CHRONIC KIDNEY DISEASE METHODOLOGY BY USING MACHINE LEA RNING

[1]B.Sasi Varna, [2]G.Pravallika, [3]Dr.A.Althaf Ali

[1,2]Students, [3]Assistant Professor
Madanapalle Institute of Technology and Science

***Abstract*: Chronic kidney disease (CKD) is a global health issue that causes a high incidence of morbidity and death, as well as the onset of additional illnesses. Because there are no clear symptoms in the early stages of CKD, people frequently miss it. Early identification of CKD allows patients to obtain prompt therapy to slow the disease's development. Due of their rapid and precise identification capabilities, machine learning models can successfully assist doctors in achieving this aim. We present a machine learning framework for diagnosing CKD in this paper. The CKD data set was collected from the machine learning repository at the University of California, Irvine (UCI). As a result, it will determine whether or not a patient has CKD and, if so, whether or not further drugs should be taken. Six machine learning algorithms (Logistic Regression, AdaBoost, Random Forest, Decision Tree, and Gradient Boosting) were used to establish models.**

INTRODUCTION

CHRONIC kidney disease (CKD) is a global public health problem affecting approximately 10% of the world's population .The percentage of prevalence of CKD in China is 10.8% and the range of prevalence is 10%-15% in the United States. According to another study, this percentage has reached 14.7% in the Mexican adult general population. This disease is characterized by a slow deterioration in renal function, which eventually causes a complete loss of renal function. CKD does not show obvious symptoms in its early stages. Therefore, the disease may not be detected until the kidney loses about 25% of its function. In addition, CKD has high morbidity and mortality, with a global impact on the human body. It can induce the occurrence of cardiovascular disease. CKD is a progressive and irreversible pathologic syndrome. Hence, the prediction and diagnosis of CKD in its early stages is quite essential, it may be able to enable patients to receive timely treatment to ameliorate the progression of the disease. . For example, the models built by machine learning algorithms were used to diagnose heart disease diabetes and retinopathy, acute kidney injury cancer and other diseases. In these models, algorithms based on regression, tree, probability, decision surface and neural network were often effective. In the field of CKD diagnosis, Hodnel and et al. utilized image registration to detect renal morphologic changes .Vasquez-Morales et al. established a classifier based on neural network using large-scale CKD data, and the accuracy of the model on their test data was 95% .In addition, most of the previous studies utilized the CKD data set that was obtained from the UCI machine learning repository.

Existing System:
Using training data set required Model is trained and tested. Respective Algorithm is them used along with trained model for CKD detection. As an Input patient input parameter is given in system. Figures are analyzed using Machine learning technique and diagnosis is done.

Proposed System:
Proposed several machine learning models in this section, the component models that performed better when diagnosing the data samples were chosen for inclusion. Examination of the component models' mistakes determined the component models' roles as potential biomarkers.

SYSTEM DESIGN

Modules Description

A module is a bounded contiguous group of statements having a single name and that can betreated as a unit. In other words, a single block in file of blocks. Chronic Kidney disease Using Machine Learning and Deep Learning can contain the following modules.

User:
View Home page: Here user view the home page of Machine learning Methodology for chronic Kidney disease Web appellation.
View About page: In the about page, users can learn more about Machine learning Methodology for chronic Kidney disease.
Select Model: To create a model that predicts disease with better accuracy, this module will helps user.
Input Values: The user must provide input values for the certain fields in order to get results.
View Results: User view's the generated results from the model.

System:
Working on ckd severity dataset: System checks for data whether it is available or not and load the data in CSV file.
Pre-processing: Data need to be pre-processed according the models it helps to increase the accuracy of the model and better information about the data.

