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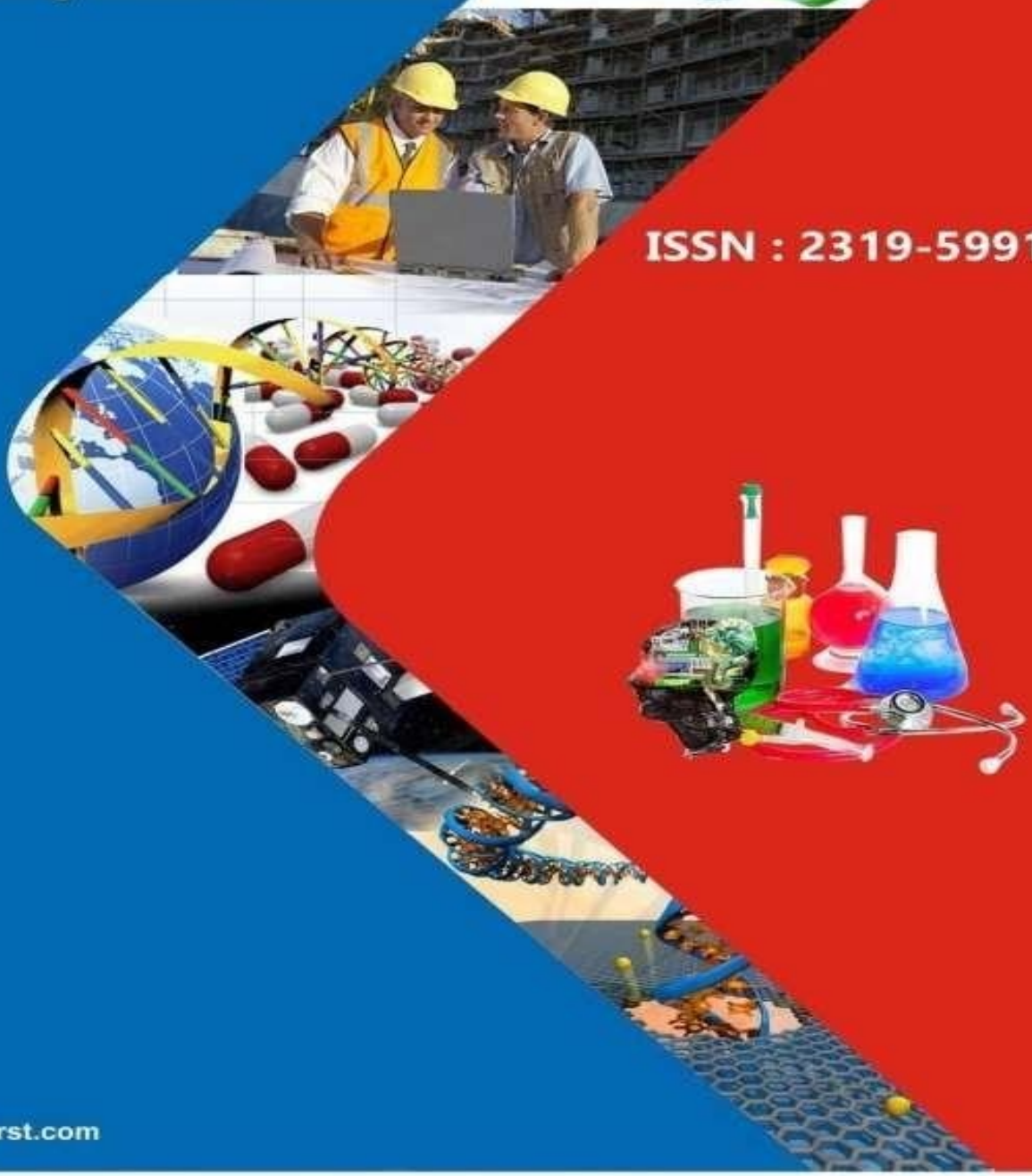

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SMARTCARE: ONLINE HEALTH CONSULTING SYSTEM

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ABSTRACT:

The healthcare industry collects huge amounts of healthcare data which, unfortunately, are not "mined" to discover hidden information for effective decision making. Block Chain has been a current trend for attaining diagnostic results. Huge amount of unmined data is collected by the healthcare industry in order to discover hidden information for effective diagnosis and decision making. Block Chain is the process of extracting hidden information from massive dataset, categorizing valid and unique patterns in data. Researchers all over the world are working in either multi agents or in ontologies for developing system in health care domain. It might have happened so many times that you or someone need doctor help but they are not available due to some reason. The health management system is an end user support and online consultation project. Here we propose a system that allows users to get guidance on their health issues through an intelligent health care online system. The objective of our paper is to predict Chronic Kidney Disease (CKD), Heart Disease and Liver Disease using clustering technique, K-means algorithm.

