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Disease Prognosis Via Machine Learning And Prediction

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Abstract: The revelation of informationfrom clinical datasets is significant so as to make powerful medical determination. The point of data mining is toextricate information from data put away in dataset and produce clear and reasonable depiction of examples. Diabetesis an interminable sickness and a significant general wellbeing challenge around the world. We utilized Weka tool for the analysis diabetes, no-diabetic examination. Out of sixclassification algorithms, four algorithms depict hundred percent accuracy on train and test data. Overall, in this paper we have performed the data mining using classification algorithms. The data set of hba1c test used inthis work is collected from diagnostics and research laboratory LUMHS, Hyderabad. It is observed by performinghba1c test that many patients were prediabetic and there were less number of patients with diabetes as this test is topredict diabetes by which a patient can go back from becoming diabetic in future. From the classificationexperiments it is evident that the male diabetic patients are more as compared to female diabetic patients. In bothclassification experiments, random forest model shows the highest accuracy.

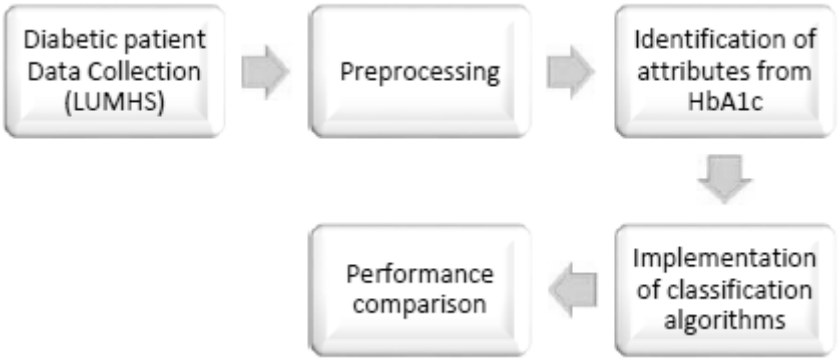
1. INTRODUCTION

HbA1c term is related to diabetes, it shows how much blood glucose is present in our body and used for diagnosingpatients with diabetes via measuring HbA1c or Glycohemoglobin. In the analysis of diabetes, we are fundamentally worried about characterizing an illnessstate as opposed to building up a reference interim for wellbeing. Analysis of glycated hemoglobin (HbA1c) in bloodgives proof about a person's normal blood glucose levels during the past a few months, which is the predicted halfexistenceof red platelets (RBCs). HbA1c is presently suggested as a standard of care (SOC) for testing and checkingdiabetes, specially the sort diabetes 2 [1].Data analysis [2] is the process of analyzing large dataset related to wide variety of fields including, health care,satellite images, agriculture images, biodiversity, and many more. In this paper we are applying analysis process viamachine learning algorithms and focusing on medical data.A few endeavors are made to assess the presentation of characterization techniques for Clinical dataset, especially,Diabetes [3]. In study [4], a correlation of three distinctive methods - Neural Network, Support Vector Machine(SVM) and Multilayer Perceptron, have been accounted for diabetes dataset. The outcome indicated SVM as ready togive preferable exactness results over Neural Network and Multilayer Perceptron.A compelling prescient AI method for diabetes dataset with a few classifiers accessible in WEKA and Rapid Minerinformation mining device have been tended to in [5];

coming about better exactness for SVM classifier [5]. Moreover,an exactness of 80.41% as far as characterization between two classes (nonappearance or nearness of diabetes) havebeen examined in [6]. The investigation [7] has created models for diabetic forecast utilizing Stream Associativearrangement and Association rules and contrasted with prescient principles mined with choice trees. In one study, choice List, K-NN and Naïve Bayes for grouping of diabetes have been utilized and looked at the exactnessof models. Bayes gives the 52.33% of precision as better classifier [8].(Abdul Jalil et al., 2021; Mohd Noh et al., 2021; Mustafa et al., 2021; Roszi et al., 2021; Tumisah et al., 2021). If it is managed well, various problems can be avoided (Irma et al., 2021; Suzana et al., 2021; Rohanida et al., 2021; Nazrah et al., 2021; Shahrulliza et al., 2021).
Theexplanation for utilizing these calculations is that practically all potential parts of managed learning approaches areconsidered. In this manner, the trial results convers more extensive range of administered learning calculations for theassorted social insurance information (i.e., diabetes). Further, this investigation additionally consolidates gatheringstrategies with considered order techniques to accomplish better precision.All aspects require effective leadership and management (Mohd Arafat et al., 2021; Sumaiyah et al., 2021; Hifzan et al., 2021; Shahrul et al., 2021; Helme et al., 2021).The success of something depends on good and efficient management (MohdAli et al., 2021; Parimala et al., 2021; SitiJamilah et al., 2021; Nor Fauziyana et al., 2021; Noel et al., 2021).