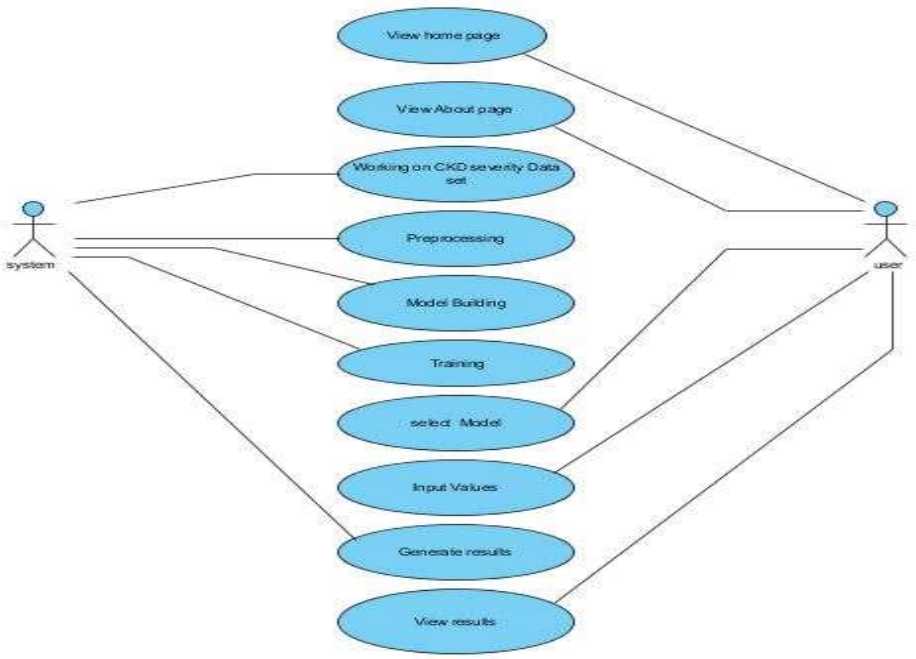
Training the data: After pre-processing, the data will split into two part as train and test data before training with the given algorithms.
Model Building: To create a model that predicts the water is pure are not pure with better accuracy, this module will helps user.
Generate Results: We train the machine learning algorithm and calculate which type of Treatments needed for the patient.

UML DIAGRAMS

UML stands for Unified Modelling Language. UML is a standardized general-purpose modelling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.
The goal is for UML to become a common language for creating models of object-oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.
The Unified Modelling Language is a standard language for specifying, Visualization, Constructing and documenting the artefacts of software system, as well as for business modelling and other non-software systems.
The UML represents a collection of best engineering practices that have proven successful in the modelling of large and complex systems.
The UML is a very important part of developing objects-oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

USE CASE DIAGRAM

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what systems functions are performed for which actor. Roles of the actors in the system can be depicted.



