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CHAPTER 1

INTRODUCTION

The term attrition refers to employees leaving an organization. The reason including resignation, termination, death or retirement. This reduces the company's man power thereby the overall turnover is affected in long-term. We have created a Machine Learning Model to predict the Employee attrition of provided data. And we have also created a dashboard, a report, a story using IBM Cognos to analyse the given data. The process of identifying the issue will lead to solution.

Machine Learning is one of the AI technology that is used to automatically learn and improve the given dataset. It is the rapid growing fields of Computer Science. This study provides the Classification of an employee which is labelled either as 'Yes' or 'No'.

IBM Cognos Business Intelligence is a web-based integrated business intelligence suite by IBM. It provides a toolset for reporting, analytics, scorecarding, and monitoring of events and metrics. The software consists of several components designed to meet the different information requirements in a company.

1.1 Project Overview

Employee Attrition refers to when a company employee chooses to leave a company to work for another company. Employee attrition is a very common process across organisations. Various employees leave one company for another company just because of some benefits. The benefits depend on employee to employee like some may be better compensation, distance from home, better growth Opportunity, better skillset training, better role, environment factors, bad relationship with managers etc. The analysis has been carried out to find out the most important factor that affects employee's attrition. The opposite of attrition is retention. As employee's attrition very negatively affects company growth, every year companies come with different retention schemes for employees so employees don't leave the company. Those methods include retention bonuses, better training, promotion and stock options which mature after some definite period. So finding the important factor for attrition will help organisations to plan their retention schemes more targeted.

1.2 Purpose

Employee attrition rate meaning is that it's a metric through which employers calculate the rate at which employees are leaving the organization. It is used by the human resources department to calculate the number of vacant positions and plan the hiring accordingly. Employee attrition refers to the loss of employees due to life events such as retirement, resignation initiated by the employee, elimination of a position, or other similar event.

As opposed to turnover, when a job is vacated and refilled, with attrition, the employer will not refill the position.

This guide discusses common reasons for employee attrition and steps employers can take to benefit from or reduce attrition. Employers want to reduce turnover because recruiting and training of new hires is costly.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing Problem

The problem which increases attrition rate in employees are:

- More Business Travel
- Office Distance from Home
- Worked in a greater number of companies
- Need of overtime to complete work
- More number in present company
- If he is not promoted from long time.

2.2 References

1. Aswathappa, K. (2000), “Human resource and Personnel Management”, Tata McGraw-Hill Publishing Company Limited, New Delhi .

2. Chao, Chih Yang Huang, Yi Li Lin, Chih Wei, “The Relationship between Leadership Behavior of a Principal and Quality of Work Life of Teachers in an Industrial Vocational High School inTaiwan”

3. Chaudhuri, Manodip Ray. “Employ Training Grooming for a better Tomorrow”. HRM Review, Vol. 4. No.1, January 2004 .

4. D.R. Saklani,2004 Quality of Work Life in the Indian Context, “An Empirical Investigation, Commerce Department, Shaheed Bhagat Singh College, University of Delhi” .

2.3 Problem Statement Definition

The success of any manufacturing organisation depends largely on the workers, the employees are considered as the backbone of any company. The study was mainly undertaken to identify the level of employee's attitude, the dissatisfaction factors they face in the organisation and for what reason they prefer to change their job. Once the levels of employee's attitude are identified, it would be possible for the management to take necessary action to reduce attrition level. Since they are considered the backbone of the company, their progression will lead to the success of the company for the long run.

This study can be helpful in knowing why the employees prefer to change their job and which factors make employees dissatisfied. Since the study is a critical issue, it is needed by the originators in order to assess the overall interest and the feelings of the employees towards their nature of job and organisation.

Customer Problem Statement Template

Fig 2.1 Problem Statement

CHAPTER 3

IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to help teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

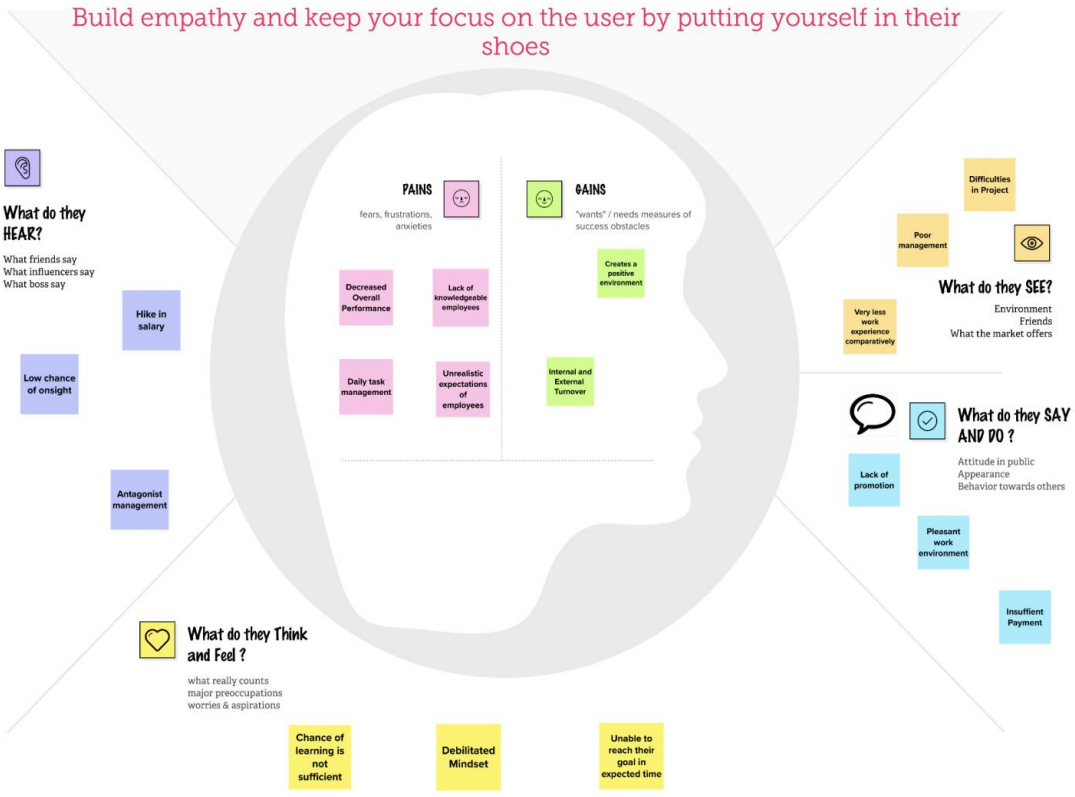


Fig 3.1 Empathy Map

3.2 Ideation & Brainstorming

3.2.1 Ideation

Ideation is the process where you generate ideas and solutions through sessions such as Sketching, Prototyping, Brainstorming, Brainwriting, Worst Possible Idea, and a wealth of other ideation techniques. Ideation is also the third stage in the Design Thinking process.

