ABSTRACT

Chronic kidney disease(CKD) or chronic excretory organ disease has become a significant issue with a gradual rate. An individual will solely survive while affected by ckd for a mean time of eighteen days, that makes an enormous demand for a excretory organ transplant and chemical analysis. It is necessary to own effective strategies for early prediction of CKD. Machine learning strategies area unit effective in CKD prediction. This work proposes a workflow to predict CKD standing supported clinical knowledge incorporating knowledge in missing worth handling methodology with cooperative filtering and attribute choice. Out of the eleven machine learning strategies, thought about the additional tree classifier and random forest classifier area unit shown to lead to the best accuracy and nominal bias to the attributes. The analysis conjointly assortment and highlights the importance of incorporative domain knowledge once victimization machine learning for CKD standing prediction .

TABLE OF FIGURES

Early Detection Of Chronic Kidney Disease

1.INTRODUCTION

Chronic kidney disease (CKD) is a widespread disease worldwide. CKD is the 11th leading cause of death worldwide, with 1.2 million deaths each year, and according to the Kidney Foundation in Bangladesh, about 40,000 people with CKD experience kidney failure each year, and several thousand die in the short stage of life due to CKD. Predictive analytics for healthcare using machine learning is a challenging task to help doctors make accurate treatment decisions to save lives. Together, the researchers researched chronic kidney disease, with most of their work being on purely statistical models, which created numerous gaps in the development of machine learning models.In this paper, we discussed the current methods and proposed an improved technology based on XGBoost (Extreme Gradient Boost), which combined the significant characteristics of the F-score and evaluated four pre-processing scenarios. In addition, we provided machine training methods for predicting chronic kidney disease with clinical information. Four master learning techniques including Support Vector Regressor (SVR), Logistic Regressor (LR), AdaBoost, Gradient Boosting Tree, and Decision Tree Regressor are explored. Components are

constructed from the UCI CKD dataset and the results of these models are compared to determine the best regression model for prediction.

1.1. PROJECT OVERVIEW

Chronic Kidney Disease refers to the kidneys' inability to fulfill their normal blood filtration role and other functions (CKD). The term "chronic" refers to progressive deterioration of kidney cells over time. A kind of artificial intelligence is machine learning (ML) (AI). Its heart is algorithmic procedures, which allow the machine to solve issues without the need for specialist computer programming. The widespread use of ML in the medical industry promotes medical innovation, lowers medical expenses, and improves medical quality. However, further research on using ML to solve clinical problems in nephrology is needed. 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.

1.2.PURPOSE

Machine learning refers to a computer program, which calculates and deduces the information related to the task and obtains the characteristics of the corresponding pattern . This technology can achieve accurate and economical diagnoses of diseases hence, it might be a promising method for diagnosing CKD. It has become a new kind of medical tool with the development of information technology and has a broad application prospect because of the rapid development of electronic health record . In the medical field, machine learning has already been used to detect human body status , analyze the relevant factors of the disease and diagnose various diseases. 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 .

2.LITERATURE SURVEY

2.1 EXISTING PROBLEM

The current system of diagnosis is based on urine examination using the serum creatinine level. Many medical methods are used for this purpose, such as screening, ultrasound method. During the screening,

patients with hypertension, cardiovascular disease in the anamnesis, diseases in the past and patients who have relatives with kidney disease are examined. This technique involves calculating an estimated GFR from the serum creatinine level and measuring the urinary albumin-to-creatinine ratio (ACR) in the first morning urine sample. This paper focuses on machine learning techniques such as ACO and SVM by minimizing features and selecting the best features to improve prediction accuracy.

2.2 REFERENCES

Baisakhi Chakraborty [1] proposed developing a CKD prediction system using machine learning techniques such as K nearest neighbors, logistics regression, decision tree, random forests, naïve Bayes, supports vector machines, and multilayer perception algorithms. These are applied and their performance compared to the precision, and recall results. Finally, a random forests is chosen to implement this system.

S.Dilli Arasu and Dr.R.Thirumalaiselvi [2] addressed missing values in the chronic kidney disease dataset. Missing values in the dataset reduce model accuracy and predictive results. They find a solution to this problem by preforming a recalculation process at the CKD level and getting unknown value in process. They replaced the missing values with newly calculated values.

S.Ramya and Dr.N.Radha [3] worked to improve diagnostic time and diagnostic accuracy using various machine learning classification algorithms. Th proposed work addresses the classification of different stages of CKD according to their severity. Analyze different algorithms such as Basic Propagation Neural Network, RBF, and RF. The analysis results show that the RBF algorithm outperforms other classifiers, achieving 85.3% accuracy.

A.Salekin and J.Stankovic [4] evaluated three classifiers to detect CKD: Random Forest, K-Nearest Neighbors, and Neural Networks. They used a dataset of 400 patients from the UCI with 24 attributes. Trait reduction analysis was performed to find attributes that recognize this disease with high accuracy using the wrapper method. By factoring in albumin, specific gravity, diabetes mellitus, hemoglobin, and hypertension, CPR can be predicted with 0.98 F1 and 0.11 RMSE.