Use Case Diagram

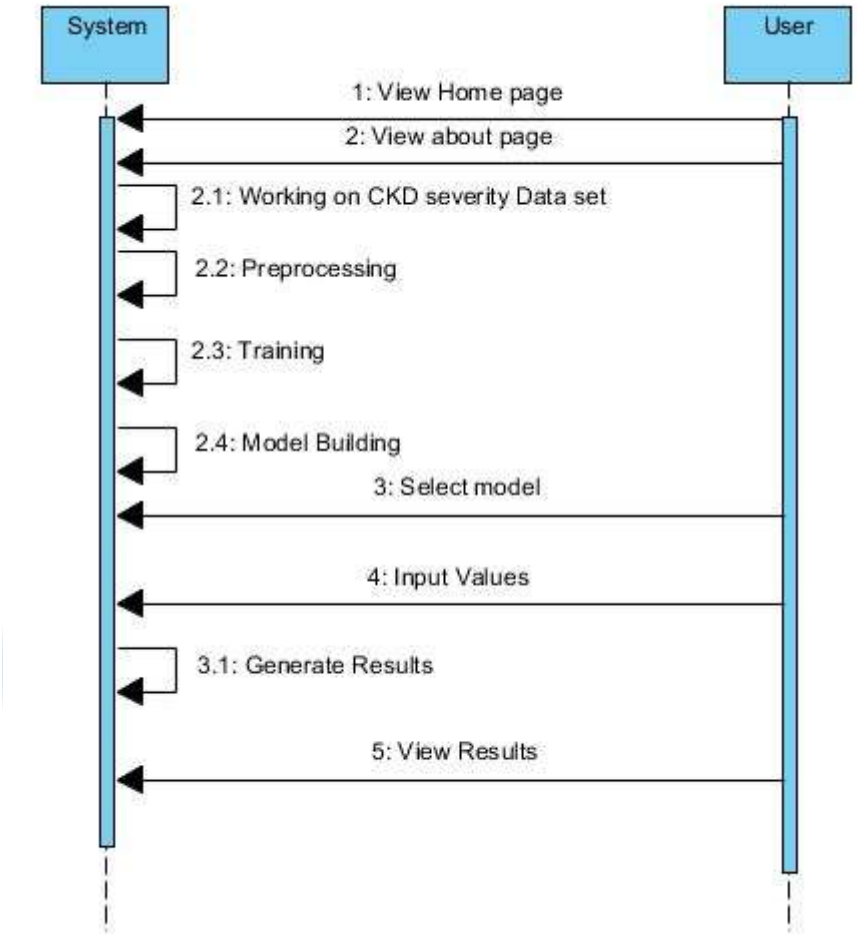
CLASS DIAGRAM

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information

Class Diagram

SEQUENCE DIAGRAM

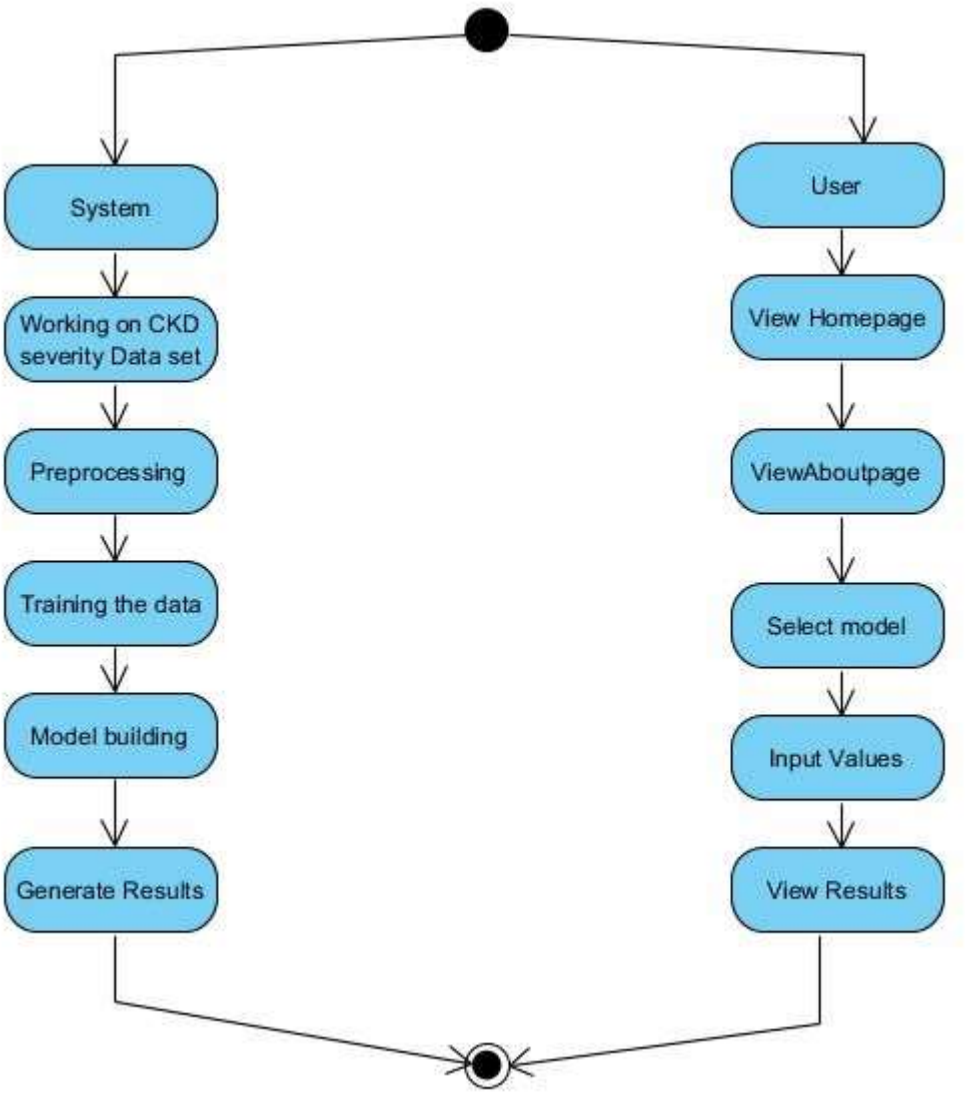
A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams



Sequence Diagram

ACTIVITY DIAGRAM:

