Task A16

Group 3

IAM Institut für Allgemeine Mechanik | RWTH AACHEN UNIVERSITY

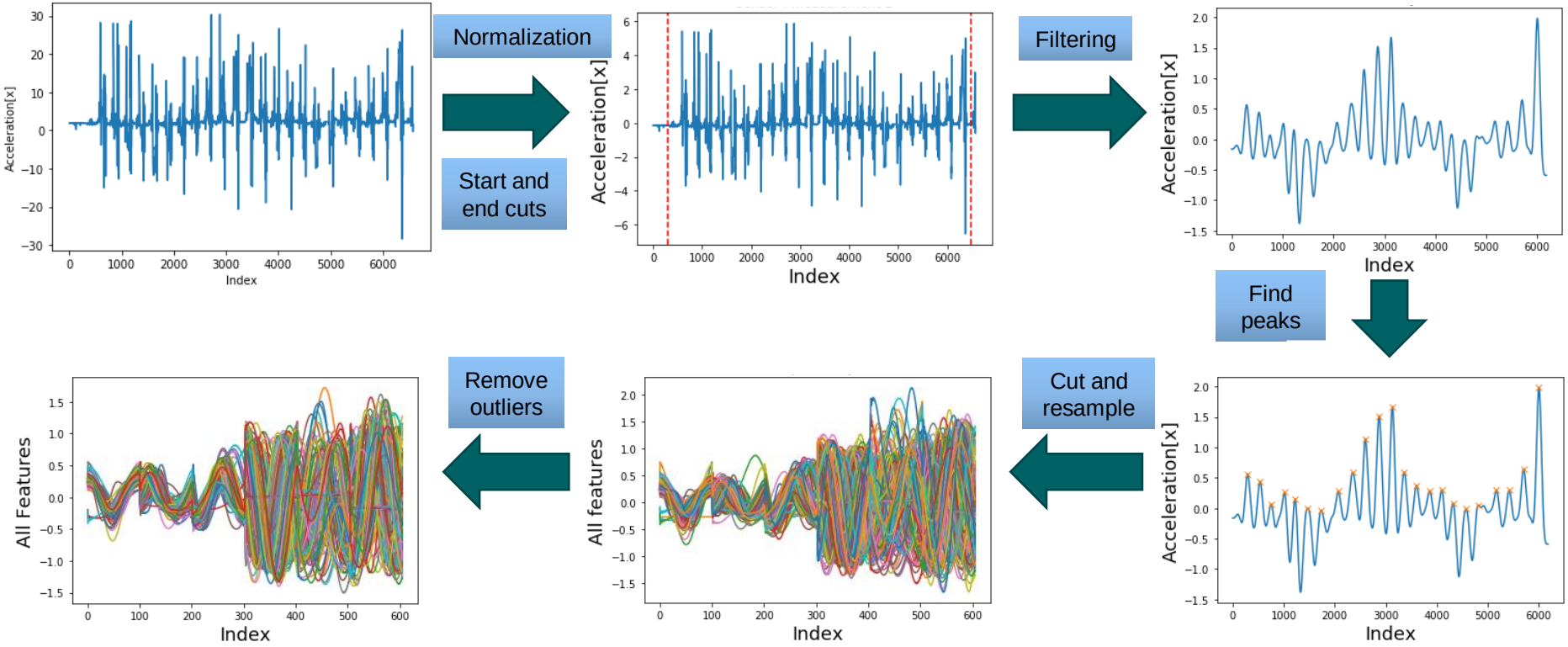
Motivation & Aim

- Binary classification of normal walking and handicapped walking using the Artificial Neural Networks
- Group task

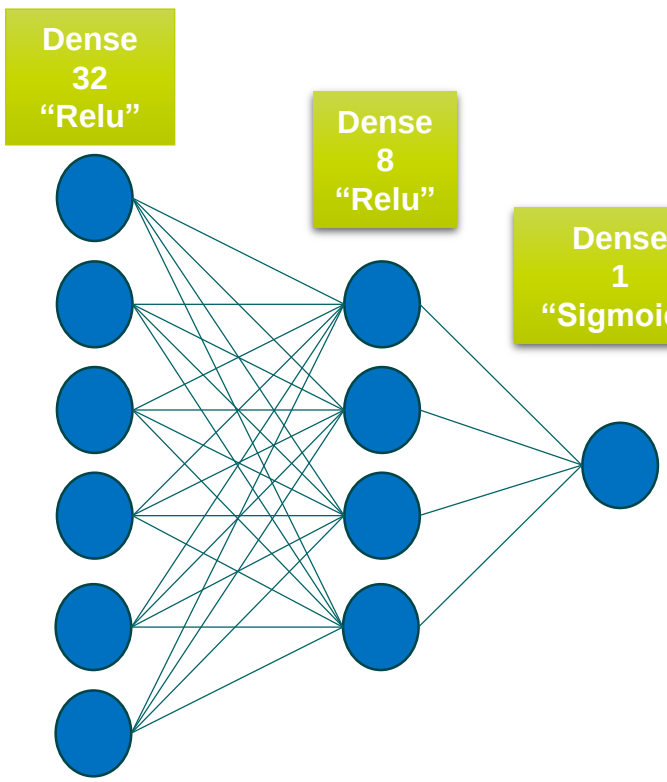
Data source	Sensor 2 and Sensor 4
Sensor signals	Acc and gyr
Validation	5-fold subject wise

