=8, kernel\_size=kernel\_size,strides=1,padding='same',kernel\_regularizer=reg))

model.add(layers.BatchNormalization(momentum=0.8))

model.add(layers.ELU())

model.add(layers.AveragePooling1D(2))

model.add(layers.Dropout(0.5))

model.add(layers.Conv1D(filters=4, kernel\_size=kernel\_size,strides=1,padding='same',kernel\_regularizer=reg))

model.add(layers.BatchNormalization(momentum=0.8))

model.add(layers.ELU())

model.add(layers.GlobalAveragePooling1D())

model.add(layers.Dropout(0.5))

model.add(layers.Dense(3,activation='softmax',kernel\_regularizer=reg))

kernel\_size=9

reg=regularizers.l2(1e-4)

No filter, dropout 0.3

Cost matrix:

Train (acc 0.985)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 2496 | 40 |
| Actual others | 0 | 313 |

Validation (acc 0964)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 809 | 31 |
| Actual others | 3 | 107 |

Test 20% (acc 0.961)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 816 | 36 |
| Actual others | 1 | 97 |

Low pass filter(400Hz):

dropout 0.3

Cost matrix:

Train (acc 0.996)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 2525 | 11 |
| Actual others | 0 | 313 |

Validation (acc 0973)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 818 | 22 |
| Actual others | 3 | 107 |

Test 20% (acc 0.964)

|  |  |  |
| --- | --- | --- |
|  | Predicted 0 | Predicted others |
| Actual 0 | 822 | 30 |
| Actual others | 4 | 94 |