Ideation is the process of forming ideas from conception to implementation, most often in a business setting.

3.2.2 Brain storming

Brainstorming is a group problem-solving method that involves the spontaneous contribution of creative ideas and solutions. This technique requires intensive, freewheeling discussion in which every member of the group is encouraged to think aloud and suggest as many ideas as possible based on their diverse knowledge.

Brainstorming combines an informal approach to problem-solving with lateral thinking, which is a method for developing new concepts to solve problems by looking at them in innovative ways. Some of these ideas can be built into original, creative solutions to a problem, while others can generate additional ideas.

Step-1: Team Gathering, Collaboration and Select the Problem statement

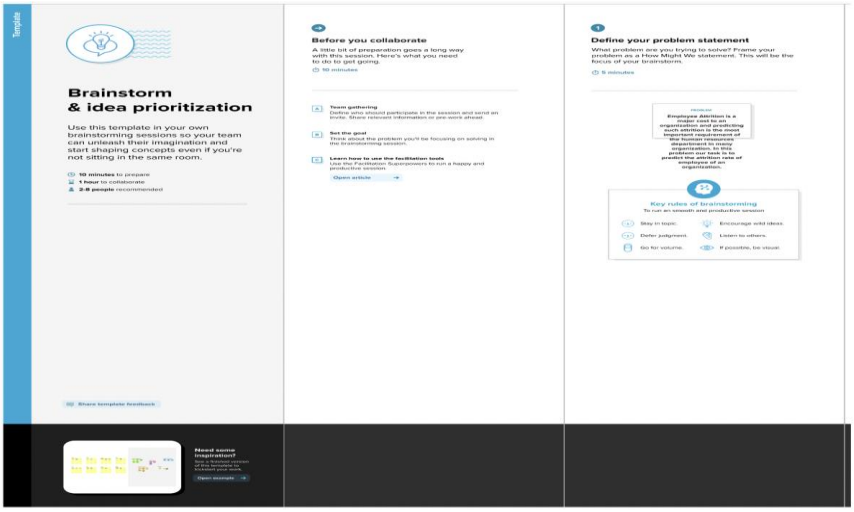


Fig 3.2 Brainstorming

Step-2: Brainstorm, Idea Listing and Grouping

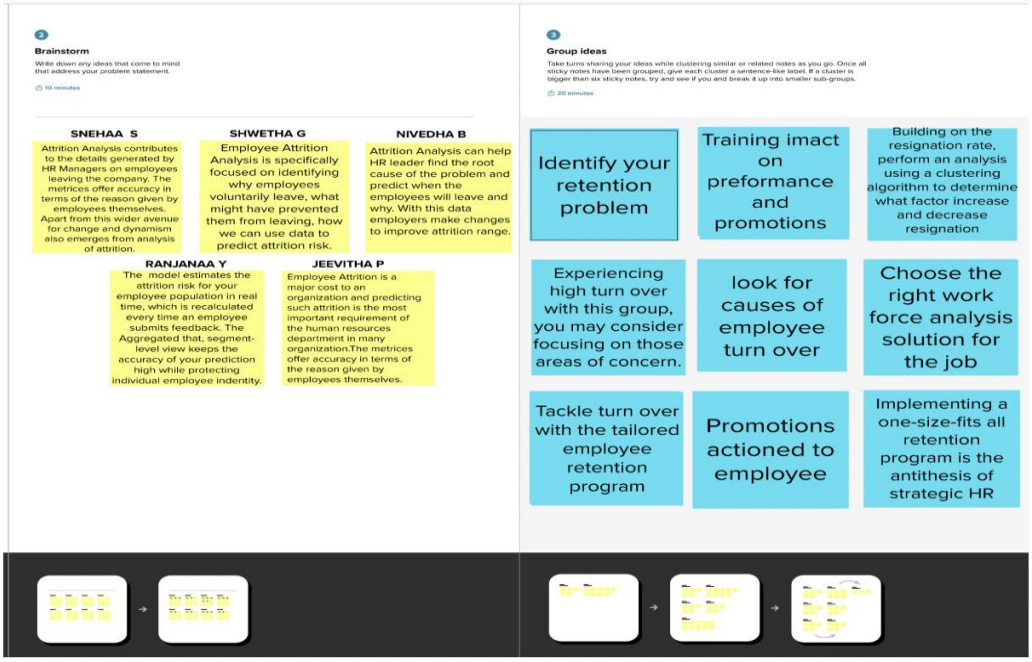


Fig 3.3 Brainstorming

Step-3: Idea Prioritisation

Fig 3.4 Brainstorming

3.3 Proposed Solution

Your proposed solution should relate the current situation to a desired result and describe the benefits that will accrue when the desired result is achieved. So, begin your proposed solution by briefly describing this desired result.

Solution description

The performance of the corporate employee can be better understood by gathering their data set and applying data analysis techniques like visualisation. Keeping track of the rate at which employees leave your company can alert you to problems with your staff in enough time to implement a fix

Uniqueness

If the supervisors or HR came to know about some employees that they will be planning to leave the company then they could get in touch with those employees which can help them to stay back or they can manage the workforce by hiring the new alternative of those employees.

Customer Satisfaction

HR may remain in touch with these workers and guarantee that they consider your firm in the future when they have the opportunity by conducting extensive departure interviews. Request regular feedback, listen to the employee's voice, and rectify any gaps in their employee experience. A person who is satisfied with their employment is unlikely to resign if the majority of their working criteria are met.

Revenue Model

HR uses models to predict what employees will be more likely to leave given some attributes through data pre-processing, analysing, validating and predicting. Attrition compares the number of individuals who departed a company/office/department to the average number of persons employed in that year.

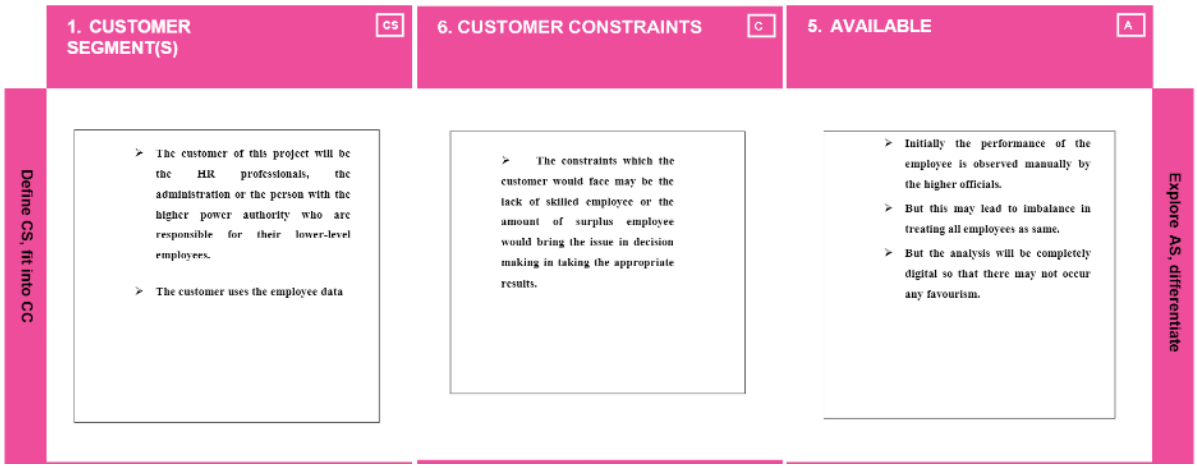
Scalability of the Solution

A strong measure to know how satisfied the employees should be, build within the organisation. A very powerful way used by organisations is the survey method- here the details of the employees are kept confidential and some organisations even hire other organisations to get this work done by them.

