World Academy of Science, Engineering and Technology
International Journal of Computer and Information Engineering
Vol:19, No:04, 2025

Robust Recognition of Locomotion Patterns via Data-Driven Machine Learning in the Cloud Environment

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Abstract : Human locomotion recognition is important in a variety of sectors, such as robotics, security, healthcare, fitness tracking and cloud computing. With the increasing pervasiveness of peripheral devices, particularly Inertial Measurement Units (IMUs) sensors, researchers have attempted to exploit these advancements in order to precisely and efficiently identify and categorize human activities. This research paper introduces a state-of-the-art methodology for the recognition of human locomotion patterns in a cloud environment. The methodology is based on a publicly available benchmark dataset. The investigation implements a denoising and windowing strategy to deal with the unprocessed data. Next, feature extraction is adopted to abstract the main cues from the data. The SelectKBest strategy is used to abstract optimal features from the data. Furthermore, state-of-the-art ML classifiers are used to evaluate the performance of the system, including logistic regression, random forest, gradient boosting and SVM have been investigated to accomplish precise locomotion classification. Finally, a detailed comparative analysis of results is presented to reveal the performance of recognition models.

Keywords : artificial intelligence, cloud computing, IoT, human locomotion, gradient boosting, random forest, neural networks, body-worn sensors
Conference Title : ICMLHL 2025 : International Conference on Machine Learning and Human Learning
Conference Location : Paris, France
Conference Dates : April 17-18, 2025