Long short-term memory-based Gait Phase Prediction Using Heel Acceleration in People with Gait Disorders

Gait phase Prediction is essential for the proper and accurate control of gait-assistive orthoses. In this study, the gait of both healthy volunteers and people with gait disorders was measured by motion capture. A prediction model of gait phase was constructed using long short-term memory, a type of neural network. The heel acceleration data were used as input and the model predicted the gait phase 0.1 s ahead. To improve the prediction accuracy for patients, we propose a method in which a model is created for each individual participant and the length of the input acceleration data is adjusted according to the length of one gait cycle for that participant. The prediction accuracy of the gait phase was 84% using the conventional model and 89% using the individual model. This prediction model is expected to be applicable to gait-assistive orthoses [1].
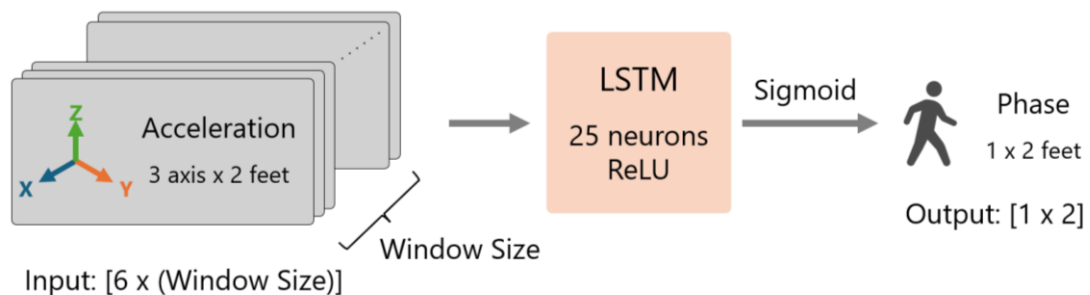
Fig 1. Prediction model of gait phase

Keywords: Gait Phase, Prediction, Gait Disorders, Deep learning, Long short-term memory

References:

[1] Y. Totoki, T. Hasegawa, S. Shirafuji, J. Ota and A. Yozu, "Long short-term memory-based Gait Phase Prediction Using Heel Acceleration in People with Gait Disorders," 2024 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Orlando, FL, USA, 2024, pp. 1-4