I. INTRODUCTION

Smart Health Care Prediction using Block Chain is a new powerful technology which is of high interest in computer world. It is a sub field of computer science that uses already existing data in different database to transform it to new researches and result. The actual task is to extract data by automatic or semi-automatic means. The different parameters included in Block Chain include clustering, forecasting, path analysis and predictive analysis. With the growing researching the field of health informatics a lot of data is being produced. The analysis of such a large amount of data is very hard and requires excessive knowledge. Smart health care applies Block Chain techniques for health diagnosis. Block Chain refers to extracting meaning full information from the different huge amount of dataset. It is the process of determining the unseen finding pattern and knowledge from the massive amount of data set [2].

Block Chain is significant research doings in the field of medical sciences since there is a requirement of wellorganized methodologies for analyzing, predict and detecting diseases. To detect and predict diseases Block Chain applications are used for the management of healthcare, health information, patient care system, etc. It also plays a major role in analyzing survivability of a disease. Block Chain classification techniques play a vital role in healthcare domain by classifying the patient dataset. Block Chain classification technique is used to analyses and predicts many diseases. The classification techniques like Feature selection methods, improve the performance accuracy of the algorithm by reducing the dimensionality of the feature and it can be grouped into a wrapper and filter method. Tendency for Block Chain application in healthcare today is great, because healthcare sector is rich with information, and Block Chain is becoming a necessity. Healthcare organizations produce and collect large volumes of information on daily basis. Use of information technologies allows atomization of processes for extraction of data that help to get interesting knowledge and regularities, which means the

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elimination of manual tasks and easier extraction of data directly from electronic records, transferring onto secure electronic system of medical records which will save lives and reduce the cost of the healthcare services, as well and early discovery of contagious diseases with the advanced collection of data.

Block Chain can enable healthcare organizations to predict trends in the patient conditions and their behaviors, which is accomplished by data analysis from different perspectives and discovering connections and relations from seemingly unrelated information. Raw data from healthcare organizations are voluminous and heterogeneous. They need to be collected and stored in the organized forms, and their integration enables forming of hospital information system. Healthcare Block Chain provides countless possibilities for hidden pattern investigation from these data sets. These patterns can be used by physicians to determine diagnoses, prognoses and treatments for patients in healthcare organizations. Block Chain has been a current trend for attaining diagnostic results. Huge amount of unmined data is collected by the healthcare industry in order to discover hidden information for effective diagnosis and decision making. Block Chain is the process of extracting hidden information from massive dataset, categorizing valid and unique patterns in data. There are many Block Chain techniques like clustering, classification, association analysis, regression etc. The Health Management system is an end user support and online consultation project. Here we propose a system that allows users to get guidance on their health issues through an intelligent health care system online. Liver failures are at high rate of risk among Indians. The diagnosis of liver disorder at any early stage helps in designing effective prevention measures. In India, one in five persons is affected by liver disease. It is expected that by 2025 India may become the 'World Capital for Liver Diseases'. The widespread occurrence of liver infection in India is contributed due to deskbound lifestyle, increased alcohol consumption and smoking. There are about 100 types of liver infections. Most prevalent liver infections are cirrhosis, non-alcoholic fatty liver disease and alcoholic liver disease. In the recent years sensors and mobile devices have been used extensively used for rapid detection of an infected liver.Chronic kidney disease (CKD) also called chronic renal failure, which has become a serious problem in the world in which the kidneys are damaged and it is the cause of improper function of kidney organ. The starting date of kidney failure may not be known, it may not recognize as an illness of the patient because it cannot show any symptoms initially. The failure of the kidney can affect the whole human body and it can be a cause of seriously illness and cause of deaths. In chronic kidney disease, the patient's kidneys are damaged and decrease their functions. If Kidney decrease gets worse, waste can build to high levels in your blood and many complications may develop like high blood pressure, anemia, weak bones, poor nutritional health and nerve damage. In India, the projected number of deaths due to chronic kidney disease was around 5.21 million in 2008 and it is expected to rise to 7.63 million in 2020 (66.7% of all deaths).

