A data-driven approach to detect upper limb functional use during daily life in breast cancer survivors using wrist-worn sensors.

Emmerzaal, J., Filtjens, B., Vets, N., Vanrumste, B., Smeets, A., De Groef, A. and De Baets, L.

Aim: assess functional upper limb (UL) use in breast cancer survivors.

Tool: wrist-worn accelerometers.

Taks: four daily life activities: laundry, kitchen work, shopping, and bed making.

Dataset: 3-axis accelerometer data and video recordings.

Participants: 10 breast cancer survivors

Annotation method: FAABOS coding scheme

Annotation tool: Adobe Premiere Pro

Upper limb(UL) dysfunction is one of the long-term complications of breast cancer treatment.

Temporal Convolutional Neural Network (TCN) model was used for data analysis in this study.

The model showed high agreement with the video-annotated ground truth for functional UL use, with an intraclass correlation coefficient (ICC) of 0.975 for functional UL use.

Percentage of functional UL use had an ICC value of 0.794. TCN model overestimated the amount of functional UL use by 0.71 min or 3.06%. Because of the identical acceleration patterns, the model struggled to correctly characterize arm swing during walking.

Future works:

Adding a new category, *arm-swing*, in addition to functional/non-functional UL use to avoid overestimation and have a fine-grained representation.

Including outdoor activities in addition to indoor activities.