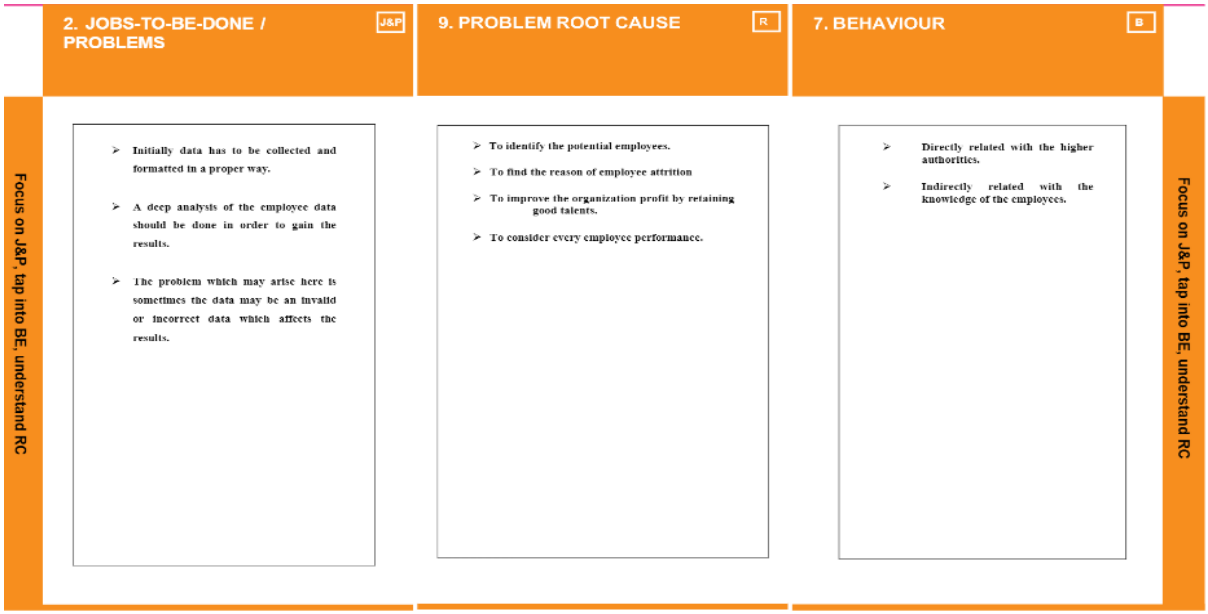
3.4 Problem Solution fit

The problem stated by the customer is actually solved when the solution satisfies the need. The accuracy of the Solution should be threshold enough to have the best fit solution.

Define CS, fit into CC



Focus on J&P, tap into BE, understand RC



Identify Strong TR & EM

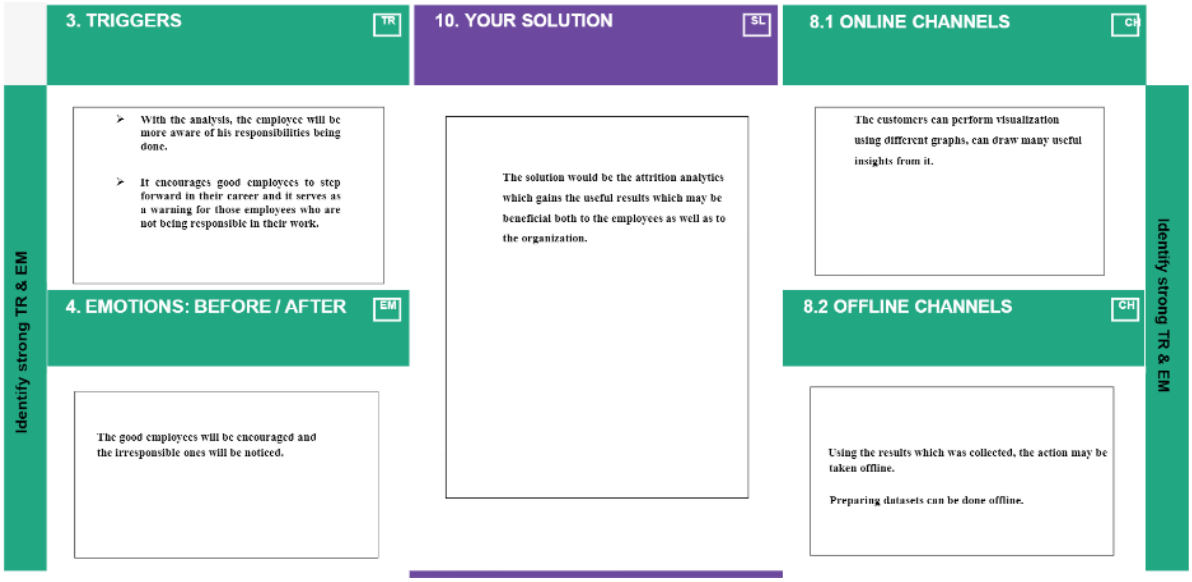


Fig 3.5 Problem solution fit

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional requirements may involve calculations, technical details, data manipulation and processing, and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements, these are captured in use cases.

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 Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Feedback	Feedback through Form Feedback through Gmail Feedback through Instagram polls Feedback through LinkedIn
FR-4	User Rating	Rating via Mail Rating through Message
FR-5	Employee Management	Validating and managing the employee details
FR-6	Attrition Analytics	Analysing and finding out the major reason for the attrition of employees using dataset

4.2 Non-Functional requirements

In system engineering and requirement engineering , a non-functional requirement (NFR) is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. They are contrasted with function requirements that define specific behavior or functions. The plan for implementing functional requirements is detailed in the system design.

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This Data Visualization shall be easy to use for all users with minimal instructions. 100% of the languages on the graphical user interface (GUI) shall be intuitive and understandable by non-technical users.
NFR-2	**Security**	The employee data is kept secure and their identity is hidden for the organization.
NFR-3	**Reliability**	The Link shall be operable in all conditions. The system must be less prone to errors
NFR-4	**Performance**	This software is portable and inter-operable. It works smoothly without generating errors. It also provides a faster response
NFR-5	**Portability**	The link shall be portable to all operating platforms. Therefore, this link should not depend on the different operating systems.
NFR-6	**Scalability**	Our solution is scalable for large and small datasets. It provides an efficient solution despite the size of the dataset.

