Intelligent Monitoring System for Elderly Care based on IoT and Machine Learning

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Purpose Today, the number of Internet of Things (IoT) devices is growing rapidly [1]. These devices can measure different physical and biological variables, which can then be used for different purposes. Combining this large amount of data with a person's life history and applying machine learning models can enable the early detection of pathologies or diseases [3]. In this context, we propose a system that focuses its technological capabilities on monitoring people with mild cognitive impairment or dementia, integrating a remote, continuous, and non-intrusive monitoring platform [2]. The clinical purpose is to detect early changes in daily routines, mobility patterns, or treatment adherence that may indicate progression of impairment, and to provide support tools to caregivers and healthcare professionals for decision-making based on objective data. **Method** As can be seen in Figure 1, the system is based on data collection and analysis using a network of IoT devices and an intelligent analysis engine. For data collection, various sensors are installed in the user's home, including motion sensors in key rooms and sensors that detect when the front door, refrigerator, and medicine cabinet are opened. In addition, a wearable device with GPS, a heart rate sensor, and an accelerometer is used to record activity outside the home. These devices communicate wirelessly with a home hub that sends the data to a cloud server, where it is initially validated, filtered, and anonymized before being stored. Subsequently, the analysis layer of the platform uses machine learning models [3], based on neural networks, to build a personalized profile of each patient's routine, learning from their usual patterns to generate automatic alerts when it detects significant deviations. **Results and Discussion** The processing made by the intelligent analysis module on data collected by IoT devices, including user behavior patterns, allows alerts to be issued and anomalies in the data to be detected. This information, correctly interpreted by healthcare professionals, allows this type of disease or pathology to be treated in its early stages. In this way, the impact of the system focuses on early detection of deterioration [2], prevention of adverse events, and support for medical decision-making.

References

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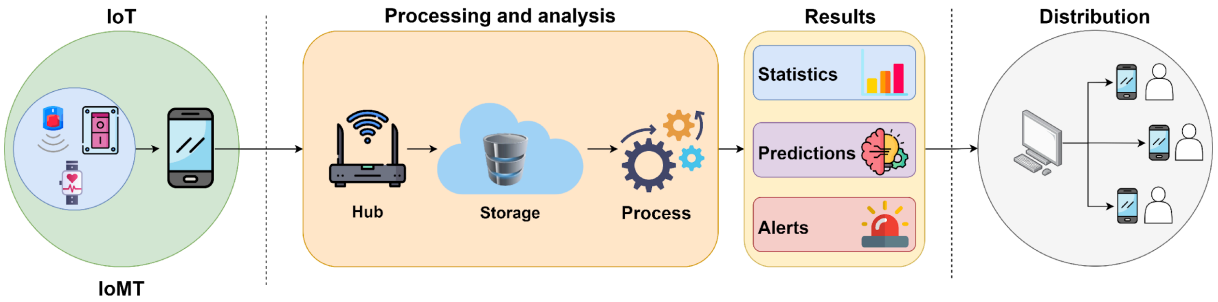

Figure 1. Architecture of the intelligent system based on IoT and Machine Learning