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論　文　要　旨
Thesis Abstract

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主論文題名　（Title）

Development of Deep Learning Models for Movements Classification to Support Daily Life and Rehabilitation for the Elderly

内容の要旨　（Abstract）

With the increasing number of elderly people and the decline in the working population, the application of Artificial Intelligence (AI) in healthcare and life support for the elderly is becoming more and more urgent. In order to accurately support the elderly, it is necessary to clearly and accurately recognize their movements. This study uses 3 different types of AI architectures, namely Transformer, LSTM and Adaptor, to classify daily movements from lower limbs to upper limbs and then the full body. In which, the Adaptor architecture designed and proposed by the author has shown clear superiority over the Transformer architecture, LSTM. The study uses open-source data to train and test the AI models, then compares the results with 14 other studies that also use similar datasets, and shows that the best models in the study have reached state-of-the-art status compared to the best models of other studies. Most notably, the ability to recognize Shuffling movements - a movement commonly seen in the elderly - achieved the highest accuracy of 94% in the study, much higher than other studies. Furthermore, in order for AI models to be able to reduce the size and increase the processing time to be able to embed in real-time devices such as Exoskeletons, smartphones or rehabilitation machines, the study proposed applying the Knowledge Distillation method to reduce the size of AI models while still maintaining good accuracy through the Teacher - Student mechanism and achieved positive results.

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