CHAPTER 5
PROJECT DESIGN

5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation 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.

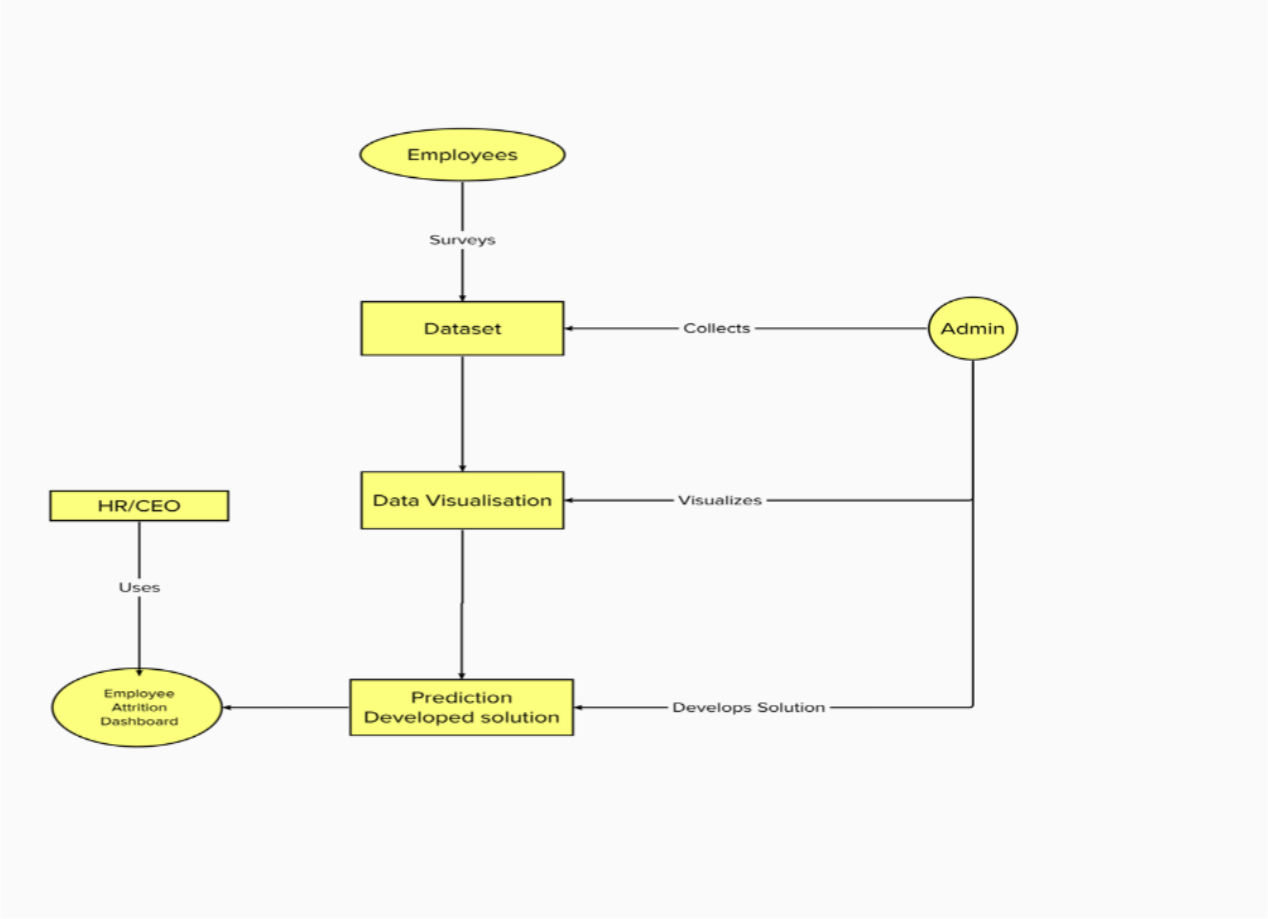


Fig 5.1 Data flow Diagram

5.2 Solution & Technical Architecture

5.2.1 Solution Architecture

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

● Find the best tech solution to solve existing business problems.

● Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.

● Define features, development phases, and solution requirements.

● Provide specifications according to which the solution is defined, managed, and delivered.

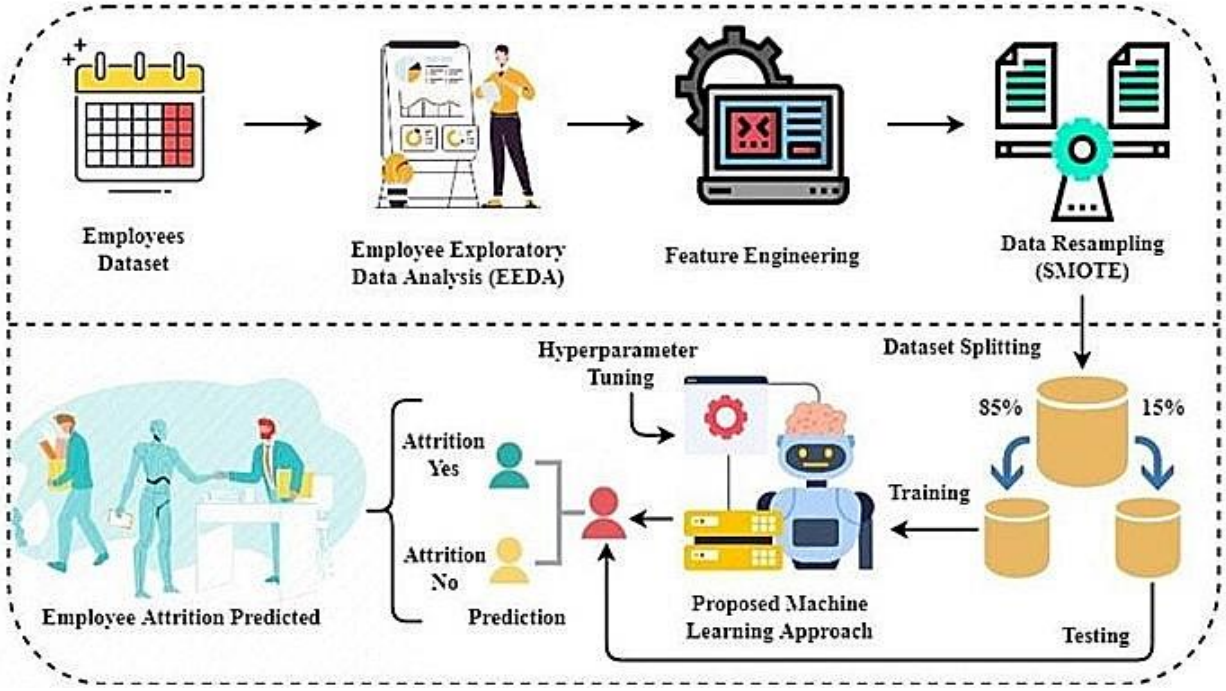


Fig 5.2 Solution Architecture

5.2.2 Technical Architecture

Technology architecture associate's application components from application architecture with technology components representing software and hardware components. Its components are generally acquired in the marketplace and can be assembled and configured to constitute the enterprise's technological infrastructure. Technology architecture provides a more concrete view of the way in which application components will be realized and deployed. It enables the migration problems that can arise between the different steps of the IS evolution path to be studied earlier.