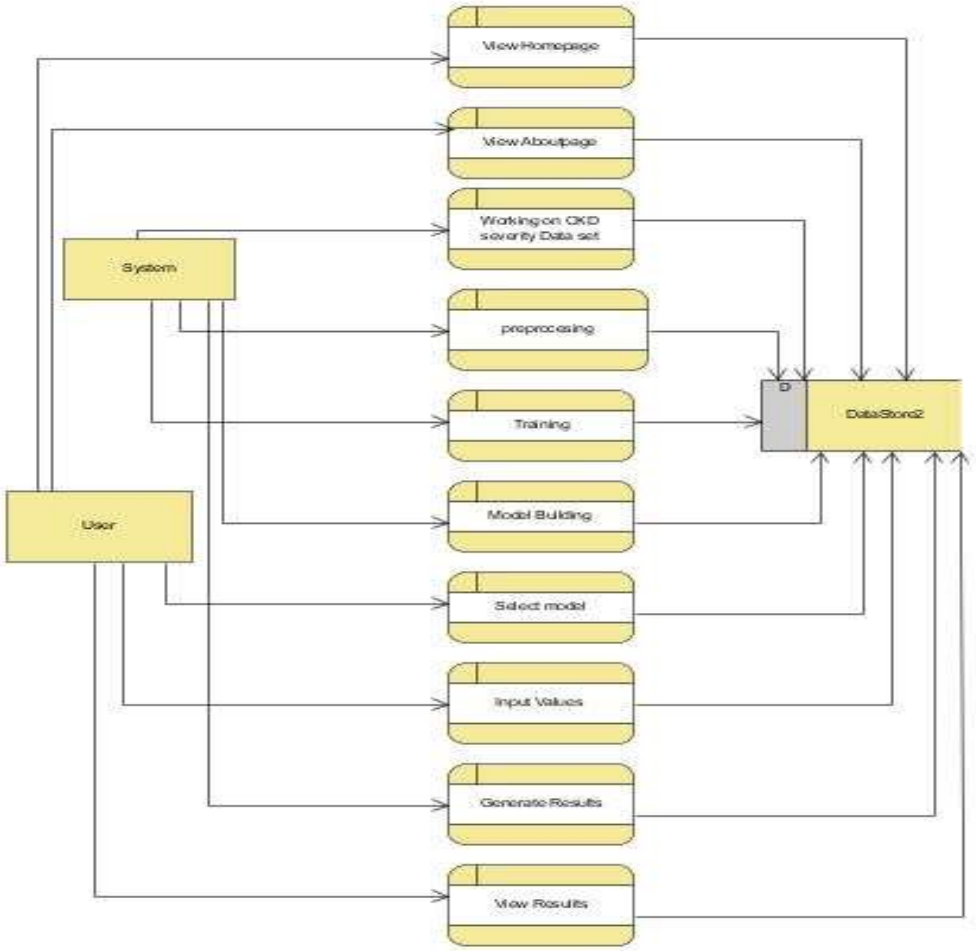
Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.