- Compare Sensor 2 and Sensor 4 for accuracy and loss

Data pre-processing



Neural Network Model



1 - Normal

0 - Impaired

Optimizer : “adam”
Loss: “binary_crossentropy”
Metrics: Accuracy

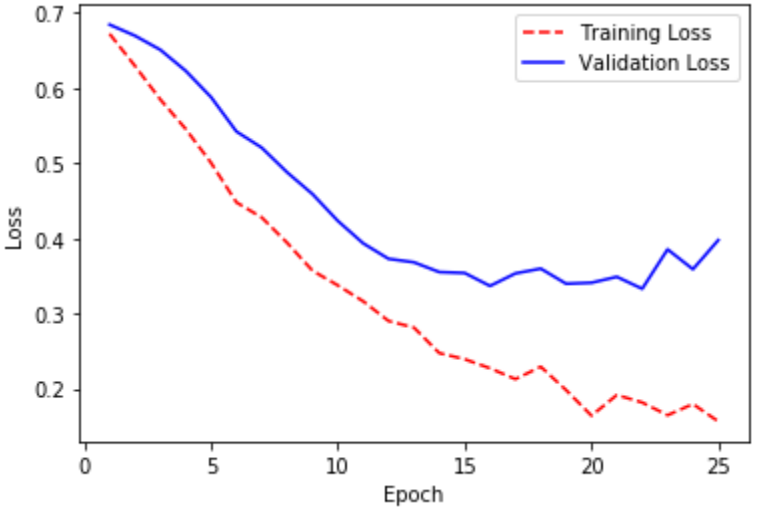
5-fold subject wise validation
Sklearn.model_selection.GroupKFold

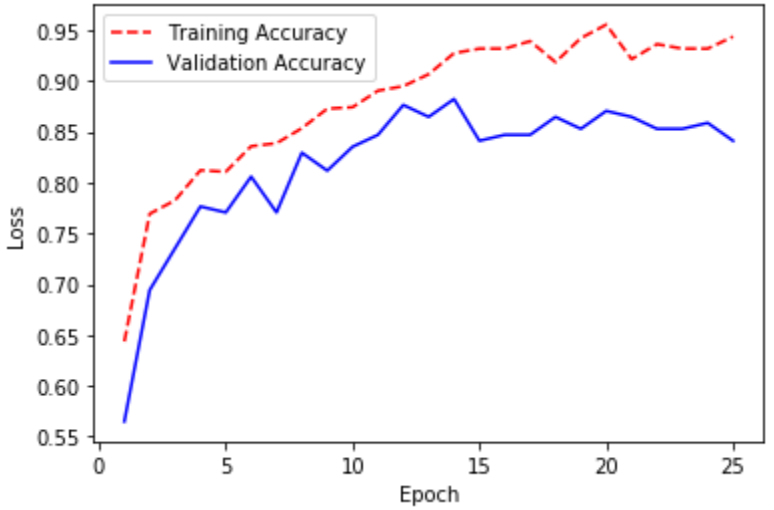
epochs = 15
Validation_split = 0.2

```
model = tf.keras.Sequential([
tf.keras.layers.Flatten(),
tf.keras.layers.Dense(32 ,input_shape=(606,),kernel_initializer = 'uniform',activation="relu"),
tf.keras.layers.Dense(8,kernel_initializer = 'uniform',activation="relu"),
tf.keras.layers.Dense(1,kernel_initializer = 'uniform',activation="sigmoid")
])

model.compile( optimizer = "adam", loss = "binary_crossentropy", metrics = ["accuracy"])
```

Results


Training Loss
Validation Loss
Loss
Epoch
0.7
0.6
0.5
0.4
0.3
0.2
0
5
10
15
20
25


Training Accuracy
Validation Accuracy
Loss
Epoch
0.95
0.90
0.85
0.80
0.75
0.70
0.65
0.60
0.55
0
5
10
15
20
25

Results

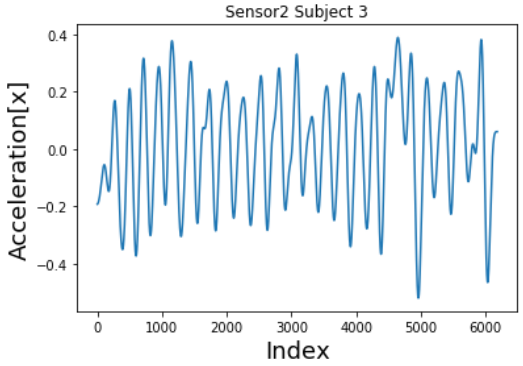
	5-fold subject wise		Sample wise	
	Sensor 2	Sensor 4	Sensor 2	Sensor 4
Test Accuracy	0.67 ±0.01	0.52 ±0.01	0.88 ±0.05	0.71 ±0.05
Validation Accuracy	0.80	0.59	0.86	0.64

Sensor 2 Clear Winner!!!

Discussion and Conculsion

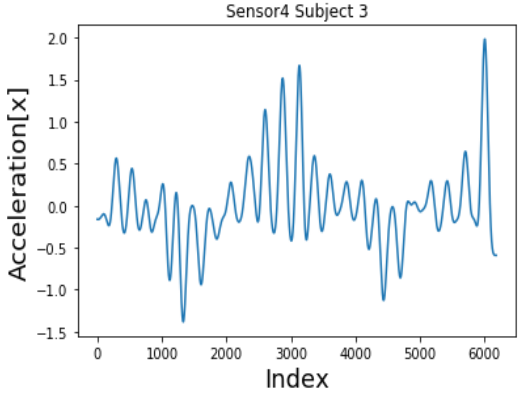
Why was sensor 2 better?

- We had erroneous and inconsistent data for sensor 4
- The NN could not learn much with the respective data subject wise



Why mediocre accuracy?

- Subject wise validation doesn't provide enough training sets
- Only 9 training subjects
- Better result with sample wise training



Thank you for your attention!

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