Section A-Research paper
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5G Diabetes: Using Healthcare Big Data Clouds to ImproveIndividualized Diabetes Diagnosis

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ABSTRACT— Recent innovations in mobile computing and AI, as well as recent advancements in wireless networking and big data technologies like 5G, medical big data data analysis, and the Web of Things, are paving the way for the creation and roll out ofnovel diabetes tracking systems and applications.

It is crucial to develop efficient approaches for the identification and management of diabetes due to the long-term and systemic damage experienced by patients. In this article, we use the results of our research to divide these approaches into two categories: Diabetes 1.0 and Diabetes 2.0. Both of these approaches have serious flaws in their
networking and intelligence. To this end, we're working to develop a smart, efficient, and cost-effective method of diagnosing and treating diabetes at an individual level. In this piece, we first present the 5G-Smart Diabeticsystem, which utilizes cutting-edge tools likewearable 2.0, artificial intelligence, and big data to provide in-depth sensing and evaluation for diabetic patients. After that, we show you how 5G-Smart Diabetes uses a centralized data repository and a unique data analysis model for each individual patient. Atthe end, we construct a 5G-Smart Diabetic testbed with wearable sensors, mobile devices, and large data clouds to analyze the results. The trial findings demonstrate theeffectiveness of our method in providing patientswith individualized recommendations for diagnosis and therapy

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INTRODUCTION

Nearly 8.5% of the global population has diabetes, making it one of the most prevalent chronic diseases. This equates to 422 million individuals. Most people with diabetes mellitus have type 2, which accounts for 90% of all cases [1]. Even more seriously, as noted in [2], the situation will worsen as more adolescents and young adults become diabetic. Improving approaches for the prevention and treatment of Type 2 diabetes is urgently needed [3] because of the enormous effect diabetes has on world health and economy.

Furthermore, several variables, including an incorrect and unhealthy lifestyle, an emotionally susceptible state, and societal and occupational stress, might contribute to the development of the illness. But the current technology for detecting diabetes has certain drawbacks, such as: • The device is unpleasant, and real-time data gathering is challenging. In addition, there is no way to track many physiological parameters in real time for diabetic patients [4, 5].

• There is no system for exchanging data or for conducting individualized analyses of huge data from many sources, such as lifestyle, sports, food, etc., in the current model for detecting diabetes [6, 7].

The prevention and management of diabetes and the associated monitoring measures are not consistently recommended [8, 9].

In this article, we first propose a next-generation diabetes solution identified as the 5G-Smart Diabetes system to address the aforementioned issues by combining cutting- edge technologies such as 5G mobile networks, artificial intelligence, medical big data, social media, smart clothing [10], as well as so on. The 5G-Smart Diabetes data- sharing method and individualized data- analysis approach are then introduced. We conclude by describing the 5G-SmartDiabetes testbed we developed using the smart clothes, smartphones, and big data healthcare clouds.

The "5G" in "5G-Smart Diabetes" really refers to two different things. On the one hand, it alludes to the use of 5G technology as a means of communication to enable excellent and ongoing tracking of the physiological states of those with diabetes and to offer treatment services for those with the condition without restricting their independence. However, "5G" is shorthand for the "5 goals" of providing efficient, comfortable, customizable, environmentally friendly, and intelligent services to users.

Cost-effectiveness is accomplished in two ways. To begin, 5G-Smart Diabetes encourages a healthy lifestyle among its users in order to forestall the onset of the illness. The expense of managing diabetes might be reduced if illness risk could be reduced. Second, 5G-Smart Diabetes makes it possible to treat the condition outside of a hospital, saving money compared to emergency care or, more specifically, extended stays in a hospital.

Patient convenience: 5G-Smart Diabetes must not interfere with everyday life in order to provide patients with convenience.

RELATED WORK

Disease Prediction Using Deep Neural Networks and Large Healthcare Data,"

Correct analysis of medical data aids in early illness identification, patient treatment, and

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community services; this is especially true as big data becomes more prevalent in the biomedical and healthcare fields. When medical data is of poor quality, however, analytical accuracy suffers. In addition, several regional illnesses have distinct symptoms depending on location, which may make it difficult to anticipate epidemics. In this research, we centralize machine learning techniques for accurate forecasting of chronic illness outbreaks in areas prone to such outbreaks. Using actual hospital data gathered in the heart of China between 2013 and 2015, we put the updated prediction algorithms through their paces. To get around the problem of missing information, we use an implicit component model to fill in the blanks. We do research on a local, persistent condition, cerebral infarction. Using both organized and unstructured hospital data, weoffer a novel multimodal risk factor prediction method based on convolutional neural networks (CNNs). We found no prior work in the field of health care big data analytics that specifically addressed both kinds of data. Our proposed approach achieves a prediction accuracy of 94.8% and a convergence time that is quicker than the CNN-based unimodal illness risk prediction algorithm.