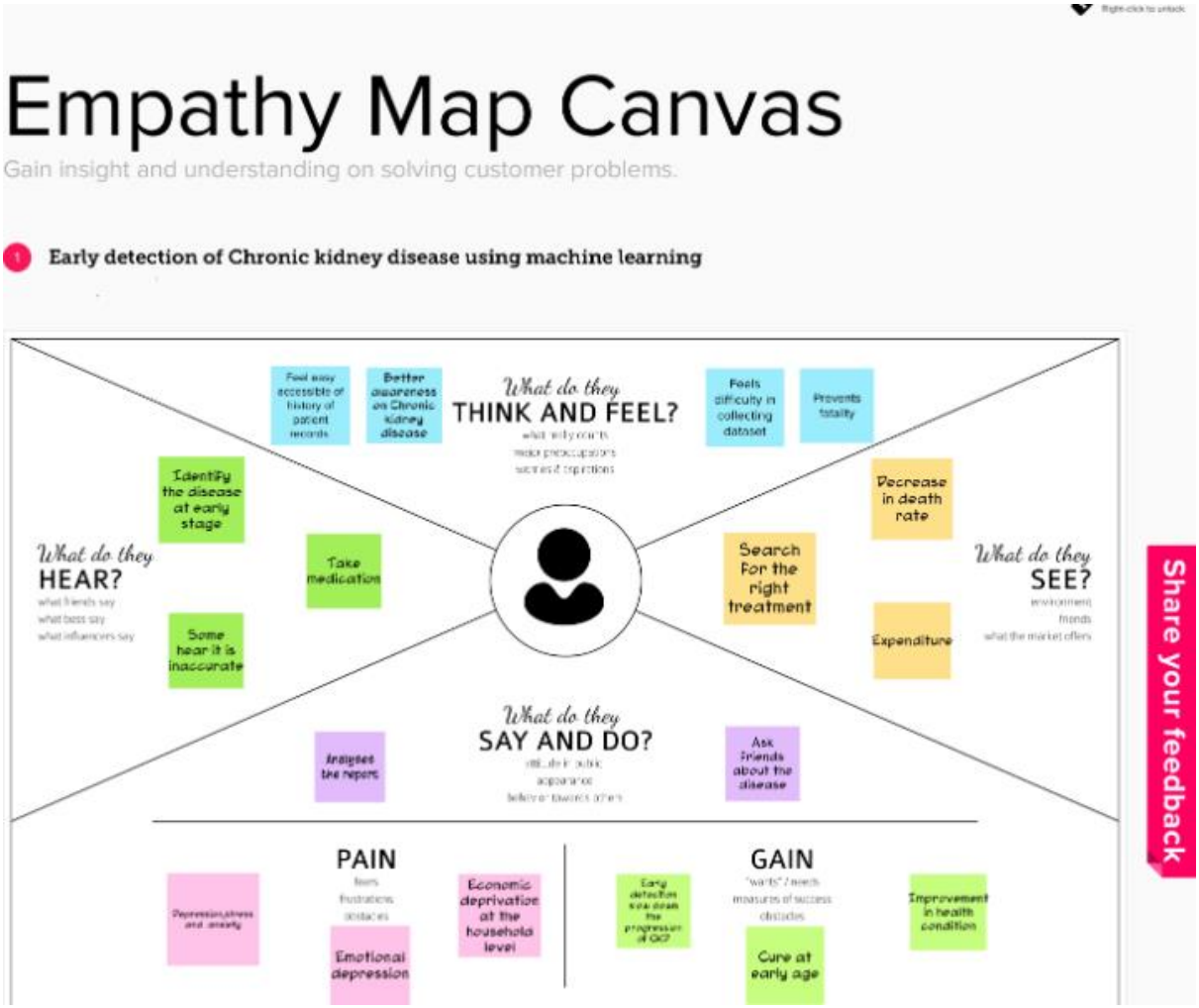
P.Yildirim [5] studied the effect of sampling algorithms in predicting chronic kidney disease.Experiments were performed by comparing the effects of his three samplings algorithms, Resample, SMOTE and Spread Sup Sample, on predictions by the multi=layer perceptron classification algorithm. This study showed thatampling algorithms can improve the performance of classification algorithms, and that resampling methods have higher accuracy among sampling algorithms. Spread Sub Sample, on the other hand, performed better in terms of execution time.

2.3 PROBLEM STATEMENT DEFINITION

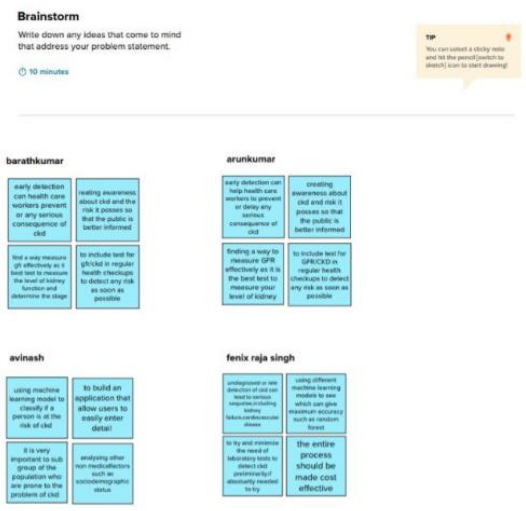
Chronic kidney disease (CKD) is a widespread disease worldwide. CKD is the 11th leading cause of death worldwide, with 1.2 million deaths each year, and according to the Kidney Foundation in Bangladesh, about 40,000 people with CKD experience kidney failure each year, and several thousand die in the short stage of life due to CKD. Predictive analytics for healthcare using machine learning is a challenging task to help doctors make accurate treatment decisions to save lives.