2. METHODOLOGY

The major stepsinclude the dataset collection, identification of attributes, implementation of six classification algorithms andperformance comparison of those algorithms. We utilized Weka instrumentfor the analysis diabetes. The sample dataset is shown in the figure below. The dataset consists of HbA1c report of 8524patients.



The Diabetes data was split into train and test set data using (0.7 – 0.3) % ratio respectively. Train set were 8, 524and Test set = 3,655. The key attributes that were used during modeling were “Sex”, “Age”, “Result”, and “Class.”

Model attributes	Scale of Measurement
Sex	Nominal
Age	Numeric
Result	Numeric
Class	Nominal

3. RESULTS AND DISCUSSION

The accuracy, Kappa statics and RMSE of six classification algorithms for training data and testing data to classifydiabetic and non-diabetic patients are shown in table VI and table VII respectively. Indeed, findingsdemonstrate that the correctly classified instances for Bayesian network, J-48 decision Tree, Multilayer perceptron and random forest are100%. However, Naïve Bayes and SVM depicts 97% and 99% accuracy respectively. The kappa statistics and RMSEvalues also depicts the similar results with highest values for four classifiers.The best way is to do efficient management (Ahmad Shafarin et al., 2021; Junaidah et al., 2021; Farah Adibah et al., 2021; Ahmad Shakani et al., 2021; Muhamad Amin et al., 2021). This demonstrates that the importance of something being managed well (Santibuana et al., 2021; Nor Diana et al., 2021; Zarina et al., 2021; Khairul et al., 2021; Rohani et al., 2021; Badaruddin et al. , 2021, Abdul Rasid et al., 2021).

Train Data					
Model	Accuracy	Kappa Statistic	Correctly Classified Instances	Incorrectly Classified Instances	RMSE
Bayesian Classifier	100.0%	1.00	8,524	0	0.0002
J-48 Decision Tree	100.0%	1.00	8,524	0	0.0000
Naïve Bayes	97.1%	0.94	8,274	250	0.1713
Multilayer Perceptron	100.0%	1.00	8,524	0	0.0000
SVM	99.2%	0.98	8,456	68	0.0893
Random Forest	100.0%	1.00	8,524	0	0.0002
Test Data					
Model	Accuracy	Kappa Statistic	Correctly Classified Instances	Incorrectly Classified Instances	RMSE
Bayesian Classifier	100.0%	1.00	3,655	0	0.0002
J-48 Decision Tree	100.0%	1.00	3,655	0	0.0000
Naïve Bayes	97.5%	0.95	3,565	90	0.1667
Multilayer Perceptron	100.0%	1.00	3,655	0	0.0026
SVM	99.5%	0.99	3,638	17	0.0682
Random Forest	100.0%	1.00	3,655	0	0.0000

The performance metrics used to compare the models shows no sign of under fitting or over fitting. This is a positiveresult and good for all the models. Bayesian Classifier, J-48 Decision Tree, Multilayer Perceptron, and RF modelsachieved the highest accuracies (100%) on both train and test set data. Naïve Bayes and SVM achieved an accuracyof 97.1% and 99.2% in train data and 97.5% and 99.5% in test set data respectively.In addition, Bayesian Classifier, J-48 Decision Tree, Multilayer Perceptron, and RF models had the lowest Root MeanSquare Error. All the models performed well in classifying the diabetic and non-diabetic patients, but it is clear thatthese four models are the best to be used in classifying patients with diabetes and those who don't. All the models hadhigher Area under Receiver Operating Characteristic (>0.9) which is perfect for classification.The accuracy comparison of six classifiers depicts that Random forest givesthe highest accuracy as compared to other five classifiers to classify male and female patients. After this classificationit is also identified that there more male diabetic patients than female diabetic patients.