It provides a more precise means of evaluating responses to constraints (nonfunctional requirements) concerning the IS, notably by estimating hardware and network sizing needs or by setting up server or storage redundancy. Technology architecture concentrates on logistical and location problems related to hardware location, IS management capabilities, and the sites where the different parts of the IS are used. Technology architecture also ensures the delivered application components work together, confirming that the required business integration is supported.

Fig 5.3 Technology Architecture

5.3 User Stories

A user story is an informal, general explanation of a software feature written from the perspective of the end user. Its purpose is to articulate how a software feature will provide value to the customer. User stories are a few sentences in simple language that outline the desired outcome. They don't go into detail. Requirements are added later, once agreed upon by the team.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (CEO)	Registration	USN-1	As a CEO, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
Customer (Employee)		USN-2	As an employee, I can register for the application by entering my mail, password, and confirming password.	I can access my account/dashboard	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 Facebook login	Medium	Sprint-1
Customer (CEO)	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account/dashboard	High	Sprint-1
Customer (Employee)		USN-6	As a user, I can log into the application by entering email and password.	I can access my account/dashboard	High	Sprint-3
CEO	Dashboard		As a CEO, I can use the predict button to know which factor keeps the employee at the	I can view the visual chart	High	Sprint-4
			company and which prompts others to leave			
Employee		USN-8	As an employee of the organization, I can view, fill and submit the survey form that is displayed.	I can see the acknowledgement message for submitting the survey.	High	Sprint-4

CHAPTER 6
PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint planning is an event in scrum that kicks off the sprint. The purpose of sprint planning is to define what can be delivered in the sprint and how that work will be achieved. Sprint planning is done in collaboration with the whole scrum team.

In scrum, the sprint is a set period of time where all the work is done. However, before you can leap into action you have to set up the sprint. You need to decide on how long the time box is going to be, the sprint goal, and where you're going to start. The sprint planning session kicks off the sprint by setting the agenda and focus. If done correctly, it also creates an environment where the team is motivated, challenged, and can be successful. Bad sprint plans can derail the team by setting unrealistic expectations.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S

Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	2	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-2	Dashboard	USN-6	As a user, I can able to access the dashboard	4	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-2		USN-7	As a user, I can able to upload my dataset through dashboard	2	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-3		USN-8	As a user, I can able to done a Data Pre-processing	3	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-3		USN-9	As a user, I can able to build a model for my dataset – Train the model	4	Low	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-3		USN-10	As a user, I can able to test my model	4	Low	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-3		USN-11	As a user, I can able to evaluate my performance	3	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S

Sprint-4		USN-12	As a user, I can able find a prediction of my dataset attrition rate using algorithm	5	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-4		USN-13	As a user, I can able view the visualization of my dataset in the dashboard	5	High	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-2		USN-14	As a user, I can to ask the help to the development team	3	Low	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-4	Database	USN-15	As a user, I can assure that my information are in the safe state	5	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S
Sprint-2	Logout	USN-16	As a user, I can able to logout the page with my presence	2	Medium	Ranjanaa Y Jeevitha P Nivedha B Shwetha G Snehaa S

Table : Sprint Planning

6.2 Sprint Delivery Schedule

In this part, we are going to plan our project based on scrum planning. Sprint planning should be constrained no more than two hours for each week of the sprint. So, for example, the sprint planning meeting for a two-week sprint would be no longer than four hours. This is called " timeboxing ", or setting a maximum amount of time for the team to accomplish a task, in this case, planning the sprint. The scrum master is responsible for making sure the meeting happens the timebox is understood. If the team is happy before the timebox is finished, then the event is over. A timebox is a maximum time allowed; there is no minimum time allowed.

Sprint	**Total Story Points**	**Duration**	**Sprint Start Date**	**Sprint End Date (Planned)**	**Story Points Completed (as on Planned End Date)**	**Sprint Release Date (Actual)**
Sprint-1	7	6 Days	24 Oct 2022	29 Oct 2022	7	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	14	6 Days	07 Nov 2022	12 Nov 2022	14	12 Nov 2022
Sprint-4	15	6 Days	14 Nov 2022	19 Nov 2022	15	19 Nov 2022

Table - Sprint Delivery Schedule

6.3 Reports from JIRA

Jira Software is part of a family of products designed to help teams of all types manage work. Originally, Jira was designed as a bug and issue tracker. But today, Jira has evolved into a powerful work management tool for all kinds of use cases, from requirements and test case management to agile software development.