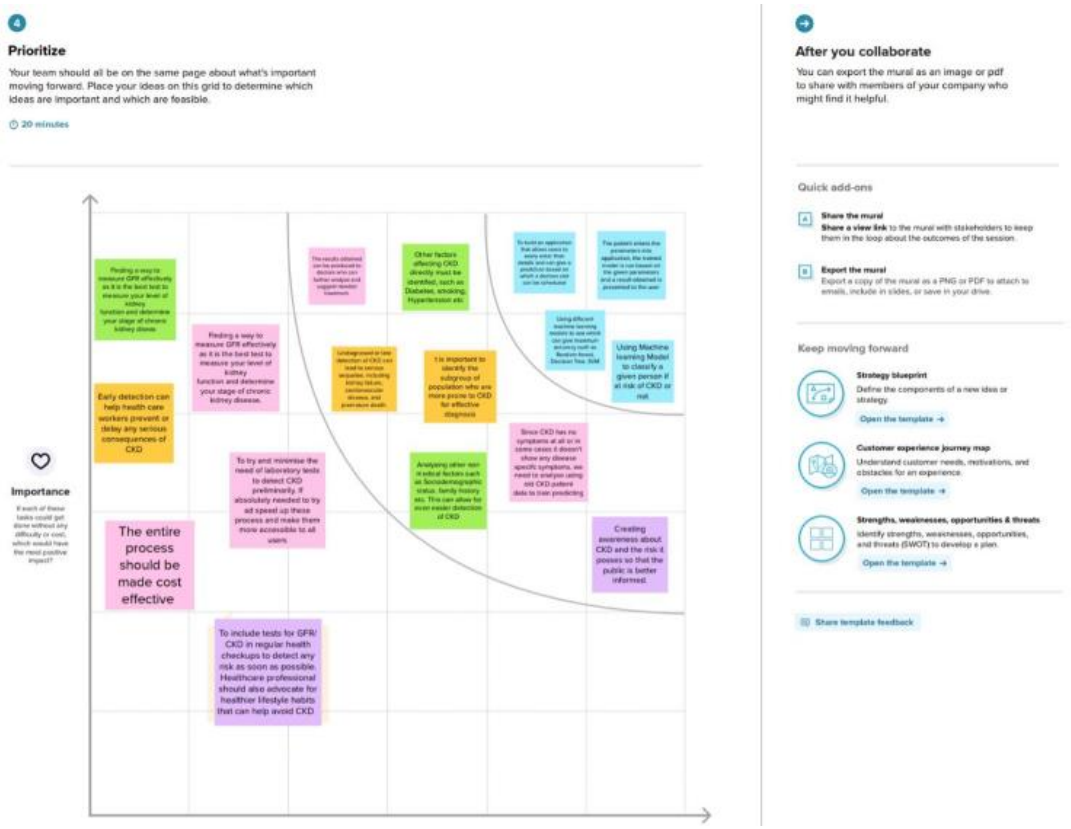
3.IDEATION &PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2.IDEATION AND BRAINSTORMING





3.3 PROPOSED SOLUTION

A proposed framework for developing a prediction engine learning models and their comparison .The main goal of current research is to design a machine learning techniques to predict CKD using associative and classification algorithms. The proposed technique generates classification association rules (CARs) to determine techniques with a high percentage of correctly classified cases and identified classifiers may facilitate early diagnosis of CKD and a comparative analysis of the proposed technique is performed. using other state-of-the-art techniques.

It briefly describes different stages:

(i). Data set selection phase:

The data set is selected predict CKD for data analysis and effective knowledge. Enough data is needed to implement the machine learning technique for the selected data set. In this set experiments, CKD data are obtained from UCI machine learning repository.

(ii). Pre-processing and transformation phase:

Data set is prepared in file format with attribute 16attributes. The data set is converted to binomial format implement associative techniques. Moreover, it is missing records, duplicate records and unnecessary fieldsremoved for standard data format.

(iii). Feature Selection Phase:

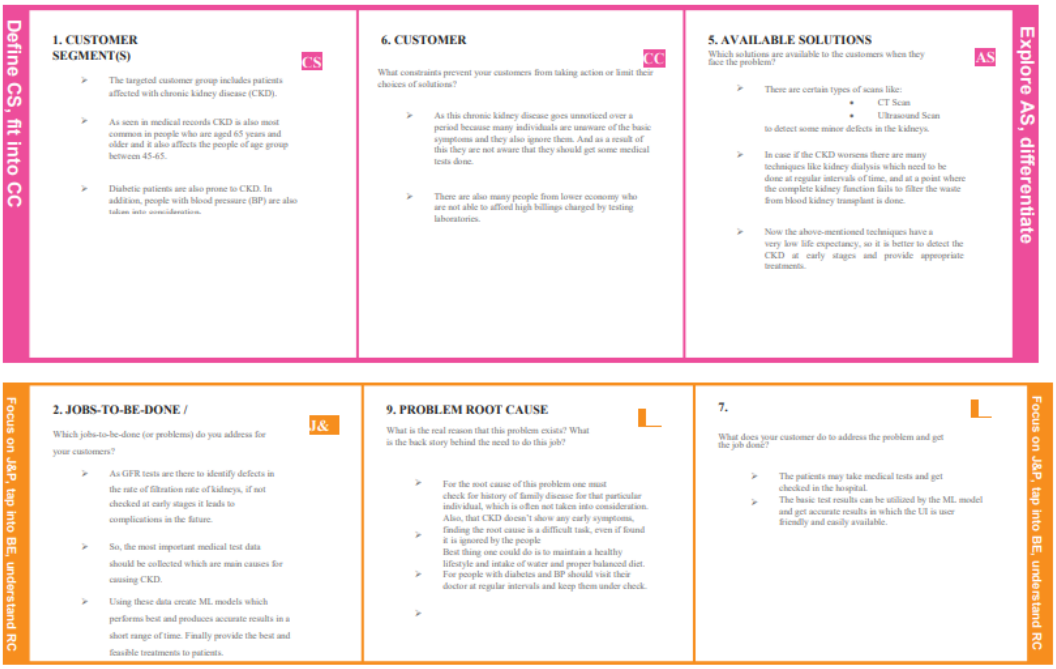
The most promising featureof the CKD dataset are selected using the WEKA pro toolbetter results. Feature evaluators and search methods areused for this purpose. A function based on correlationthe selection subset evaluator is used as function evaluator,and a greedy stepwise search method is used.