Heart disease has become a serious problem in the world in which the heart is damaged and it is the cause of improper function of heart. Life is dependent on competent functioning of heart, because heart is necessary part of our body. If function of heart is not suitable, it will affect the other body parts of human such as brain, kidney etc. Heart disease is a disease that affects on the function of heart. There are number of factors which increases risk of heart disease. At the present days, in the world heart disease is the main cause of deaths. The World Health Organization (WHO) has expected that 12

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million deaths occur worldwide, every year due to the heart diseases.

Prediction by using Block Chain techniques gives us accurate result of disease. Smart health prediction system can find out and extract hidden knowledge related with heart disease, kidney disease and liver disease from a historical heart disease, kidney disease and liver disease database. It can answer complex queries for diagnosing the disease and thus help healthcare analysts and practitioners to make intelligent clinical decisions which conventional decision support systems cannot. There is vast potential for Block Chain applications in healthcare. Generally, these can be grouped as the evaluation of treatment effectiveness; management of healthcare; customer relationship management; and detection of fraud and abuse. More specialized medical Block Chain, such as predictive medicine and analysis of DNA microarrays, lies outside the scope of this paper.

Other Block Chain applications related to treatments include associating the various side-effects of treatment, collating common symptoms to aid diagnosis, determining the most effective drug compounds for treating sub populations that respond differently from the mainstream population to certain drugs, and determining proactive steps that can reduce the risk of affliction. The most important aim of this paper is to study the different Block Chain techniques used in prediction of liver, kidney and heart disease by using different Block Chain tools [3].

II. LITERATURE SURVEY

Classification algorithm is one of the greatest significant and applicable Block Chain techniques used to apply in liver, kidney and heart disease prediction. Classification algorithm is the most common in several automatic medical health diagnoses. Many of them show a good classification accuracy listed below

A: Work related with Liver Disease:

Prasad proposed “Implementation of Partitional Clustering on ILPD Dataset to Predict Liver Disorder with methods C4.5, NBC in 2016. The result shows NBC algorithm has the highest accuracy [6]. P. Rajeswari, et. al. analyzed the Liver Disorder Using Block Chain Algorithm with Naïve Bayes algorithms, FT tree algorithm , and K Star in 2010. The classification accuracy is found to be better using FT Tree algorithm compare to other algorithms [7]. Noor et.al. have proposed Block Chain Techniques For Optimization of Liver Disease Classification” with Decision Tree, Naive Bayes , and NB Tree algorithm in 2013. The result shows NB Tree algorithm has the highest accuracy; however the Naïve Bayes algorithm gives the fastest computation time [8]. S. Dhamodharan proposed Liver Disease Prediction Using Bayesian Classification” with methods Naïve Bayes and FT tree algorithm in 2014. The result concludes that the accuracy of Naïve Bayes algorithm is much better [9]. Et.ai. have proposed Ensemble Correlation Between Liver Analysis Output with methods KNN, SVM, MLP and decision tree in 2014. The prediction can be correlated and furthermore the correlation can be utilized for detecting the anomaly on the analysis [10]. S. Annesh Kumar et. al. have proposed” A novel approach for Liver disorder Classification using Block Chain Techniques” with methods Fuzzy, Kmeans classification in 2015. Fuzzy based classification gives better performance and achieved above 94% accuracy for each type of liver disorder [11]. Thangarajul, et. al. have analyzed the performance of PSO- K Star Classifier Over Liver Diseases ”with methods PSO with K Star classification in 2015. PSO-K star algorithm is best suitable algorithm for the classification of liver disorders as it improved the performance in prediction accuracy [12]. Gregory et. al. have propose Prediction of Liver Disease (Biliary Cirrhosis) Using Block Chain

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Technique with method FT Tree algorithm in 2015. The classification accuracy is found to be better using FT Tree algorithm [13].Vijayarani et. al. have proposed Liver Disease Prediction using Block Chain Technique with method Naïve Bayes SVM in 2015. The SVM classifier is considered as a best classification algorithm [14]. Ebenezer et. al. have proposed the Liver Disease Diagnosis Based on Neural Networks "with methodsC4.5, CART, Naïve Bayes, SVM in 2015. SVM is the optimal model as it gives more accurate result than other algorithms [15]. Baitharua et. al. have analyzed the Block Chain Techniques For Healthcare Decision Support System Using Liver Disorder Dataset with methodsJ.48, SVM, Random Forest in 2016.

