

Enabling IoT for In-Home Rehabilitation: Accelerometer Signals Classification Methods for Activity and Movement Recognition

ABSTRACT

Abstract—Rehabilitation and elderly monitoring for active ageing can benefit from Internet of Things (IoT) capabilities in particular for in-home treatments. In this paper we consider two functions useful for such treatments: Activity Recognition (AR) and Movement Recognition (MR). The former is aimed at detecting if a patient is idle, still, walking, running, going up/down the stairs or cycling; the latter individuates specific movements often required for physical rehabilitation such as arm circles, arm presses, arm twist, curls, seaweed and shoulder rolls. Smart phones are the reference platforms being equipped with an accelerometer sensor and elements of the IoT. The work surveys and compares accelerometer signals classification methods to enable IoT for the aforementioned functions. The considered methods are Support Vector Machines (SVMs), Decision Trees (DTs) and Dynamic Time Warping (DTW). A comparison of the methods has been proposed to highlight their performance: all the techniques have good recognition accuracies and, among them, the SVM-based approaches show an accuracy above 90% in the case of AR and above 99% in the case of MR.

EXISTING SYSTEM

Physical medicine and rehabilitation (PMR), also called physiatry, is the branch of medicine emphasizing the prevention, diagnosis, and treatment of nerves, muscles, bones and brain disorders that may produce temporary or permanent impairment. Rehabilitation physicians (physiatrists) treat injuries or illnesses that affect how you move, with the aim of enhancing performance. A very important kind of PMR concerns the physical therapy for elderly people. When it comes to care for senior citizens It can be difficult for seniors with physical conditions

to travel to and from a therapists office to receive care. It is difficult for them to travel . Moreover, outpatient physical therapy can be stressful, and offices are often noisy and crowded.

DRAWBACKS

- They (Senoir citizens) may be tired easily .
- It is difficult for them to travel.
- Some people get afraid of looking at hospital environment.

PROPOSED SYSTEM

In this paper we consider two functions useful for such treatments: Activity Recognition (AR) and Movement Recognition (MR). The former is aimed at detecting if a patient is idle, still, walking, running, going up/down the stairs or cycling; the latter individuates specific movements often required for physical rehabilitation such as arm circles, arm presses, arm twist, curls, seaweed and shoulder rolls. Smart phones are the reference platforms being equipped with an accelerometer sensor and elements of the IoT. The work surveys and compares accelerometer signals classification methods to enable IoT for the aforementioned functions. The considered methods are Support Vector Machines (SVMs), Decision Trees (DTs) and Dynamic Time Warping (DTW). A comparison of the methods has been proposed to highlight their performance: all the techniques have good recognition accuracies and, among them, the SVM-based approaches show an accuracy above 90% in the case of AR and above 99% in the case of MR.

ADVANTAGES

- There is no need for the elderly people to move.
- By staying at home they are getting treatment.
- They may feel stress less.

SYSTEM REQUIREMENTS

H/W System Configuration:-

- Processor - Pentium –IV
- RAM - 4 GB (min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

S/W System Configuration:-

- Operating System : Windows 7 or 8 32 bit
- Application Server : Tomcat5.0/6.X
- Programming Language : Java
- Java Version : JDK 1.6 and above