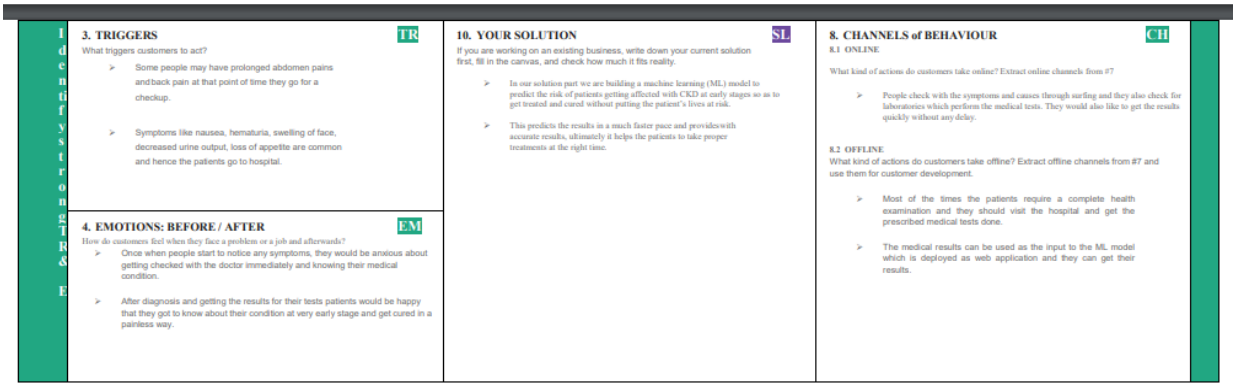
3.4. PROBLEM SOLUTION FIT

Project Title: Early Detection of Chronic Kidney Disease using Machine Learning

Project Design Phase-I - Solution Fit Template

Team ID: PNT2022TMID01260





4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration.	Registration through Form
FR-2	User Confirmation.	Confirmation via Email Confirmation via OTP
FR-3	Dataset Collection.	Collect the data set related to Chronic Kidney Disease and process the data.
FR-4	Training the Model.	By using the processed data the model will be trained again and again by using back propagation techniques.
FR-5	Testing the Model.	By using 20% of dataset the model will be tested.
FR-6	Detection.	By using the data collected from the tested model the result is Detected.

4.2. NON-FUNCTIONAL REQUIREMENTS

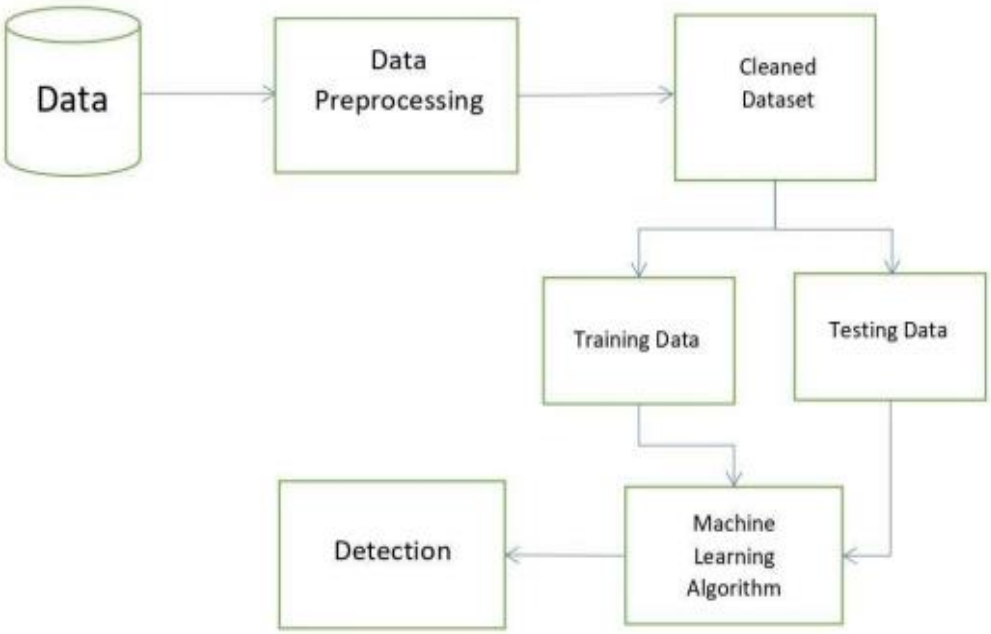
Following are the non functional requrements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Creating a machine learning model that uses the attributes of medical tests taken for different purposes to detect chronic kidney disease at early stage.
NFR-2	**Security**	The reports are maintained confidentially to the patients.
NFR-3	**Reliability**	The model will identify and detect the kidney disease earlier, so more number of clients will approach us and it results how the model is more reliable to the customers.
NFR-4	**Performance**	We can detect the chronic kidney disease with more than 95% of accuracy. we have more hidden layers and hence its accuracy also high.