The paper, titled "Application of Adaptive Neuro- Fuzzy In for Diabetic Identification and prediction,"

data suggest that by 2040, one in ten personswill have diabetes, making it one of the most frequent metabolic illnesses. However, data also reveal that one every two adults who have diabetes are undiagnosed. Based on datasets of diabetic patients (the Pima Indians Diabetes Dataset), this research proposes a hybrid adaptive neural-fuzzy inference system (ANFIS) approach to diabetes patient classification. Seven hundred sixty datapoints make up the Pima Indians Diabetic Dataset. This approach employs a diabetes lineage function to construct a fuzzy rulebasis based on various premises, which is then utilized to set the attributes vector. The ANFIS Fuzzy Logic Toolkit and the MATLAB Toolbox were used to build the Neuro-Fuzzy ANFIS modeling. Specificity, accuracy, and sensitivity were examined to evaluate the algorithm's overall performance. Accuracy results for the suggested neural network on the Pima Indians Diabetes Dataset showed 85.35 percent for the training data and 84.27 percent for the testing data.

Management of Diabetes Treatment in Real Time Using Data Stream Mining,"

Emerging mobile apps on smartphones are geared toward recording inputs of intakes (such as calories, fats, amount of water, etc.), monitoring one's activity levels (such as the number of steps walked), and inferring one's health condition, marking a significant step forward in healthcare using information technology. An innovative approach of integrating traditional Chinese medicine (TCM) healthcare concepts with modern mobile app software development, big data, sensor technology, and artificial intelligence (in the areas of decision induction, it is reasoning, and picture recognition) is suggested in this study. Traditional Chinese Medicine (TCM) has evolved into a comprehensive, systematic, and universal health care system with strong links to our everyday lives. For this healthcare idea to be

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widely adopted as an assistant who is monitoring and counseling the user on his or her health with forewarning any health danger, we need more pervasive technologies, such as mobile smartphones and their sensing apps. In this work, we examine the difficulties and possible future uses. This initiative takes use of the widespread adoption of mobile smartphones and EEG sensors to provide accessible, personalized TCM healthcare to everyone,anywhere.

Anthropometric and triglyceride phenotypes for the detection of diabetes type 2 risk using machine learning.

Despite the robust association of the hypertriglyceridemic waistband (HW) phenotypic and type 2 diabetes, the predictive efficacy of morphologies based on specific anthropometric measures and triglyceride (TG) levels has not been studied. The current research set out to determine whether or not HW phenotype was associated with T2DM inKorean adults and, further, to investigate the predictive potential of different phenotypes made up of different combinations of specific anthropometric measures and TG levels. Eleven thousand nine hundred thirty-seven people were surveyed between November of 2006 and the beginning of 2013 for this cross- sectional retrospective research. We took anthropometric measures along with fasting blood glucose and TG levels. Using HW andother anthropometric variables, we compared healthy individuals to those with diabetes type 2 using a binary logistic regression (LR) analysis. The predictive ability of different phenotypes was assessed using two machine learning algorithms: naïve Bayes (NB) and LR. A tenfold validation procedure was used for all prediction studies. High waist circumference (HW) was the strongest independent predictor of type 2 diabetes (p 0.001, adjusted OR = 2.07 [95% CI, 1.72-2.49] in males; p 0.001, modified OR = 2.09 [1.79-2.45] in women). The correlation between HW phenotypic components circumference of the waist (WC) and triglyceride (TG) levels and diabetes type 2 was stronger for WC than for TG. In general, the phenotypes were more predictive of future outcomes in females than in males. Men's waist-to-hip ratio + TG or women's rib-to-hip ratio + TG (AUC by NB = 0.73, AUC by LR = 0.735) were the best phenotypic predictors of T2DM. The existence of HW was shown to have the greatest correlation with T2D, although it's possible that combining measures of real WC and TG levels isn't the most accurate way to predict T2D. Our results may be useful in informing the clinical decision-support system development for primary T2D screening.