By analysing the results Random Forest gives the overall best classification result [16]. Gulia et. al have proposed the Liver Patient Classification Using Intelligent Techniques "with methods SVM, Random Forest in 2014. The results indicate that Random Forest algorithm outperformed all other techniques with the help of feature selection [17].

B: Work related with Chronic Kidney Disease:

S. Ramya et. al. have diagnosis the Chronic Kidney Disease Using Machine Learning Algorithms" with methods Random Forest ,Back Propagation ,Radial Basis Function in 2016.The results indicate that Random Forest algorithm outperformed all other techniques with the help of feature selection[18]. Lambodar Jena et. al. have applied Distributed Block Chain Classification Algorithms for Prediction of Chronic-Kidney Disease with methods Naïve Bayes ,Multilayer Perceptron, SVM, J48, Conjuctive rule, Decision tree in 2015. The SVM classifier is considered as a best classification algorithm[19]. Vijayaran et. al. have proposed Kidney disease Prediction Using SVM and ANN Algorithm with methods SVM and ANN in 2015.The SVM classifier is considered as a best classification algorithm because of its highest classification accuracy values[20]. ParulSinha et. al. have Comparative Study of Chronic Kidney Disease Prediction using SVM in 2015.The result shows SVM algorithm has the highest accuracy [21].Manish Kumar proposed Prediction of Chronic Kidney Disease Using Random Forest Machine Learning Algorithm with Random forest, Sequential minimal optimization, Naïve Bayes, Radial basis function, Multilayer perception methods in 2016. Naïve Bayes algorithm is best suitable algorithm for the classification of kidney disorders as it improved the performance in prediction accuracy [22]. Abheer et. al. have proposed Diagnosis and Classification of Chronic Renal Failure Utilising Intelligent Block Chain Classifiers with method Decision tree in 2014. This is the most effective model to predict patients with kidney disease [23]. Kousal Kumar et. al. have proposed Artificial Neural Networks for Diagnosis of Kidney Stones Diseases with Radial Basis Function, Multilayer Perceptron and Learning Vector Quantization methods in 2012. Radial Basis Function gives better performance and achieved above 94% accuracy for each type of kidney disorder [24]. K. R. Laxmi et. al. have Performance Comparison of Three Block Chain Techniques For Predicting Kidney Dialysis Survivability with methods ANN, Decision tree and Logistic regression in 2014. The classification accuracy is found to be better using Decision Tree algorithm compare to other algorithms [25]. Kaladhar et. al. have proposed Statistical and Block Chain Aspects on Kidney Stones: A Systematic Review and Metaanalysis with methods Naïve Bayes, Logistic regression, Random Forest and J48 in 2012. The classification accuracy is found to be better using Naïve Bayes algorithm compared to other algorithms [26]. Veenita proposed" Chronic Kidney Disease Analysis Using Block Chain Classification Technique with method

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Naïve Bayes Artificial Neural Network in 2016. The classification accuracy is found to be better Naïve Bayes [27].

C: Work related with Heart Disease:

Roohallah proposed" A Block Chain approach for diagnosis of coronary artery disease with methods SVM, NBC, ANN and Bagging Algorithm in 2013.This research investigates applying a range of techniques to different types of Decision Trees seeking better performance in heart disease diagnosis [28]. Randa proposed" Feature Analysis of Coronary Artery Heart Disease Data Sets Elsevier, International with method C4.5in 2015.