5.PROJECT DESIGN

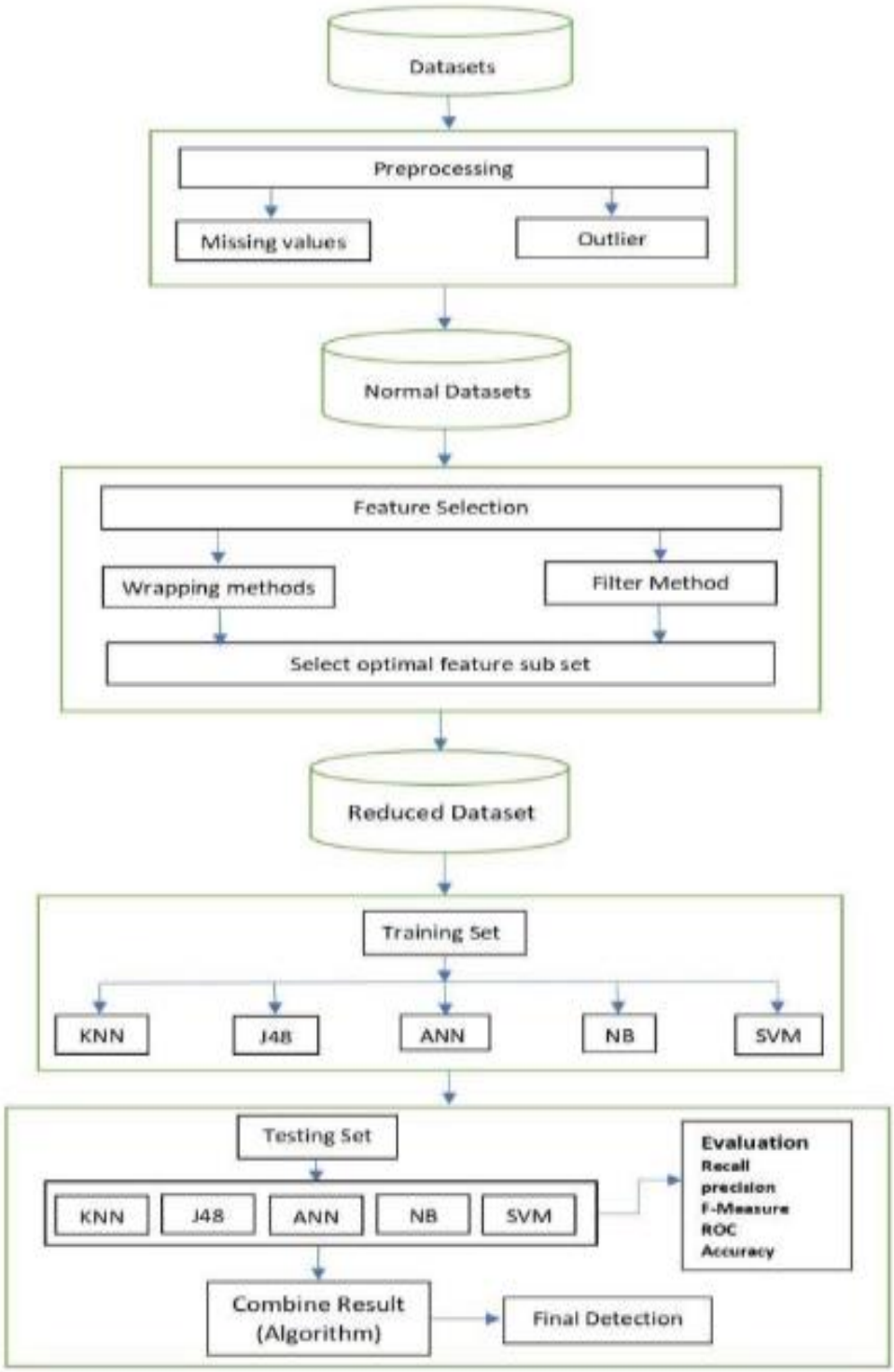
5.1. DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