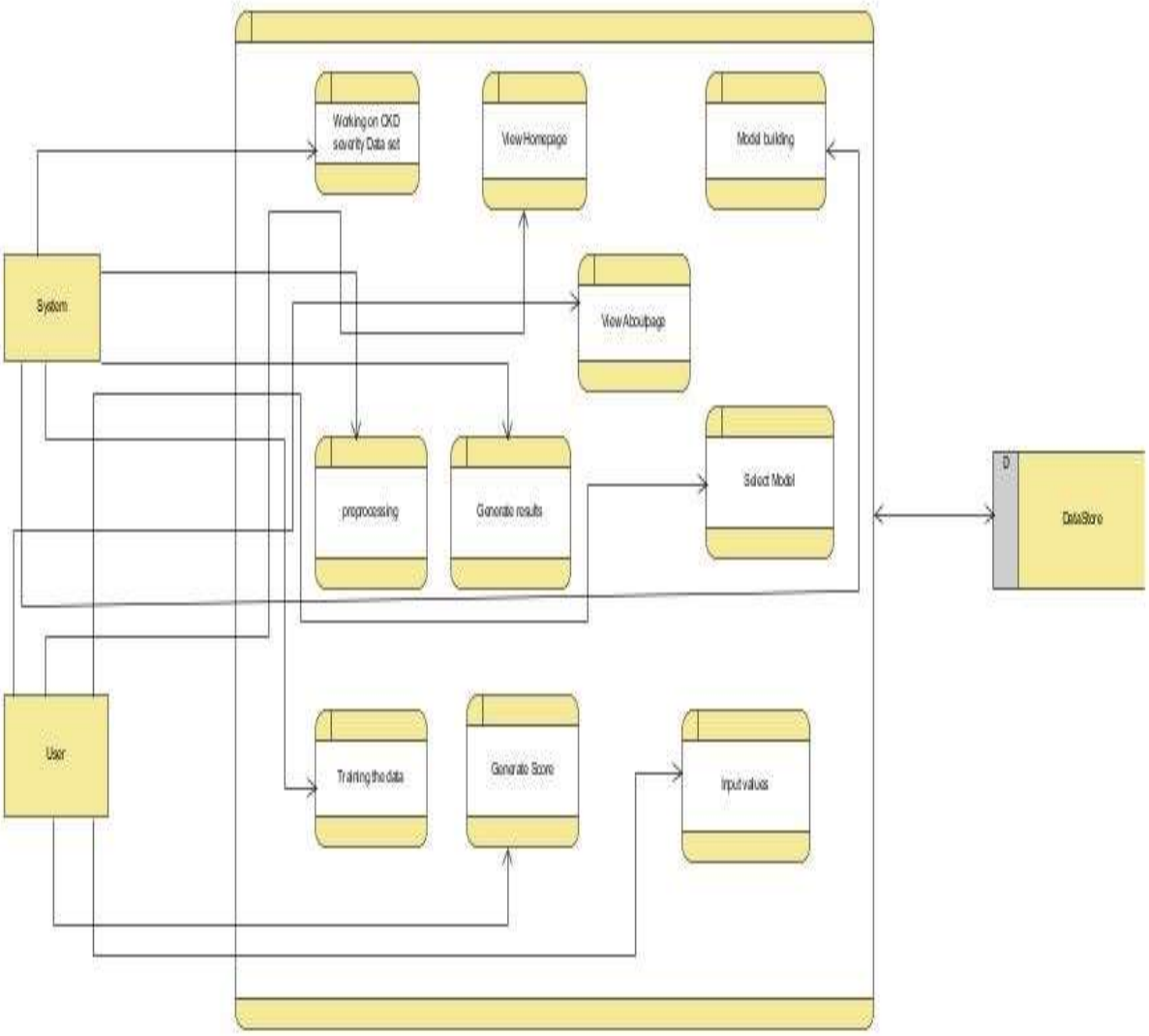


Activity Diagram

DFD DIAGRAM:

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system. A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both. It shows how information enters and leaves the system, what changes the information and where information is stored. The purpose of a DFD is to show the scope and boundaries of a system as a whole. It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.


View Homepage
View Aboutpage
Working on CKD severity Data set
System
preprocessing
Training
D
DataStore2
User
Model Building
Select model
Input Values
Generate Results
View Results