This is the most effective model to predict patients with heart disease[29]. M.khil proposed Classification of Heart Disease Using K-Nearest Neighbour and Genetic Algorithm with methods KNN, Genetic algorithm in 2013. KNN is more accurate than genetic algorithm [30].Y. Alp et. al. have proposed Evidence Combination in Medical Block Chain with methods KNN, Naïve Bayesian and Decision Tree in 2004.Naïve Bayes algorithm gives the fastest computation time[31]. Franck Le Duff proposed Predicting Survival Causes After Out of Hospital Cardiac Arrest using Block Chain Method with method NB tree in 2004.NB tree algorithm has the highest accuracy[32].Boleslaw Szymanski proposed Using Efficient Supanova Kernel For Heart Disease Diagnosis with method SVM in 2006.The result shows SVM algorithm has the highest accuracy[33]. HeonGyu Lee proposed Mining Bio-Signal Data: Coronary Artery Disease Diagnosis using Linear and Nonlinear Features of HRV with methods Bayesian classifiers, CMAR, Decision Tree and SVM in 2007.The SVM classifier is considered as a best classification algorithm because of its highest classification accuracy values [34]. Niti Guru proposed Decision Support System for Heart Disease Diagnosis Using Neural Network with method Neural Networkin 2007. In this paper proposed the prediction of Heart disease, Blood Pressure and Sugar with the aid of Neural networks [35]. Sellappan Palaniappan proposed Intelligent Heart Disease Prediction System Using Block Chain Techniques with methods Decision Trees, Naïve Bayes and Neural Network in 2008.It is user friendly, web based, scalable, reliable and expandable [36]. LathaParthiban proposed" Intelligent Heart Disease Prediction System using CANFIS and Genetic Algorithm with methods CANFIS and Genetic Algorithm in 2008. The CANFIS model is shown the potential in the prediction of the heart disease as illustrated by the result [37]. HaiWang proposed" Medical Knowledge Acquisition through Block Chain with method KNN in 2008. This paper presents a model of medical knowledge acquisition through Block Chain [38].

III. SYSTEM ANALYSIS

EXISTING SYSTEM :

The rate of kidney, liver and heart diseases is increasing at an exponential rate. The busy lifestyle of people in this era with all the fast food in the lunch break and getting back to sitting and working has pushed as over the edge. Along with this people today have a lack of exercise and are less active. For most of them recreation is just another movie in bed or anything technology based. Physical activities have reduced drastically. These factors boosted the rate of kidney, liver and heart diseases to an unfortunately high percentage. In a developing country like ours the rate of heart diseases has the same effect. The annual mortality rate per 100,000 people from cardiovascular diseases in Bangladesh has increased by 128.9% since 1990, an average of 5.6% a year. Prediction of heart diseases is a difficult and risky task. Since it is directly dependent on people's' health, accuracy is a major factor. If not predicted accurately it can be disastrous. This research therefore

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focuses on the comparison of different Block Chain techniques to predict it.

DISADVANTAGES OF EXISTING SYSTEM :

1) Less accuracy
2)low Efficiency

PROPOSED SYSTEM :

The proposed system aims at presenting the end users a personalized health-care system with help of Block Chain. In the proposed method we use the concepts of fitness number. In the proposed approach we convert the given data set into binary format as per the given condition for liver, kidney and heart disease. We divide the large data set into number of parts. We perform simple intersection calculation for every part of data set and finally we consider only those item set which satisfy the given minimum support fitness value. Disease Classification Method:

In this work, the comparison of feature selections to classify dataset is presented. The dataset is gathered from a famous travel UCI WEB Repository and kaggle

Overview of research framework constitutes the five main steps:

1) Data Collection: collected disease data from a data set providing website

2) Feature Extraction: Main purpose of the second step is to transform the dataset in the database into a format suitable for Block Chain by extracting and reducing terms from text

3) Feature Selection: There are large amount of extracted features from the feature extraction step. If classification models are created with all of them, they could give a lowaccurate classification result on a test dataset, which is the effect known as over fitting.

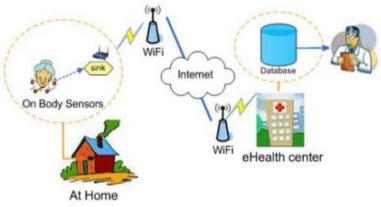
4) Classification: The selected features of training and test sets are transformed into a document matrix. Then only the document matrix of training set is used to create models with classification algorithms. The purpose of the fourth step is selecting the best algorithm for classifying the disease dataset

5) Models' Performance Evaluation: After the classification models were built. They are used to evaluate their performance in the fifth step. The document matrix of test set from the previous step is taken to evaluate with the models. The performance evaluation is considered both number of features and accuracy of models. The proposed system has 3 options which will predict 3 different health issue. The system predicts whether the user's heart, kidney or liver are healthy or not. The user has to provide input to the system. The system then predicts user's health according to the user's data provided by comparing it with the dataset provided using KNN algorithm.