5.2.SOLUTION AND TECHNICAL ARCHITECTURE

The deliverable shall include the architectural diagram which is as follows



5.3. USER STORIES

Use the below template to list all the user stories for the project

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the diagnosis tool using my email and password.	I can access my account / dashboard.	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the diagnosis tool	I can receive confirmation email & click confirm.	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login.	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail login.	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering credentials	I can login and access past records.	High	Sprint-1
	Dashboard	USN-6	As a user, I can see my past records and activities	I can access the functionalities diagnosis tool	High	Sprint-3
	Entry form	USN-7	As a user, I must enter my pre-diagnostic test result.	I can use the form to input test results.	High	Sprint-2
	Report	USN-8	As a user, I can view the report generated by the tool	I can view negative or positive results produced after diagnosis.	High	Sprint-3
Customer Care Executive	Queries	USN-9	As a patient care executive,I must assist users that face problems	I will provide 24/7 support for the tool	Low	Sprint-4
	Feedback	USN-10	As a patient care executive, I should get input for the tools enhancement from the users.	I must work on improving tool's performance	Low	Sprint-4
Administrator	Feature importance	USN-11	As an administrator, I should identify the most significant factor that lead to chronic kidney disease.	I must identify the important features	High	Sprint-2
	Train model	USN-12	Ass an administrator, I must use the most suitable ML model for detection of chronic kidney disease.	I should efficiency train the ML model	High	Sprint-2

6. PROJECT PLANNING AND SCHEDULING

6.1. SPRINT PLANNING AND ESTIMATION

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the selected project & gathering information by referring to technical papers, research publications etc.	29 Aug-3 Sept
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements	5 Sept- 10 Sept
Ideation	List them by organizing the brainstorming session and prioritize the top 3 ideas based on feasibility & importance.	12 Sept -17 Sept
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	19 Sept -24 Sept

Problem Solution Fit	Prepare problem - solution fit document.	26 Sept – 1 Oct
Solution Architecture	Prepare a solution architecture document.	26 Sept – 1 Oct

Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	3 Oct – 8 Oct
Functional Requirement	Prepare the functional requirement document.	10 Oct-15 Oct
Data Flow Diagrams	Draw the data flow diagrams and submit for review.	10 Oct-15 Oct
Technology Architecture	Prepare the technology architecture diagram.	10 Oct-15 Oct
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	17 Oct- 22 Oct
Project Development - Delivery of Sprint-1, 2, 3 & 4	Develop & submit the developed code by testing it.	**Sprint 1** 24 Oct – 29 Oct **Sprint 2** 31 Oct – 5 Nov **Sprint 3** 7 Nov -12 Nov **Sprint 4** 14 Nov – 19 Nov

6.2. SPRINT DELIVERY SCHEDULE

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Registration	USN-1	As a user, I can register for the application by entering my name, email, password	10	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-2		USN-2	As a user, I can register for the application through Gmail	5	Medium	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-1	User Confirmation	USN-3	As a user, I will receive confirmation email once I have registered for the application	10	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-2		USN-4	As a user, I have remembered my email and password for login to the web application	5	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-2	Data Collection	USN-5	As a user, I will enter the input data for disease prediction in the form	10	High	Barathkumar Avinash Fenix raja singh Arunkumar

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Provide output to the user	USN-6	As a user, I will get the result of disease prediction in the dashboard.	10	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-3	Data Analysis	USN-7	As the admin, I will develop modules to preprocess and store the data.	10	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-4	Prediction of disease	USN-8	As the admin, I will build a Machine Learning model to predict the disease	10	High	Barathkumar Avinash Fenix raja singh Arunkumar
Sprint-4	Final Delivery	USN-9	Deploy the application in IBM cloud and make it available for use.	10	High	Barathkumar Avinash Fenix raja singh Arunkumar

7.CODING AND SOLUTIONING

HOME.HTML

```
 <!DOCTYPE html>
<html>
<head>
<title>W3.CSS Template</title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">
<link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Raleway">
<style>
body,h1,h2{font-family: "Raleway", sans-serif; color: white;}
body, html {height: 100%}
p {line-height: 2}
.bgimg, .bgimg2 {
  min-height: 100%;
  background-position: center;
  background-size: cover;
}
.bgimg {background-image: url("https://th.bing.com/th/id/OIP.-9gV69EbS5SnrmN4spgrAAHaEK?pid=ImgDet&rs=1")}
.bgimg2 {background-image: url("/w3images/flowers.jpg")}
</style>
</head>
<body>

<!-- Header / Home-->
<header class="w3-display-container w3-wide bgimg w3-grayscale-min" id="home">
  <div class="w3-display-middle w3-text-white w3-center">
    <h1 class="w3-jumbo">Chronic Kidney Disease</h1>
    <h2>Online tool to predict risk of CKD</h2>
  </div>
</header>
```

```
<!-- Navbar (sticky bottom) -->
<div class="w3-bottom w3-hide-small">
  <div class="w3-bar w3-white w3-center w3-padding w3-opacity-min w3-hover-opacity-off">
    <a href="home.html" style="width:50%" class="w3-bar-item w3-button">Home</a>
    <a href="index.html" style="width:50%" class="w3-bar-item w3-button w3-hover-black">CKD Predictor</a>
  </div>
</div>

<!-- About / Jane And John -->
<div class="w3-container w3-padding-64 w3-pale-red w3-grayscale-min" id="us">
  <div class="w3-content">
    <h1 class="w3-center w3-text-grey"><b>About Chronic Kidney Disease</b></h1>
    <p><i>Chronic kidney disease, also called chronic kidney failure, involves a gradual loss of kidney function. Your kidneys filter wastes and excess fluids from your blood, which are then removed in your urine. Advanced chronic kidney disease can cause dangerous levels of fluid, electrolytes and wastes to build up in your body.

    In the early stages of chronic kidney disease, you might have few signs or symptoms. You might not realize that you have kidney disease until the condition is advanced.

    Treatment for chronic kidney disease focuses on slowing the progression of kidney damage, usually by controlling the cause. But, even controlling the cause might not keep kidney damage from progressing. Chronic kidney disease can progress to end-stage kidney failure, which is fatal without artificial filtering (dialysis) or a kidney transplant.</i>
    </p><br>
  </div>
</div>

<div class="w3-hide-small" style="margin-bottom:32px"> </div>
```

```
</body>
</html>
```