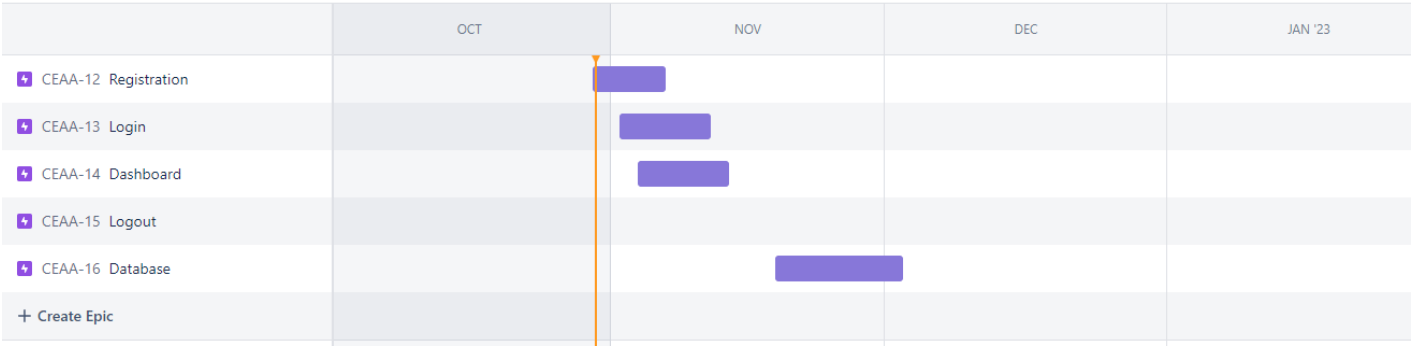


Fig 6.1 Initial sprint Planning Roadmap

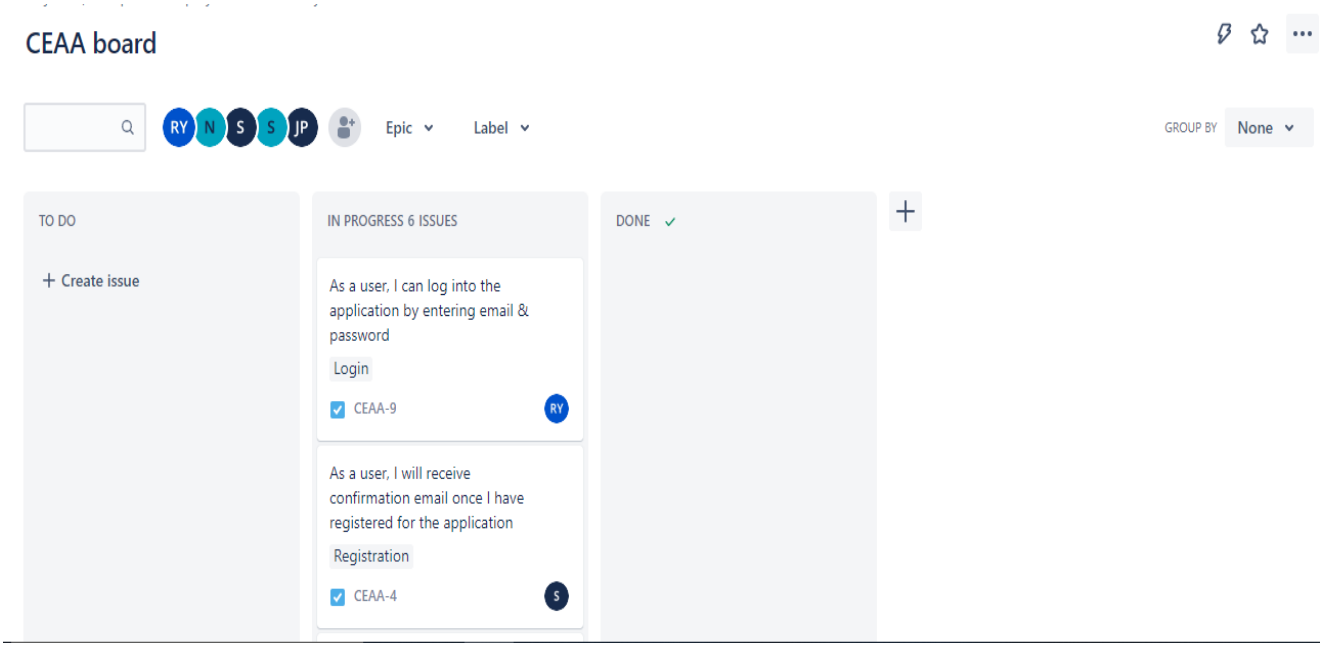


Fig 6.2 Board

6.3.1 Burndown Chart

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time. Typically, in a burn down chart, the outstanding work is often on the vertical axis, with time along the horizontal.

It is useful for predicting when all of the work will be completed. In the Daily Scrum the Development Team updates the Sprint burn down chart and plots the remaining work of the day. A burndown chart is almost a “must” have tool for a Scrum team for the following main reasons:

- Monitoring the project scope creep
- Keeping the team running on schedule
- Comparing the planned work against the team progression

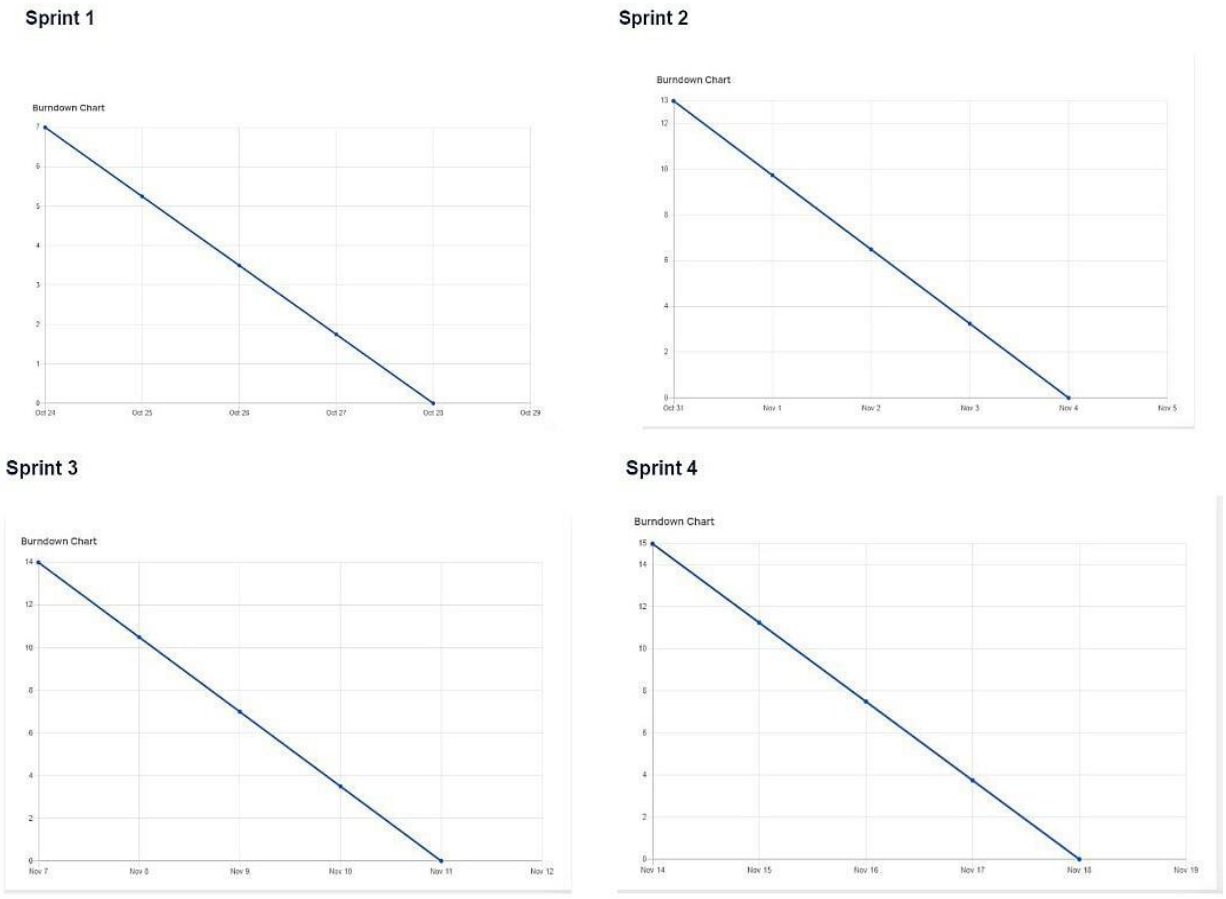


Fig 6.3 Sprint Burndown chart

CHAPTER - 7
CODING & SOLUTIONING

7.1 Machine Learning Model

A machine learning model is defined as a mathematical representation of the output of the training process. Machine learning is the study of different algorithms that can improve automatically through experience & old data and build the model. A machine learning model is similar to computer software designed to recognize patterns or behaviours based on previous experience or data. The learning algorithm discovers patterns within the training data, and it outputs an ML model which captures these patterns and makes predictions on new data.