ADVANTAGES OF PROPOSED SYSTEM :

1) High accuracy
2)High efficiency

SYSTEM ARCHITECTURE :



IV. MODULES DESCRIPTION

MODULES:

1) Admin: admin can login to application by using username and password as 'admin' and 'admin'. After login admin will add doctors and hospital details and can add disease details, medicine and symptoms details.
2) Doctor: doctor can login to application by using username and password given by admin and then can view all appointments from patients and prescribe medicines

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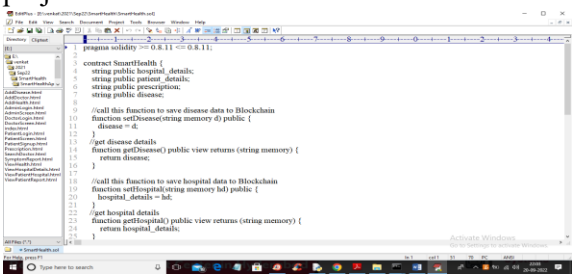
3) Patient: patients can signup with the application and then login and then search disease and its medicine details and can take appointments and can view prescription from doctors.

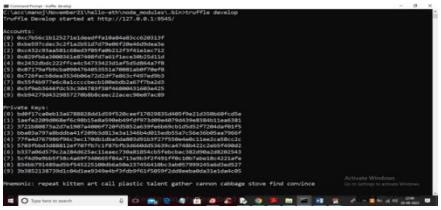
V. SCREEN SHOTS

To store data in Blockchain we need to design SMART CONTRACT which contains functions to store and retrieve details from Blockchain. We have designed following Contract for this project.

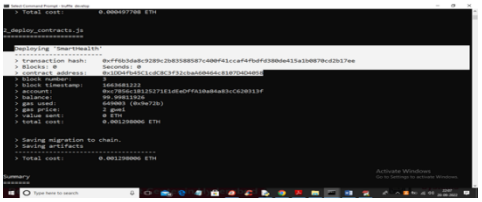


In above Smart Contract screen for different data storage we have defined different Blockchain functions and to deploy this contract on Blockchain Ethereum tool we need to follow below steps

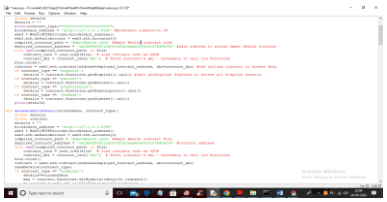
1) Go inside 'hello-eth/node_modules/bin' folder and then double click on 'runBlockchain.bat' file to start Ethereum tool and get below screen



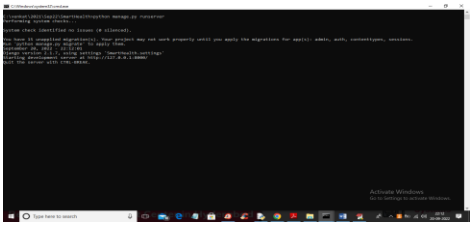
2) In above screen Ethereum generated some default account and private keys and now type command as 'truffle migrate' and press enter key to deploy contract and get below contract address



3) In above screen in white colour text we can see 'SmartHealth' contract deployed and we got contract address also and this address we need to specify in python program to store and read data from Blockchain. In below screen showing python code calling Blockchain Smart contract

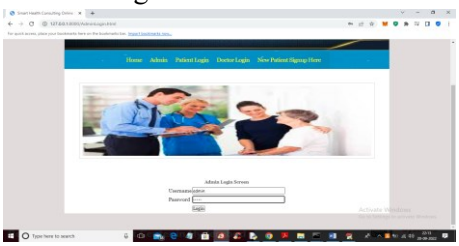


4) In above screen read red colour comments to know about Smart Contract calling from python code. Now contract deployed and now double click on 'run.bat' file to start python Django web server and get below screen



In above screen python server started and now open browser and enter URL as 'http://127.0.0.1:8000/index.html' and press enter key to get below page