INDEX.HTML

```
<!DOCTYPE html>
<html>
<head>
<title>index</title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">
<link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Raleway">
<style>
body,h1,h2{font-family: "Raleway", sans-serif; color: white;}
body, html {height: 100%}
p {line-height: 2}
.bgimg, .bgimg2 {
  min-height: 100%;
  background-position: center;
  background-size: cover;
}
.bgimg {background-image: url("https://advancedurology.com/wp-content/uploads/2021/10/Advanced-Urology-August-2021-SEO-Content_Advanced-Urology-August-2021-Can-You-Live-with-One-Kidney.jpg")}
</style>
</head>
<body style="overflow: hidden;">

<!-- Navbar (sticky bottom) -->
<div class="w3-top w3-hide-small">
   <div class="w3-bar w3-white w3-center w3-padding w3-opacity-min w3-hover-opacity-off">
     <a href="{{ url_for('my_home') }}" style="width:10%" class="w3-bar-item w3-button">Home</a>
```

```
    <!-- <a href="" style="width:50%" class="w3-bar-item w3-button w3-hover-black">CKD Predictor</a> -->
   </div>
  </div>
<!-- Header / Home-->
<!-- <header class="w3-display-container w3-wide bgimg w3-grayscale-min" id="home">
  <div class="w3-display-middle w3-text-white w3-center">
   <h1 class="w3-jumbo">Chronic Kidney Disease</h1>
   <h2>Online tool to predict risk of CKD</h2>
  </div>
</header> -->


<!-- About / Jane And John -->
<div class="bgimg">
   <div class="w3-container  w3-padding-64 w3-pale-red w3-grayscale-min " style="margin-left: 20%; margin-right: 20%; opacity: 90%;" id="us">

   <form action="{{ url_for('predict') }}" method="post"><div class="w3-content">
   <h1 class="w3-center w3-text-grey"><b>Chronic Kidney Disease Prediction</b></h1>
       <label for="urea">Enter your Blood urea:</label>
       <input type="number" id="urea" placeholder="mg/dL" name="urea" required><br><br>
       <label for="glucose">Enter your Blood Glucose random:</label>
       <input type="number" id="glucose" placeholder="mg/dL" name="glucose" required><br><br>
       <label for="anemia">Select Anemia or not :</label>
       <select name="anemia" id="anemia">
       <option value=0>Yes</option>
       <option value=1>No</option><br><br>
       </select><br><br>
       <label for="cad">Select Coronary Artery Disease or not :</label>
       <select name="cad" id="cad" >
```

```
        <option value=0>Yes</option>
        <option value=1>No</option><br><br>
        </select><br><br>
        <label for="pus">Select Pus Cell or not :</label>
        <select name="pus" id="pus">
        <option value=0>Yes</option>
        <option value=1>No</option><br><br>
        </select><br><br>
        <label for="rbc">Select Red Blood Cell Level:</label>
        <input type="number" id="rbc" placeholder="/L" required
name="rbc"><br><br>
        <label for="db">Select Diabetes Mellitus or not :</label>
        <select name="db" id="db">
        <option value=0>Yes</option>
        <option value=1>No</option><br><br>
        </select><br><br>
        <label for="pedal">Select Pedal Enema or not :</label>
        <select name="pedal" id="pedal">
        <option value=0>Yes</option>
        <option value=1>No</option><br><br>
        </select><br><br>
        <button type="submit">Submit</button>
  </div></form>
</div>
</div>
</body>
</html>
```

PREDICTIONNO.HTML

```
<!DOCTYPE html>
<html>
<head>
<title>result</title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link                                                    rel="stylesheet"
href="https://www.w3schools.com/w3css/4/w3.css">
```

```
<link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Raleway">
<style>
body,h1,h3{font-family: "Raleway", sans-serif; color: white;}
body, html {height: 100%}
p {line-height: 2}
.bgimg, .bgimg2 {
  min-height: 100%;
  background-position: center;
  background-size: cover;
}
.bgimg {background-image: url("https://img.etimg.com/thumb/msid-74591313,width-640,height-480,imgsize-624446,resizemode-4/facts-about-kidney-health.jpg")}
</style>
</head>
<body>

<!-- Header / Home-->
<header class="w3-display-container w3-wide bgimg w3-grayscale-min" id="home">
  <div class="w3-display-middle w3-text-white w3-center">
    <h1 class="w3-jumbo">Great! You look healthy</h1>
    <h3>Seems like you are not at risk of Chronic Kidney Disease.</h3>
  </div>
</header>

<!-- Navbar (sticky bottom) -->
<div class="w3-bottom w3-hide-small">
  <div class="w3-bar w3-white w3-center w3-padding w3-opacity-min w3-hover-opacity-off">
    <a href="home.html" style="width:50%" class="w3-bar-item w3-button">Home</a>
    <a href="index.html" style="width:50%" class="w3-bar-item w3-button w3-hover-black">CKD Predictor</a>
  </div>
</div>
```

```
<div class="w3-hide-small" style="margin-bottom:32px"> </div>

</body>
</html>
```

