# OpenPack Challenge 2022: 4th place Report
## Impact of Data Cleaning and Time Alignment on Activity Recognition

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## Overview

**Task:** 10-class human activity classification using IMU sensor data.

**Solution Overview:**

(1) Error Removal

(2) Timestamp Synchronization

(3) Concatenation of 4 IMU data

(4) Classify using DeepConvLSTM



Best Result
**F-1 score 0.917**

## Approach

### [1] Data Cleaning
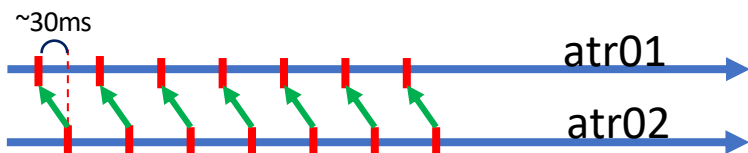
7 / 17 sessions have  error → Fill with 0

| | U103 | U104 | U107 | U108 | U109 | U204 | U207 |
|---|---|---|---|---|---|---|---|
| S0100 | ALL | | | | ALL | atr02 | atr02 |
| S0200 | | atr03&04 | | | | | |
| S0300 | atr03 | | | | | | |
| S0400 | atr03 | atr03&04 | atr03 | ALL | | | |
| S0500 | | | | | | atr02 | atr03 |

■ Sensor not working   ■ Attached wrong position
■ Attached wrong direction

### [2] Time Alignment

Some timestamps were out of sync.
→Synchronize all sensors and concatenate

~30ms

atr01

atr02

### [3] Model DeepConvLSTM

1800 = 30Hz * 60sec

Input

12 = 4sensor * 3ch

5×1

Conv     ×4
90
Dropout (0.5)

bi-directional LSTM     ×2
256

Output
10 action
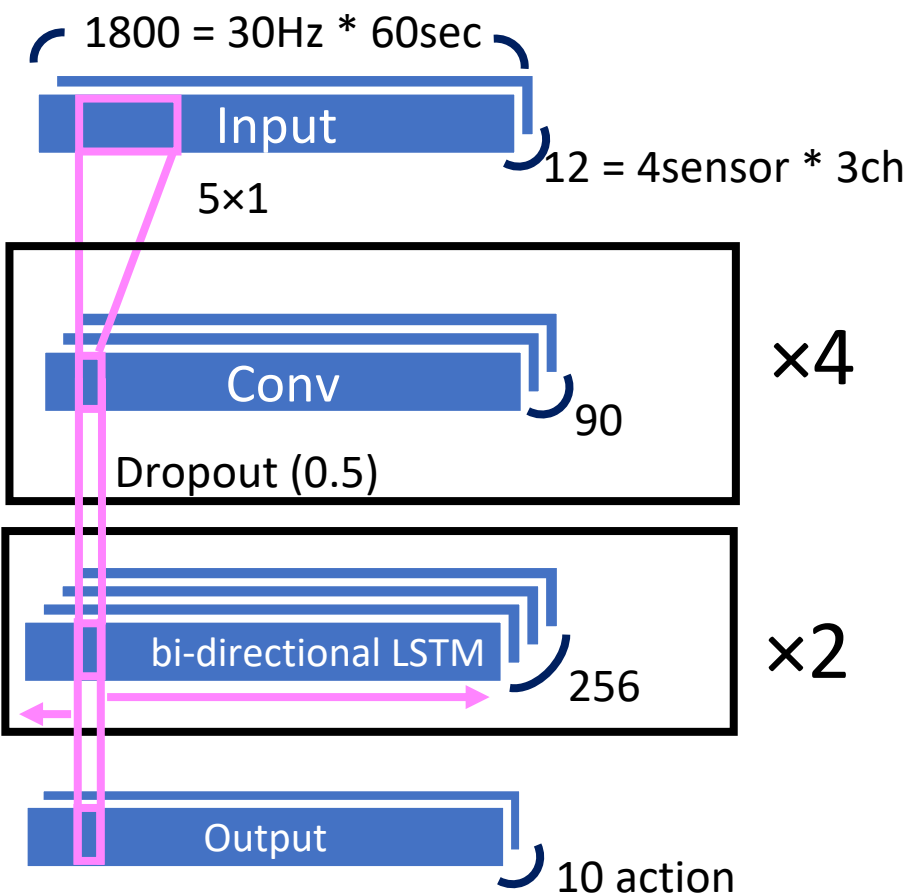
## Training & Results

| Subject | U104 | U108 | U110 | U203 | U204 | U207 |
|---|---|---|---|---|---|---|
| F-1 score | 0.954 | 0.932 | 0.912 | 0.948 | 0.831 | 0.813 |

U204 & U207 : Subjects were allowed to not strictly follow the instructions.
→ Trained model overfits the training data.