Management of Diabetes Treatment in Real Time Using Data Stream Mining,"

Insulin-dependent diabetic mellitus (IDDM) treatment requires determining the optimal insulin dose for each patient and when to administer it in order to keep blood glucose levels at a healthy range. The insulin prescription history and the patient's blood glucose responses are used in conjunction with a data stream mining technique described in this research to computationally develop actual time decision rules for designing IDDM treatment. The most up-to-date information on a patient's health is used

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to make decisions, rather than data collected over many years from a large population. Given the fact that glucose levels alter under diverse medical effects, including changes in lifestyle, kind of medicine, or other external circumstances, the rules are adaptable and more precisely anticipate if a medical implication would occur. To determine which data stream algorithms are the most effectivein terms of precision and throughput, a simulated experiment is run on a computer.

METHODOLOGY

In the study suggested, we estimate the patient's condition utilizing data by using python-based Decision Tree, SVM, and Artificial Neural Network techniques. The diabetes dataset is being used to train these algorithms. Author use Ensemble Algorithm, a hybrid of Decision Tree, SVM, and ANN algorithms, to make accurate predictions. The ensemble method will combine the training models of the other two algorithms for improved accuracy and prediction.

1) Customization: This method allows one patient to exchange his data with another dependent on the location of their respective cloud servers. Since we are working with a dataset, I cannot allow people to share their data, but I will make all projected test data values public.

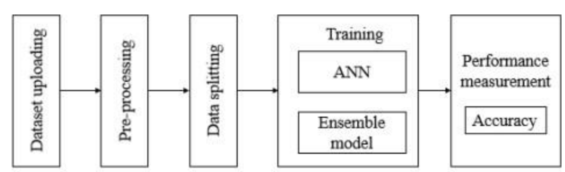
Because it does not need any intervention from a human being, this method will be regarded as intelligent.

One such application is the "Cloud Application," which functions as a server in the cloud and storage space to train dataset models using methods like decision trees, support vector machines (SVMs), artificial neural networks (ANNs), and ensemble techniques.

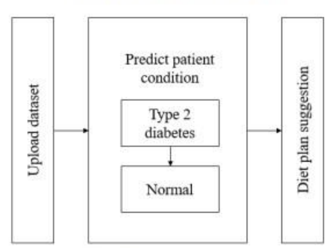
2) User Use: In this application, we are going to upload a few samples that will be treated as user sense data. This data will be transmitted to a cloud server, where it will be processed by a decision, SVM, and ANN model to predict the patient's condition. Since we lack sensors for collecting data, we will use test data that has already been uploaded in its place. Since I can't utilize user information to keep data private, I'm leaving all of my predictions out in the open for everyone to view and use.

RESULT AND DISCUSSION

The author of this research presents an economical method of monitoring diabetes patients' health utilizing current 5G technology. The condition of the illness will be serious by the time the symptoms appear or it is diagnosed through a medical check-up, and there is no way to get which intimation prior to the epidemic of diabetes that is plaguing modern society as a result of occupational stress and unhealthy lifestyle choices.



Block diagram of cloud application.



Block diagram of user application.

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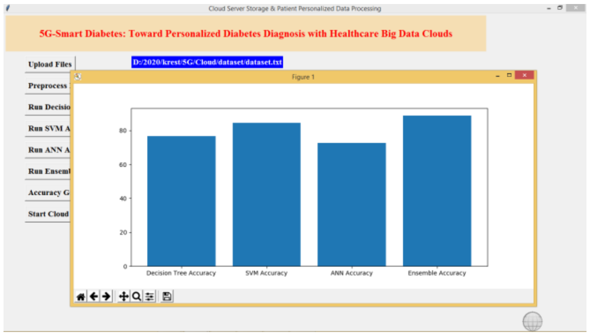

The accuracy scores are shown against time on the y-axis, while the x-axis shows the name of the method.

Based on user input, we projected a 0 or a 1 and established a normal/abnormal range forpatient readings.

CONCLUSION

In the first part of this paper, we suggest a 5G- Smart Diabetes architecture that combines a differentiation layer, an altered termination layer, and a layer for exchanging data. This system, which looks different from diabetic 1.0 and Diabetes 2.0, may provide dependable, practical, and comprehensible diabetic assurance. When that day comes, we'll have proposed a social and data sharingarchitecture that's both practical and cost-effective.

Moreover, we provide a refined analysis of data model for 5G- Aware Diabetes employing AI techniques.

Finally, taking into account the smart outfit, wifi, and server farm, we assemble a 5G-Smart Diabetes testbed. The first results demonstrate that our framework can provide patients with individualized diagnosis and therapy recommendations.

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