PREDICTIONYES.HTML

```
<!DOCTYPE html>
<html>
<head>
<title>W3.CSS Template</title>
<meta charset="UTF-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://www.w3schools.com/w3css/4/w3.css">
<link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Raleway">
<style>
body,h1,h3{font-family: "Raleway", sans-serif; color: white;}
body, html {height: 100%}
p {line-height: 2}
.bgimg, .bgimg2 {
  min-height: 100%;
  background-position: center;
  background-size: cover;
}
.bgimg {background-image: url("https://www.news-medical.net/image.axd?picture=2021%2F5%2Fshutterstock_1439981486.jpg")}
</style>
</head>
<body>

<!-- Header / Home-->
<header class="w3-display-container w3-wide bgimg w3-grayscale-min" id="home">
  <div class="w3-display-middle w3-text-white w3-center">
```

```
    <b><h1 class="w3-jumbo">Unfortunately seems like you might have CKD</h1></b>
    <h3>CKD is curable. Please do not worry and try to contact a doctor as soon as possible for further diagnosis</h3>
  </div>
</header>

<!-- Navbar (sticky bottom) -->
<div class="w3-bottom w3-hide-small">
  <div class="w3-bar w3-white w3-center w3-padding w3-opacity-min w3-hover-opacity-off">
    <a href="home.html" style="width:50%" class="w3-bar-item w3-button">Home</a>
    <a href="index.html" style="width:50%" class="w3-bar-item w3-button w3-hover-black">CKD Predictor</a>
  </div>
</div>


<div class="w3-hide-small" style="margin-bottom:32px"> </div>

</body>
</html>
```

STYLE.CSS

```
.demo{ background: #F2F2F2; }
.form-container{
    background-color: #e8ddbf;
    font-family: 'Nunito', sans-serif;
    text-align: center;
    padding: 60px 100px 100px;
    border-radius: 50%;
}
.form-container .title{
    color: #666157;
    font-size: 30px;
    font-weight: 700;
    text-transform: capitalize;
```

```
    margin: 0 0 20px;
    display: inline-block;
    position: relative;
}
.form-container .form-horizontal .form-group{
    font-size: 0px;
    margin: 0 0 15px;
}
.form-container .form-horizontal .form-control{
    color: #666157;
    background: #E6E6E6;
    font-size: 16px;
    font-weight: 600;
    letter-spacing: 1px;
    height: 45px;
    padding: 6px 30px;
    border-radius: 50px;
    box-shadow: inset -3px -3px 10px #eee;
    border: none;
    border-top: 2px solid #CECECE;
    border-left: 2px solid #CECECE;
}
.form-container .form-horizontal .form-control:focus{
    outline: none;
    box-shadow: none;
}
.form-container .form-horizontal .form-control::placeholder{
    color: #666157;
    font-weight: 600;
    font-style: italic;
}
.form-container .form-horizontal .btn{
    color: #fff;
    background-color: #e6a760;
    font-size: 25px;
    font-weight: 700;
    font-style: italic;
```

```
    text-transform: capitalize;
    width: 100%;
    border: none;
    border-radius: 50px;
    box-shadow: inset -3px -3px 10px #bd841b;
    transition: all 0.3s ease 0s;
}
.form-container .form-horizontal .btn:hover{ letter-spacing: 3px; }
.form-container .form-horizontal .btn:focus{ outline: none; }
@media only screen and (max-width:479px){
    .form-container{
        padding: 50px 50px 70px;
        border-radius: 30%;
    }
}
```

APP.PY

```
import numpy as np
import pandas as pd
from flask import Flask,request,render_template
import pickle as pk

app=Flask(__name__)
model=pk.load(open('CKD.pkl','rb'))

@app.route('/')
def home():
    return render_template('home.html')

@app.route('/Prediction',methods=['POST','GET'])
def prediction():
        return render_template('index.html')
@app.route('/Home',methods=['POST','GET'])
def my_home():
        return render_template('home.html')
@app.route('/predict',methods=['POST'])
def predict():
    input_features=[float(x) for x in request.form.values()]
```

```
    features_value=[np.array(input_features)]
    features_name=['blood_urea','blood glucose random','coronary_artery_disease','anemia','pus_cell','red_blood_cells','diabetesmellitus','pedal_edema']
    df=pd.DataFrame(features_value,columns=features_name)
    output=model.predict(df)
    if(output==0):
        return render_template('predictionNo.html')
    else:
        return render_template('predictionYes.html')


if __name__ == '__main__':
    app.run(debug=True)
```

8.RESULT

The development and execution of chronic kidney disease using machine learning is complete

9.ADVANTAGES AND DISADVANTAGES

ADVANTAGES

Early detection of chronic kidney disease provides a proper management that helps to

- Slow down the CKD progression,
- Prevent cardiovascular and other comorbidities and enable timely initiation of dialysis

DISADVANTAGES

- Slow and ineffective for real time prediction
- More time required for execution

10.CONCLUSION

This article deals with the early prediction of CKD in humans.The envelope method used here for feature selection is ACO. ACO is a meta-heuristic optimization algorithm. Out of the 24 attributes present, the 12 best attributes are taken for prediction. The prediction is done using a machine learning technique, SVM. In this classification problem, SVM classifies the output into two classes with CKD and without CKD. The main objective of this study was to predict patients with CKD using fewer attributes while maintaining higher accuracy.