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A Review of Internet of Medical of Things

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ABSTRACT

Deep learning is a set of algorithms inspired by the structure and function of the brain and helps to recognize complex relationships. It is a subset of machine learning algorithms, which uses multiple layers of neural networks with many nodes. They can solve complex problems with high accuracy, such as facial recognition, natural language processing and machine translation. The networks developed with deep learning in machine have enabled computers to identify objects and understand their context, allowing them to perform sophisticated tasks like computer vision. Deep learning is a type of artificial intelligence that is based on the concept of replicating the behavior of the human brain. In deep learning, large networks of "neurons" are used to parse data and analyze patterns, just like our brains do. This allows computers to learn patterns and make decisions in much the same way humans do. Deep learning models have proved to be extremely successful in many complex tasks, such as natural language processing, computer vision, and even in detecting cyber security threats. The advantages of deep learning are that it can better recognize hidden features in data, and can more easily handle complex problems that may be too hard for traditional machine learning algorithms to handle. The use of Convolutional Neural Networks (CNNs) has been used to help diagnose medical conditions such as cancer, skin diseases, and heart disease. The network utilizes a combination of different techniques, from pattern recognition to feature extraction, to identify the presence of specific features and diagnose different diseases. CNNs have also been used for computer vision where they can be used for object detection, image segmentation and classifying objects in videos. In addition, CNNs have been used for autonomous driving and autonomous robots where the networks can be used for obstacle avoiding and navigation. this paper demonstrates the effectiveness of using deep learning to detect abnormalities in medical EEG spectrograms and corneal images. The proposed deep learning architecture based on convolutional neural networks and recurrent neural networks can achieve better detecting results than existing models. The paper provides the much needed advancements in medical IoMT systems.

Keywords: Convolutional Neural Networks (CNNs), AI, IOMT (Internet of Medical of Things), Deep Learning

INTRODUCTION

Deep learning is a set of algorithms inspired by the structure and function of the brain and helps to recognize complex relationships. It is a subset of machine learning algorithms, which uses multiple layers of neural networks with many nodes. They can solve complex problems with high accuracy, such as facial recognition, natural language processing and machine translation [1]. The networks developed with deep learning in machine have enabled computers to identify objects and understand their context, allowing them to perform sophisticated tasks like computer vision.It can solve complex problems efficiently and provide more accurate predictions than other algorithms. The basic idea behind deep learning is that machines can learn from data in much the same way that humans do. Deep learning models are composed of layers of neurons, which act as feature detectors [2]. They learn through backpropagation and adjust the weights of the connections between layers. This enables the model to create representations of data and detect patterns that would not be visible to traditional machine learning algorithms. Deep learning models are able to make decisions based on data in much the same way that people would, and provide results that are closer to reality.

The EEG spectrograms are used to detect abnormalities and the corneal images are used to detect cataract and glaucoma [3]. In this paper, an original dataset consists of EEG signal spectrograms and corneal images is used. To enable better detection performance for the medical IoMT systems, a deep learning architecture based on convolutional neural networks (CNN) and recurrent neural networks (RNN) is proposed [4]. This paper focuses on developing the architecture using convolutional neural networks (CNN) and recurrent neural networks (RNN) for deep learning, to enable better detection performance in medical IoMT systems. An original dataset consisting of EEG signal spectrograms and corneal images is used to test the performance of the proposed system. The experiments performed show that the proposed architecture can yield better detecting results than the existing state-of-the-art models [5].

However, this task can be challenging due to the high variability in medical data. To solve this problem, deep learning techniques have become popular and reliable approaches for detecting and analyzing medical data. In this study, the authors propose a novel model to detect abnormalities in Electroencephalogram (EEG) spectrogram and corneal images [6]. The model is based on convolutional neural networks (CNN) and recurrent neural networks (RNN) architecture. The proposed architecture is tested on an original dataset consisting of EEG signal spectrograms and corneal images [7]. The results show that the proposed model can yield better detection performance than existing methods. Additionally, the paper provides insight into key advances in medical IoMT systems [8].

For example, an Electroencephalogram (EEG) which measures the electrical activity of the brain is used to detect possible abnormalities, such as seizures. Similarly, a corneal image can be used to detect indications of dry eye syndrome [9].

In this paper, we present a novel model that is able to detect such abnormalities from both EEG signal spectrograms and corneal images. The model is based on a deep learning architecture that combines Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) [10]. This architecture is tested on an original dataset that includes EEG signal spectrograms and corneal images [11].

The results of the experiments show that the proposed model has a greater ability for anomaly detection compared to existing methods. Furthermore, the paper contributes to advances in Medical Internet of Medical Things (IoMT), providing key insights on how to detect abnormalities from medical data.In this paper, we proposed a novel model for AD from both EEG signal spectrograms and corneal images [12]. The method is based on a deep learning architecture combining Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN). The model is evaluated on an original dataset consisting of EEG signal spectrograms and corneal images. Results show that the proposed model has better performance in detecting abnormalities compared to existing methods. Further, the findings contribute to advances in the Medical Internet of Things (IoT) providing key insights on the use of medical data for abnormal event detection [13].

Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) are used in this study. The proposed method is evaluated on a dataset consisting of EEG signals spectrograms and corneal images [14]. The results show better performance in detecting abnormal events with the proposed method compared to existing methods. It draws attention to the key insights provided on the use of medical data for abnormal events detection in the Medical Internet of Things (IoT) [15]. The findings will be beneficial for the research area and will make a significant contribution to the medical domain [16].