A machine learning model is a file that has been trained to recognize certain types of patterns. You train a model over a set of data, providing it an algorithm that it can use to reason over and learn from those data. Once you have trained the model, you can use it to reason over data that it hasn't seen before, and make predictions about that data.

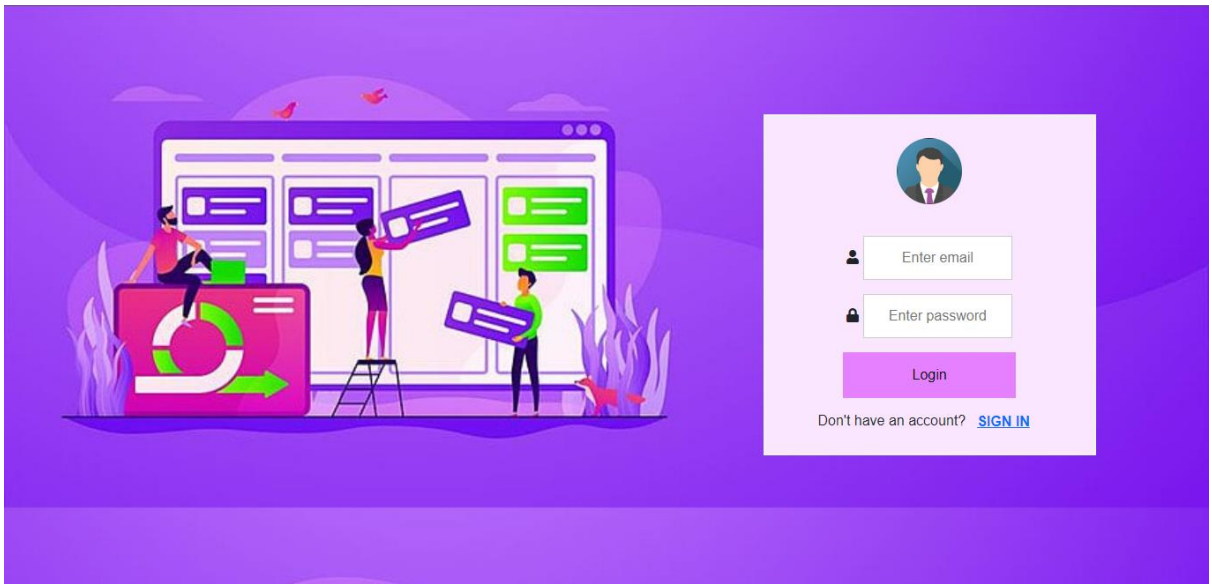
7.1.2 Tool - Google Colab

Google is quite aggressive in AI research. Over many years, Google developed an AI framework called TensorFlow and a development tool called Collaboratory. Today TensorFlow is open-sourced and since 2017, Google made Collaboratory free for public use. Collaboratory is now known as Google Colab or simply Colab.

Another attractive feature that Google offers to the developers is the use of GPU. Colab supports GPU and it is totally free. The reasons for making it free for the public could be to make its software a standard in the academics for teaching machine

learning and data science. It may also have a long term perspective of building a customer base for Google Cloud APIs which are sold on a per-use basis.

7.2 LOGIN

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form {border: 3px solid #f1f1f1;}
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  width: 50%;
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  margin: 8px 0;
  display: inline-block;
  border: 1px solid #ccc;
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}

button {
  background-color: #e580ff;
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  cursor: pointer;
  width: 58%;
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button:hover {
  opacity: 0.8;
}

.cancelbtn {
  width: auto;
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.imgcontainer {
  text-align: center;
  margin: 24px 0 12px 0;
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img.avatar {
  width: 20%;
  border-radius: 50%;
}

.container {
  text-align:center;
  padding: 16px;
}

span.psw {
  float: right;
  padding-top: 16px;
}
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/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
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     display: block;
     float: none;
  }
  .cancelbtn {
     width: 100%;
  }
}
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</head>
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  <div class="imgcontainer">
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  </div>

  <div class="container">
    <i class="fas fa-user"></i>
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<br>
<i class="fas fa-lock"></i>
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<button type="submit" name="submit">Login</button>

 Don't have an account?SIGN IN

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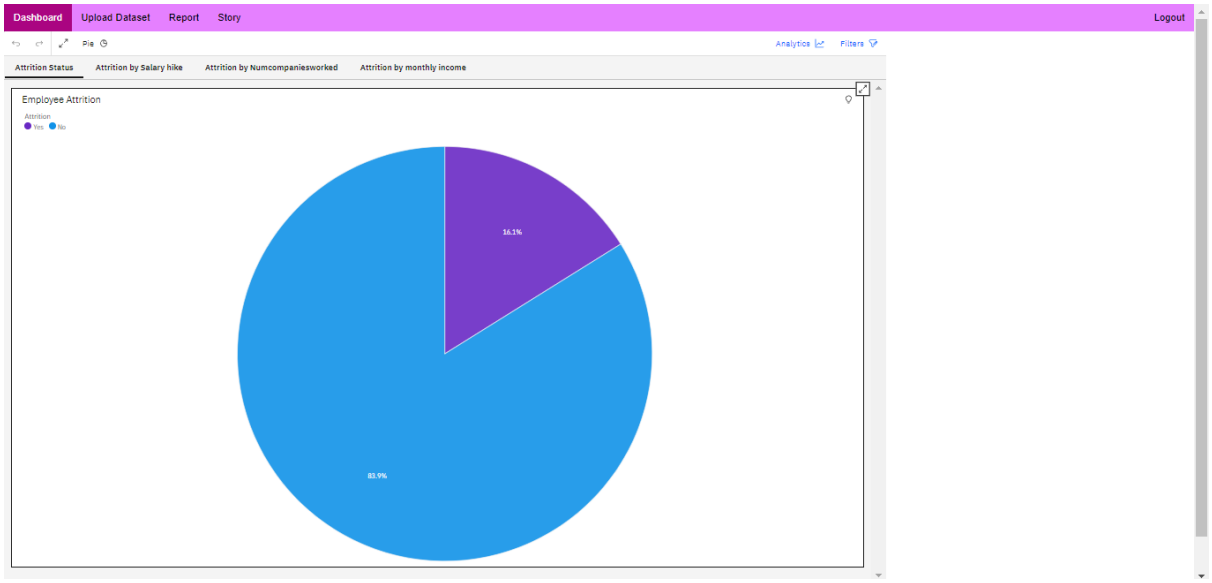
7.3 DASHBOARD