In above screen click on 'Admin' link to login as admin and get below screen



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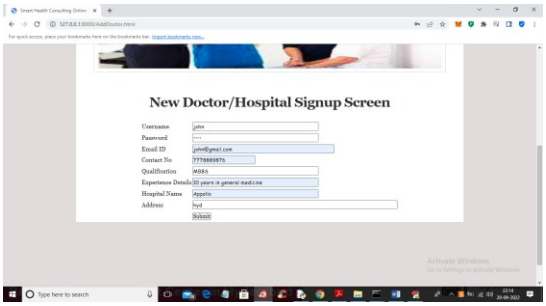
In above screen admin is login and after login will get below screen

In above screen admin can click on 'Add Doctors/Hospital Details' link to add doctor details and get below screen



In above screen admin is adding doctor details and giving username and password and now press 'submit' to save record and get below output

In above screen doctor details saved in Blockchain and now click on 'View Hospital Details' link to view all doctor details

In above screen we can see doctor details and now click on 'Add Disease' link to add disease and symptom details

In above screen admin adding disease and symptoms and medicine details and then press button to get below output

In above screen disease details saved in Blockchain and now logout and signup patient to book appointment

In above screen patient is entering signup details and then press button to get below output

In above screen signup details saved in Blockchain and now click on 'Patient Login' link to login as patient

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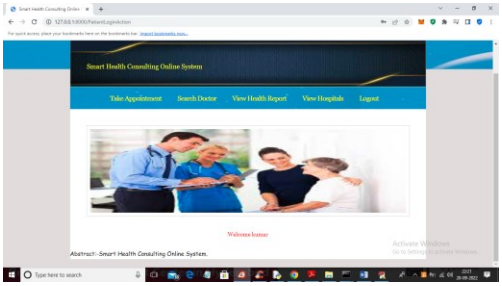
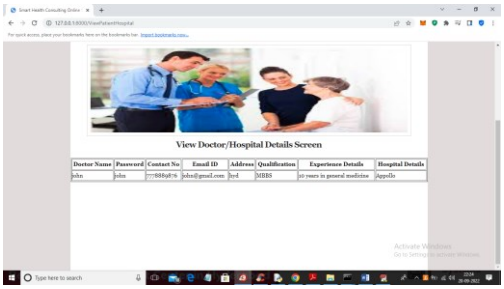
In above screen patient is login and after login will get below screen



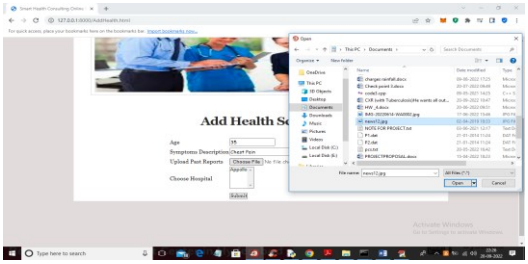
In above screen patient can click on 'Search Doctor' link to search disease and doctor details

In above screen patient enter some symptoms details and then press button to get consultation doctor, medicines and disease name

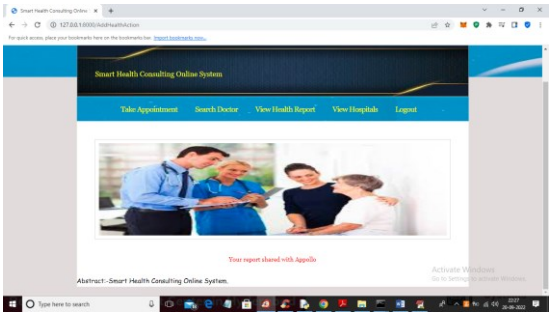
In above screen patient can view all symptoms and medicine with doctor details to consult and now click on 'View Hospitals' to view list of hospitals and doctors like below screen



In above screen patient can view all registered hospitals and doctor details and after verifying all details and now patient can click on 'Take Appointment' link to take appointment like below screen



In above screen patient will enter AGE and symptoms and then upload any document of TEST reports and then select hospital name and press button to confirm appointment like below screen



In above screen we can see report and appointment confirmed with Appollo hospital and now click on 'View Health Report' to view prescription like below screen

