

ALGORITHMS FOR RECOGNIZING PEOPLE FALLING

In this article, several known fall detection algorithms are introduced, including the detection method based on wearable devices, the detection method based on distributed environmental parameter collection, and the fall detection method based on image recognition, and analyze their advantages and disadvantages.

INTRODUCTION

With the aging of the population and the change of economic patterns, the number of elderly people living alone is growing rapidly, under normal circumstances, the physical condition of the elderly is poor, and once a fall occurs in the case of living alone, it is likely to be difficult to save themselves, resulting in irreversible consequences. In some crowded places, such as subway stations and bus stops, it is very easy to cause congestion, falling, and stampede, which will bring relatively large safety hazards. Therefore, to sum up, if the fall status of the human body can be detected in the above occasions and scenarios, after the occurrence of the fall event is perceived, the emergency can be called for rescue through automatic alarm or automatic contact with emergency contact, which can greatly reduce the occurrence of accidents and avoid irreversible consequences.

I. DETECTION METHOD BASED ON WEARABLE DEVICES

The human body uses wearable devices that integrate multiple sensors, such as smartwatches. By recording sensor data such as acceleration and angular velocity over a period of time and analyzing data changes[1], the human body can determine which state of motion it is in. Some design schemes also choose to cooperate with heart rate sensors to assist in more accurate judgments based on heart rate changes. The advantage of this direction is that it solves the traditional limitation of location distance, has a wide range of use, and this type of wearable device is easy to carry and has good portability. The disadvantage is that it requires users to wear the device in real time, which will affect their daily life experience to a certain extent.

II. DETECTION METHOD BASED ON DISTRIBUTED ENVIRONMENTAL PARAMETER COLLECTION

By deploying various sensors in the human body's surrounding environment (such as home environment), information such as ground vibration[2], pressure data, environmental sound[3], and radar signals are collected to analyze the changes in environmental information of the human

body's position within a certain range for fall detection. The advantage of this direction is that it has minimal impact on users and does not require real-time wearable detection devices; The disadvantage is that it is easily limited by the size of the detection area and can only monitor falls within a certain space, resulting in a relatively narrow market scope.

III. FALL DETECTION METHOD BASED ON IMAGE RECOGNITION

By using fixed or movable cameras to capture images of human activity and analyzing the image information, human features are extracted for fall detection. Song Zhengyun, S Jeba Berlin et al.[4], utilized the inherent advantages of convolutional neural networks in image recognition to improve the accuracy of human fall detection. The advantage of this direction is that it does not require users to wear detection devices, does not affect their daily lives, and compared to distributed environment parameter collection detection methods, it has a lower cost and a wider detection range, which has also received widespread attention.

SUMMARY

In recent years, with the popularization and development of smart homes and wearable devices, fall detection methods based on image recognition and wearable devices have emerged, providing new solutions for fall behavior detection and achieving more convenient and accurate detection.

References

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