From the literature, the aspect of globalization has led to an increase in the duration and frequency of interaction among individuals and groups. These interactions occur in organizational and social contexts. One of the notable outcomes of this trend has been an emergence of vast amounts of data, which prompt effective storage and analysis to extract meaningful data. A specific illustration is the case of the business arena in which aspects such as consumer buying behaviors and the feedback received on platforms such as social media has prompted the affected and concerned parties to embrace tools that could transform the outcomes into meaningful data. Hence, concepts of data warehousing and data mining have emerged. Whereas data warehousing ensures that the information collected in a variety of databases is organized and stored in central repositories, data mining implies that the resultant data contained in warehouse sites is extracted and analyzed to obtain meaningful patterns. The implication is that data mining aids in predicting future trends in sectors such as the business arena, upon which companies are prompted to adopt and implement relevant strategies based on depictions arising from the data mining outcomes. In future, it is evident that firms that will be in a continuous quest to keep abreast with industry demands and the needs and preferences of products and service users will have to foster data warehousing and mining to predict patterns such as buying behaviors. In so doing, it is projected that competitive advantages will be achieved due to the understanding of industry-specific needs of the consumers.

There are number of ERP solutions which are used by many organizations, depending upon the size and business functions carried out in their organizations. Sap offers the ERP solution for large enterprises (LEs). A Sap solution's cost of delivery and maintenance can vary greatly based on the enterprise. An empirical study conducted on the factors involved in choosing of ERP for an organization concluded that, organization size has a huge impact on the choice of the software package [3]. The study further commented that Sap is a clear choice for LEs. The panorama consulting survey of 2016 reports that Sap has the longest implementation duration as compared to the other counterparts [5]. The QT9 ERP [1] offers tools for automating small to medium-sized manufacturing processes. QT9 ERP is built in NET technology with an SQL Server database structure which makes for simple upgrades,

implementation and training. The framework is compliant with Windows operating systems only and draws all available data into one location using screen grids. QT9 Corporate management planning functionalities include: Supply Tracking, Market Identification, Quoting, Supplier Management, Finance, Purchase Orders, Processing, Invoicing, Inventory Control, Purchasing, Task Scheduling and Work Planning. QT9 is however slow in processing and the system is not connected to other business processes.

Microsoft Dynamics is a product by Microsoft developed for medium to large level enterprises [2]. It's a cloud-based ERP system which facilitates the automation of following business activities: purchasing, accounting, inventory management and sales activities. Nonetheless, it has minimal cross-platform support including specific application functionality, operating systems, and servers. In addition, lack of some elements and the interaction with third party functionalities leads towards complexities of integration.

Data warehousing in such an example involves data aggregation regarding activities such as likes and channeling the information to central databases while data mining implies that only the meaningful patterns and data are extracted (such as suggesting only relevant friends to the user). Given that data warehouses compile and organize information to form a common database while data mining extracts meaningful information from the resultant database, it is evident that the former precedes the latter. Similarly, this trend suggests that to detect meaningful patterns, data mining is dependent on the nature of data compiled during the warehousing procedure.

Prediction of zero day attack is a very important concept in the field of cyber security. Most organizations, and individuals do not know nor have an information before their systems, Networks, software Database or websites are compromised [1, 2]. The inability to know aforehand about incoming attacks has led to series of losses and huge financial losses [3]. In order to protect System and cyber users from zero day attack, a proactive prediction and defense systems are required, which have the capability to make intelligent decisions and prediction in real time [4, 5]. Prediction of attacks can be done basically in two ways, statistical approach and algorithm approach. The Algorithmic approach includes the probabilistic model, Data mining and the Machine Learning approach, while the Statistical models include the ordinary least square regression, logistic regression, time-series approaches and the auto regression [6, 7].

The developed tested was setup with both hardware and software. Ubuntu 4.4 with low interaction honeypot and high interaction honeypot. A Bi-Directional Recurrent Neural Network algorithm was implemented to model the prediction. BRNN is a framework in deep learning that can be used for modeling prediction**.** Due to the limitations of Recurrent Neural Network, a Bi direction Recurrent Neural was introduced. BRNN is a two units- direction al RNN that are combined together to produce an output.

To capture cyberattacks data effectively, the study incorporated a low interaction honey pot and a high interaction honey pot. These were connected to various domain with heavy traffic which include: Socio networking site, gamming site, financial transaction site and transportation site. The attack profiles in predicting zero - day attack consist of features of unknown attack. This was used to identify and predict zero day attack. It is a list of the features of unknown attacks as recorded by the system. The system records every captured data as either an attack, machine error or as a mistake.

4. CONCLUSION

In this paper we have performed the data mining using classification algorithms. The data set of hba1c test used inthis work is collected from diagnostics and research laboratory LUMHS, Hyderabad. It is observed by performinghba1c test that many patients were prediabetic and there were less number of patients with diabetes as this test is topredict diabetes by which a patient can go back from becoming diabetic in future. From the classificationexperiments it is evident that the male diabetic patients are more as compared to female diabetic patients. In bothclassification experiments, random forest model shows the highest accuracy.

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