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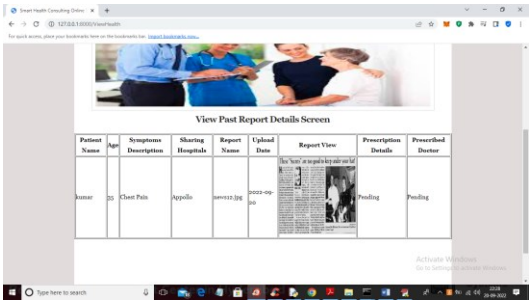
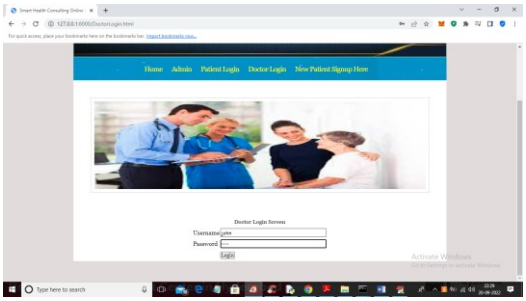
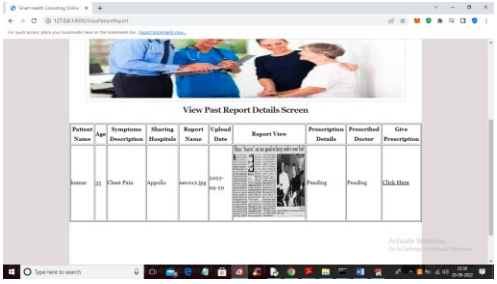


In above screen patient can view all details related to appointment and once doctor gave prescription then 'Pending' will update with doctor prescription and now logout and login as 'Doctor' to generate prescription



In above screen doctor is login and after login will get below screen

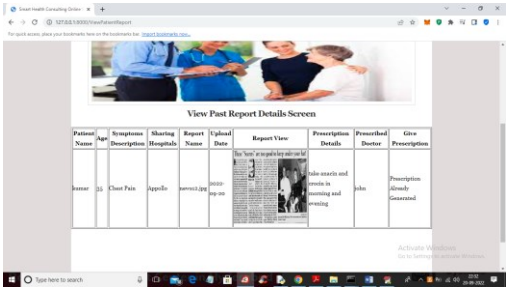
In above screen click on 'View Patients Reports' link to view appointments from patients and get below screen



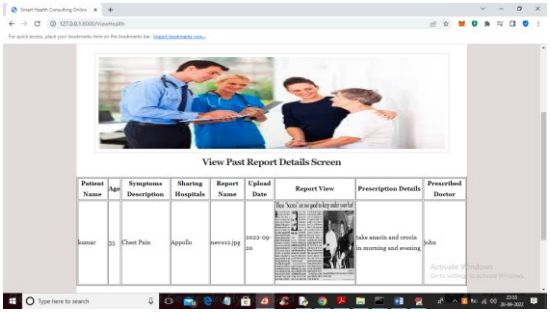
In above screen doctor will view all patient and report details and then click on 'Click Here' link to generate prescription and get below output

In above screen doctor is adding prescription details and then press button to get below output

In above screen we can see Prescription details added and now click on 'View Patients Reports' link to get below screen



In above screen doctor can see prescription already generated and this prescription can be view by patients after login like below screen



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In above screen patient can view prescription and the name of doctor who prescribed this medicines

Similarly you can add any number of patients and doctors and make appointments

VI. CONCLUSION

Block Chain has great importance for area of medicine, and it represents comprehensive process that demands thorough understanding of needs of the healthcare organizations. Knowledge gained with the use of techniques of Block Chain can be used to make successful decisions that will improve success of healthcare organization and health of the patients. It requires appropriate technology and analytical techniques, as well as systems for reporting and tracking which can enable measuring of results. The objective of this study is to observe the application of Block Chain, classification algorithm and feature selection methods to analyze and predict Chronic kidney disease, Heart disease and Liver disease. It can be very well analysis and predict by Block Chain and feature selection methods. From the experimental result, we observe that Block Chain, classification and feature selection methods have been used to identify, analysis and predict for chronic kidney, heart and liver diseases. Many researchers have been conducted different Block Chain, classification algorithm like ANN, Naïve Bays, SVM, Decision tree (J48, C4.5) and feature selection to improve the performance accuracy of the algorithm. Healthcare institutions that use Block Chain applications have the possibility to predict future requests, needs, desires, and conditions of the patients and to make adequate and optimal decisions about their treatments. With the future development of information communication technologies, Block Chain will achieve its full potential in the discovery of knowledge hidden in the medical data.

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