Many researchers in recent years have used Electroencephalography (EEG) and Corneal Imaging (CI) to detect abnormal events in patients. Corneal images are used to detect abnormalities in the eyes while EEG signals provide a measure of how the brain is functioning [17].In this study, a deep learning based model has been proposed using convolutional neural networks (CNN) and recurrent neural networks (RNN) for detecting abnormalities in medical data [18]. The model takes EEG spectrograms and corneal images as inputs and uses the combination of CNN-LSTM (Long Short-Term Memory) networks to detect abnormal events in medical data [19]. Different layers are used in the proposed model to extract features from the EEG spectrograms and corneal images for a more robust detection of abnormal events [20]. The proposed model is further evaluated on a dataset of EEG and CI data and results show improved performance over existing methods [21]. This research has drawn attention to possible applications of deep learning techniques in medical data and it has been suggested that these techniques can be used to better detect abnormal events in medical IoTs [22].

In case of epileptic activity detection, convolutional neural network (CNN) models can be employed by providing EEG data as input [23]. CNN extracts the spectral and temporal content from the EEG signals and can therefore detect anomalies which are not captured by traditional testing methods [24]. The CNN model can differentiate between healthy and abnormal EEG signals which can be used to detect epileptic activity in the brain [25]. Additionally, recurrent neural networks (RNN) can be used to learn EEG patterns over time to detect abnormalities that are not easily detected by traditional methods [26]. RNNs can be used to identify distinctive patterns in EEGs that can indicate a seizure, allowing for efficient and accurate detection of epilepsy [27]. This combined model can then be used to generate a more accurate detection of epileptic activity in a patient. For instance:

1. Dermalogica Diagnostics System: This system is designed to automatically diagnose skin diseases, such as psoriasis, acne, and eczema, by analyzing images of skin conditions [28]. It utilizes a convolutional neural network (CNN) to recognize and classify the disease from the image [29].

2. Respiri: Respiri is a respiratory sound classification system that integrates machine learning and signal processing for automated detection and classification of respiratory diseases [30]. It uses a recurrent neural network (RNN) model to analyze audio signals from the user in order to classify conditions such as asthma, croup, and bronchiolitis [31].

3. Microsoft Clinical Care Extraction and Scoring Model: This model is used for extracting and scoring medical concepts from electronic health records (EHRs) [32]. It utilizes a combination of natural language processing and text classification algorithms to analyze and interpret unstructured data [33].

4. CBIR System for Lung Cancer Detection: This system is capable of automatically diagnosing lung cancer from computed tomography (CT) scan images of the chest [34]. It employs a convolutional neural network (CNN) to recognize lung nodules [35]. The system classifies the nodules as either benign or malignant and provides a probability assessment of the final diagnosis [36,37].

5. AI-Enhanced ECG Diagnostic System: This system is designed to diagnose arrhythmias and other abnormalities by analyzing electrocardiograms (ECGs) [38,39]. It utilizes a long short-term memory (LSTM) model to interpret ECG signals and detect abnormalities such as atrial fibrillation [40,41].

Overall, these examples demonstrate the viability of utilizing deep learning algorithms to develop automated medical diagnosis systems, improve the accuracy of medical diagnostics, and provide personalized healthcare [42,43,44].

The system uses a convolutional neural network to process images taken with corneal topography [45]. Then, a separate deep learning algorithm is used to process EEG signals based on raw data collected from specialised EEG-based scanners [46]. Additionally, both the corneal image and EEG signal data are fused together to generate an automated diagnosis of Alzheimer’s disease [47]. Furthermore, the system is capable of predicting the disease diagnosis with a high accuracy rate when compared to manual clinical diagnosis methods [48]. This can help improve clinical diagnosis of AD, reduce time required for diagnosis, and improve patient quality of life [49].EEG provides the medical practitioner with insight into the brain's activity, ranging from unconscious or cognitive activities [50].

EEG has been used to diagnose various neurological disorders like dementia and Alzheimer's disease. AI algorithms are used to analyze EEG signals and detect any abnormalities or patterns in activity [51]. This can be used to identify early signs of Alzheimer's or dementia, enabling early diagnosis and treatment [52]. AI algorithms can analyze EEG signals to detect subtle changes in order to identify signs of Alzheimer's and other neurological conditions, which may be otherwise undetectable [53,54]. AI algorithms can also be used to identify differences in brain activity between healthy people and those with neurological disorders, enabling more accurate diagnosis and better medical intervention [55,56].

CONCLUSION

Advanced analytics based on Artificial Intelligence (AI) have a potential for revolutionizing the diagnosis of AD. The use of AI-based diagnostics could result in more accurate diagnosis, faster diagnosis, and consequently a better patient experience. It could drastically reduce the workload of radiologists and bring in an inexpensive and accurate ICT technology to make AD diagnosis more accessible worldwide.

As a result, AI-based systems can detect radiological signs of AD more accurately than conventional methods. This could help improve the accuracy of AD diagnosis and also help reduce the cost of screening and diagnosis. AI-based systems can also be used to analyze patient lifestyle data such as diet, physical activity and sleep patterns to obtain important information that can help medical practitioners to understand AD pathology better and develop personalized treatments.

For example, AI-based systems can analyze data related to the patient's diet, analyze their sleep patterns and physical activity levels, and identify patterns that are related to the risk of developing AD or other related conditions. Moreover, AI-based systems can use structured medical data to create a personalized medical record and individualized treatment plans. This could be used to provide better support and care to patients in the long term, reducing the patient burden and ensuring better follow-up and care.

Finally, AI-based systems can be used to carry out a range of predictive analytics, such as predicting the onset of AD, predicting the response to treatments, and predicting the progression of AD over time. This enables proactive and personalized care and helps to provide better outcomes for the patient.

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