

Master Thesis, Master Project

Human activity recognition (HAR) using the hearing aid integrated inertial sensors

The hearing aid of the future will be more than just an amplifying device. It may be used as fitness tracker to capture the user's movements and activity level. Furthermore, it may be used as home monitoring device assessing the user's vital parameters, tracking the user's activity status or detecting falls. Hearing aids are becoming more complex and most modern hearing aids are already equipped with additional sensors such as inertial sensors. Acceleration signals are analyzed with signal processing algorithms to enhance speech intelligibility and audio quality. Furthermore, inertial sensors may be used to analyze the user's movements and physical activity. Hearing aid amplification settings may be adapted according to the current activity. Moreover, given the user's explicit consent, activity recognition enables a long-term tracking of the user's daily activity status. The objective of this project is to investigate automatic activity recognition based on inertial sensor data. Therefore, data of different activities will be recorded using the IMU sensor integrated in the hearing aids. The hearing aids are provided by the cooperation partner WS Audiology. Deep learning and machine algorithms will be developed to automatically classify different activity patterns.

- Literature research on HAR using head-worn inertial sensors
- Data
 - Public datasets
 - Dataset from MaD Lab (adapt annotations)
- Implementation of DL/ML algorithms, e.g. ConvLSTM
- Confidence/robustness analysis

Requirements:

- Python, Pytorch
- Experience with deep learning and machine learning
- Deep Learning lecture
- Git

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