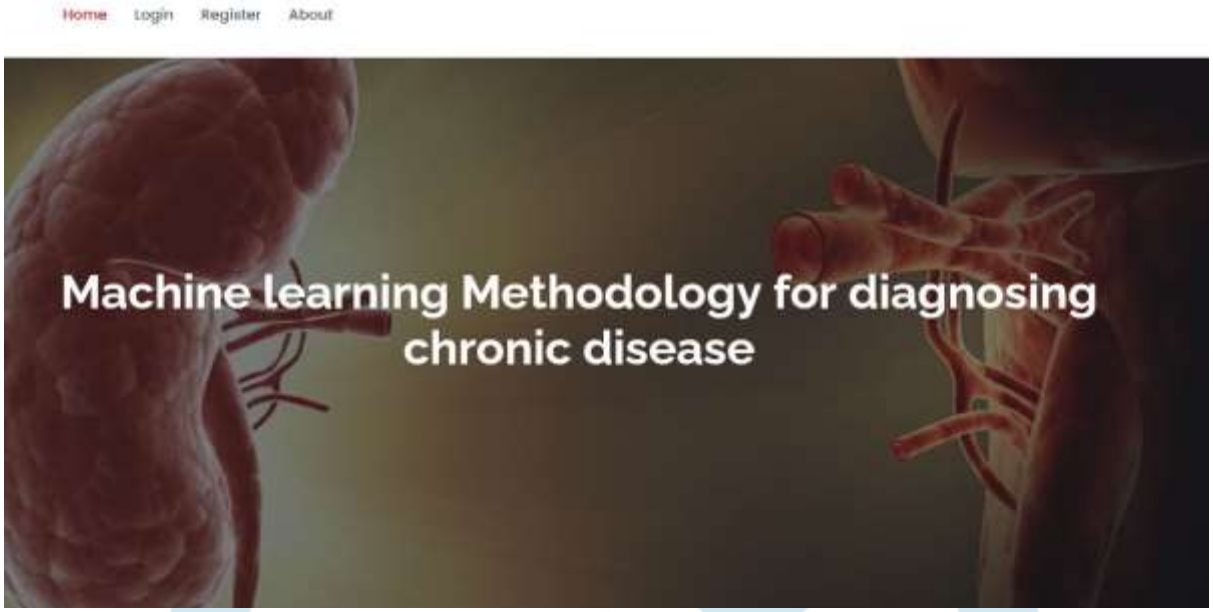


Data Flow Diagram

Screen Shots

All the screen shots of the project are given below which shows the execution for the betterunderstanding of the project.

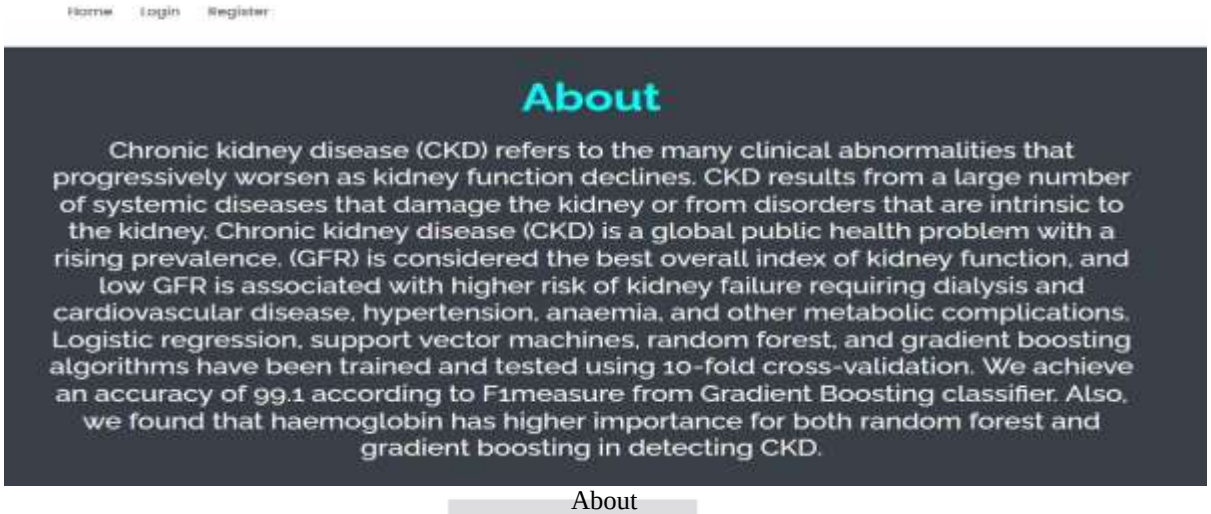
Home Page:



Home Page

About:

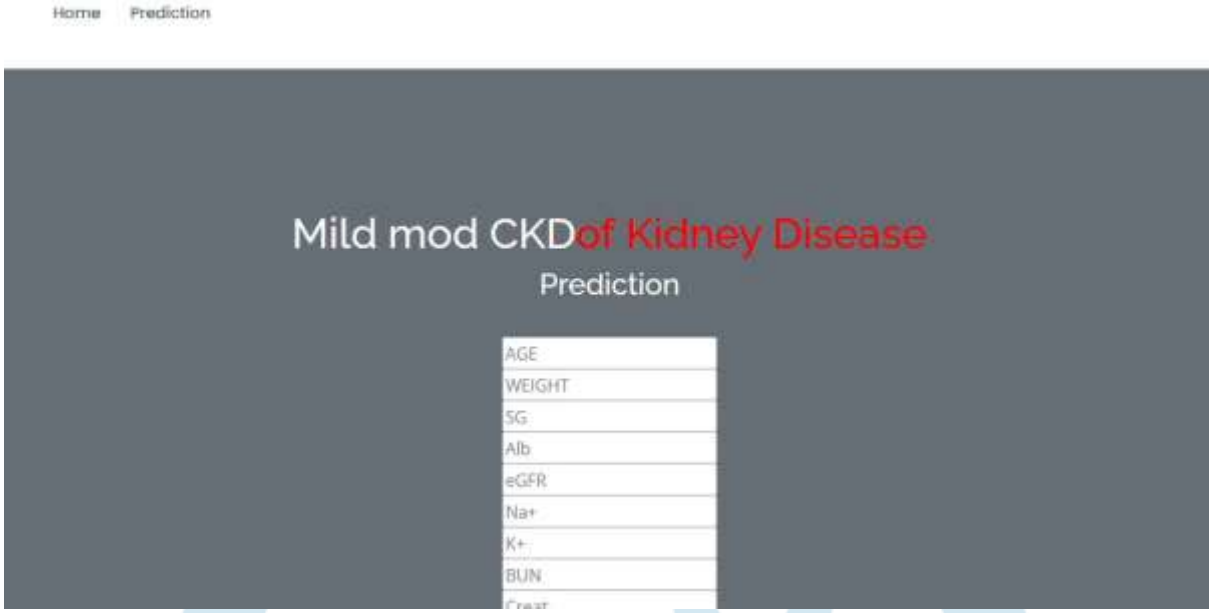
In the about page, users can learn more about A Machine Learning Methodology forChronic Kidney Diseaseand symptoms of the particular disease.



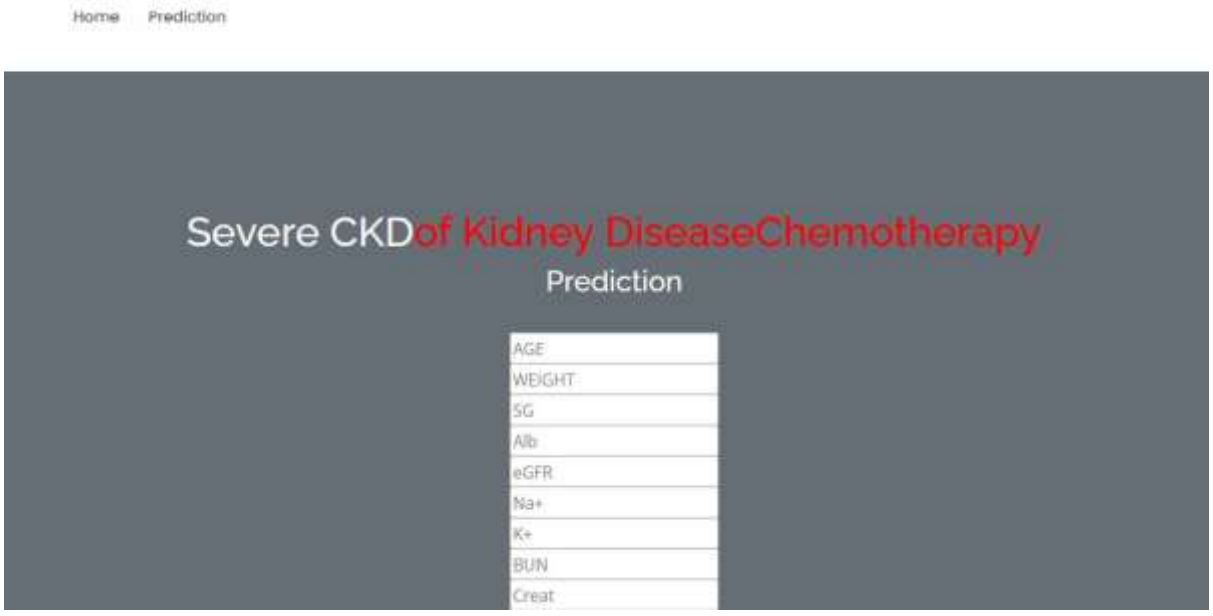
About

Prediction:

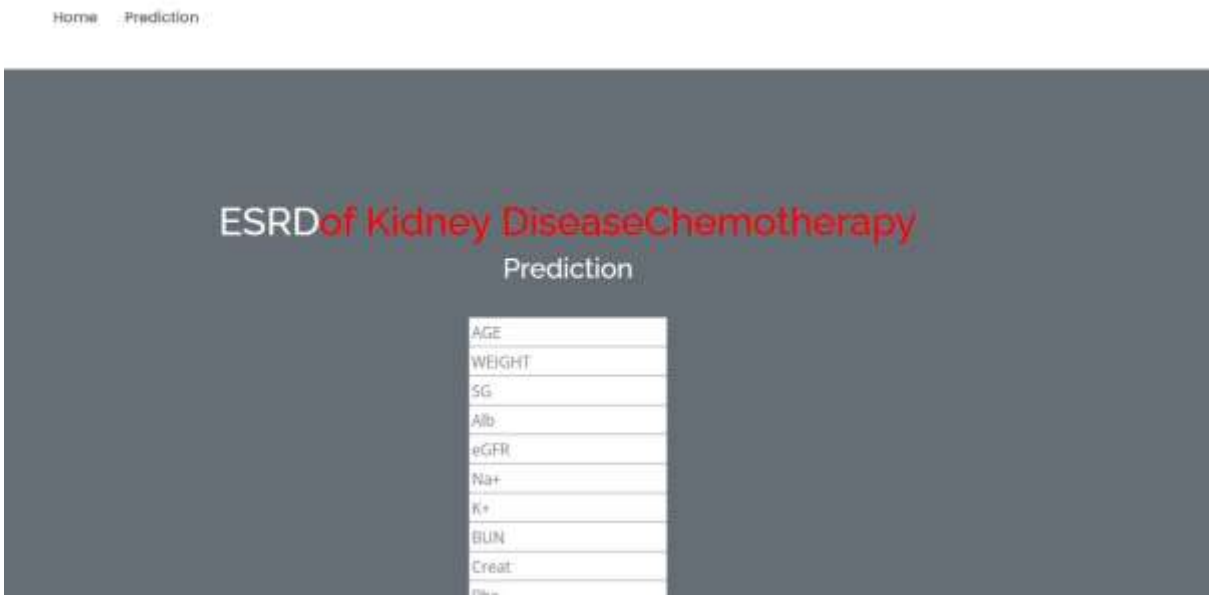
This page show the detection result of The Patient has Machine Learning Methodology for Chronic Kidney Disease.



The Patient need Treatment for Mild mod CKD of kidney disease chemotherapy.



The Patient need Treatment for Severe CKD of kidney disease chemotherapy.



The Patient need Treatment for ESRD of kidney disease chemotherapy.

SYSTEM TESTING

Testing Description

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub-assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirementsand user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

TYPES OF TESTS

Unit testing

Unit testing involves the design of test cases that validate that the internal program logicis functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests performbasic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately

Functional test

Functional tests provide systematic demonstrations that functions tested are available asspecified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted. Invalid Input : identified classes of invalid input must be rejected. Functions : identified functions must be exercised.
Output : identified classes of application outputs must be exercised. Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, keyfunctions, or special test cases. In addition, systematic coverage pertaining to identify Businessprocess flows; data fields, predefined processes, and successive processes must be consideredfor testing. Before functional testing is complete, additional tests are identified and the effectivevalue of current tests is determined.

System Test

System testing ensures that the entire integrated software system meets requirements. It tests aconfiguration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptionsand flows, emphasizing pre-driven process links and integration points.

Conclusion

An integrated biomarker model for diagnosing CKD has been proposed. The model unsupervised imputation of missing values with a selection of the most promising data imputation methods and could be used to diagnose CKD Gradient Boosting imputation. As a result, we given the vast number of variables affecting CKD around the world, it would be difficult to apply this technique to a worldwide population. However, the technology is promising and its potential widespread use in other clinical fields is great in the data (ckd and notckd), set, and the model cannot diagnose the severity of CKD.

Future Scope

In the future, Once our analysis of the data is complete, we will train a statistical model in hopes of improving the generalization performance of the model. We will collect a more representative, and more complex, set of data to improve the model.

REFERENCES

Book References

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[3] C. Barbieri et al., "A new machine learning approach for predicting the response to anemia treatment in a large cohort of end stage renal disease patients undergoing dialysis," Comput. Biol. Med., vol. 61, pp. 56-61, Jun. 2015.

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