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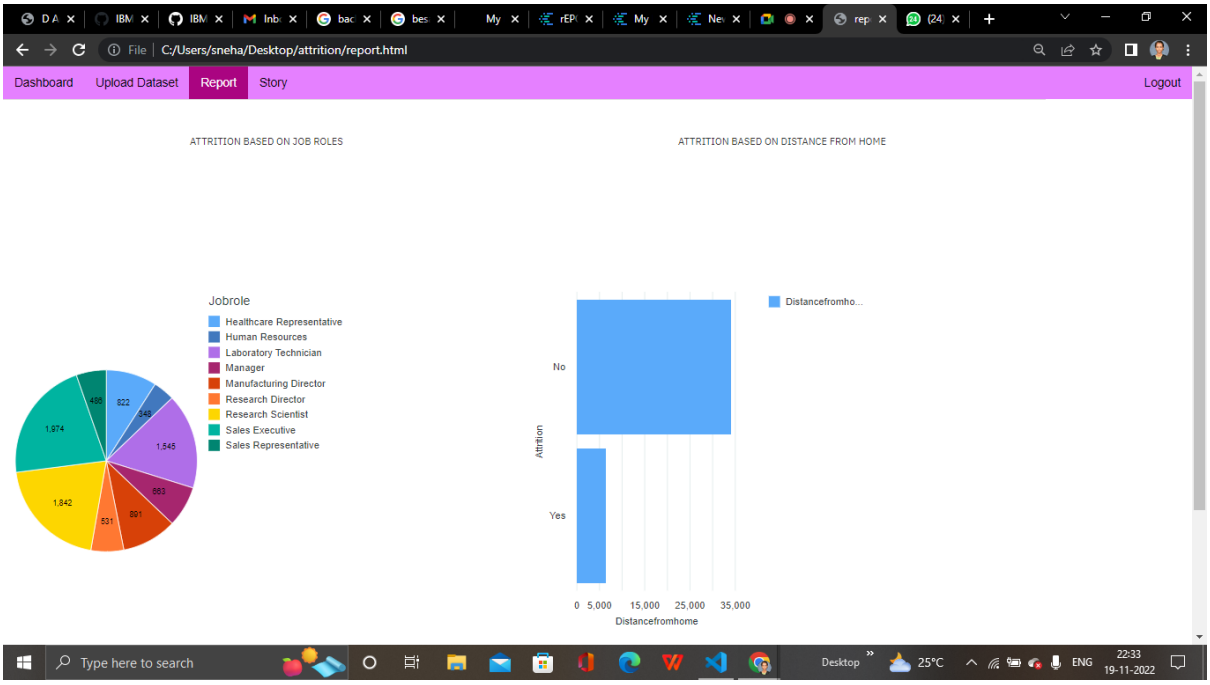
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body {
  margin: 0;
  font-family: Arial, Helvetica, sans-serif;
}
.topnav {
```

```
  overflow: hidden;
  background-color:#e580ff;
}
.topnav a {
  float: left;
  color: black;
  text-align: center;
  padding: 14px 16px;
text-decoration: none;
  font-size: 17px;
}
.topnav a:hover {
  background-color: rgb(238, 185, 240);
  color: black;
}
.topnav a.active {
  background-color: #aa0481;
  color: white;
}
</style>
</head>
<body>
<div class="topnav">
  <a class="active" href="#">Dashboard</a>
  <a href="upload.html">Upload Dataset</a>
  <a href="report.html">Report</a>
  <a href="story.html">Story</a>
  <a href="login.html" style="float: right;">Logout</a>
</div>
```

<iframe
src="https://ap1.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FAttrition%2Bdashboard&closeWindowOnLastView=true&ui_appbar=false&ui_navbar=false&shareMode=embedded&action=view&mode=dashboard&subView=model000001849076dec5_00000002"
width="1500" height="1000" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>

</body>
</html>

7.4 REPORT

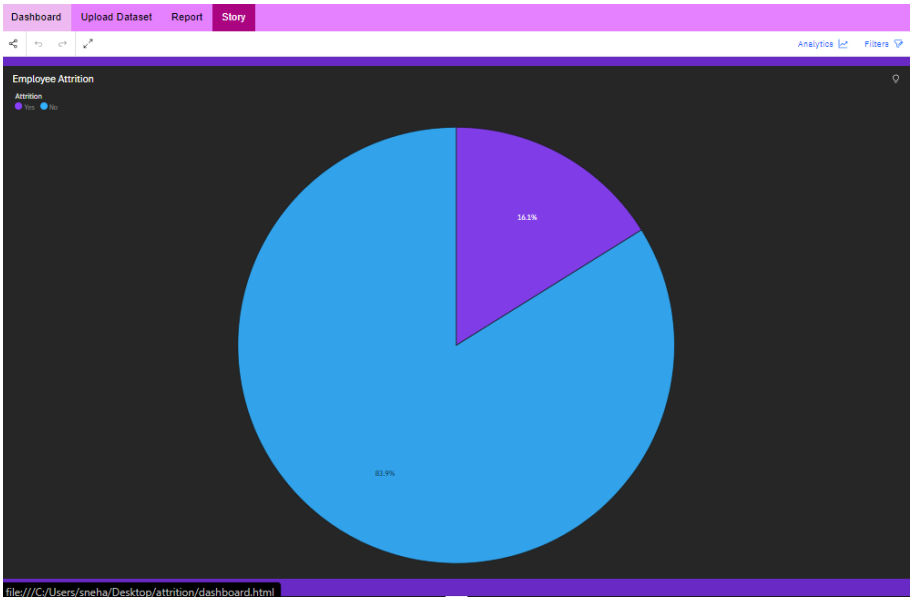



```
<!DOCTYPE html>
<html>
<head>
```

```
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body {
  margin: 0;
  font-family: Arial, Helvetica, sans-serif;
}
.topnav {
  overflow: hidden;
  background-color:#e580ff;
}
.topnav a {
  float: left;
  color: black;
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
  font-size: 17px;
}
.topnav a:hover {
  background-color: rgb(238, 185, 240);
  color: black;
}
.topnav a.active {
  background-color: #aa0481;
  color: white;
}
</style>
</head>
<body>
<div class="topnav">
```

```
    <a  href="dashboard.html">Dashboard</a>
    <a href="upload.html">Upload Dataset</a>
    <a class="active" href="#contact">Report</a>
    <a href="story.html">Story</a>
    <a href="login.html" style="float: right;">Logout</a>
  </div>
  <iframe
src="https://ap1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FMy%2BReport&amp;amp;closeWindowOnLastView=true&amp;amp;ui_appbar=false&amp;amp;ui_navbar=false&amp;amp;shareMode=embedded&amp;amp;action=run&amp;amp;prompt=false" width="1500" height="1000"
frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
  </div>
  </div>
  </div>
  </div>
  </body>
  </html>
```

7.5 STORY



```
<!DOCTYPE html>
<html>
<head>
<meta name="viewport" content="width=device-width, initial-scale=1">
<style>
body {
  margin: 0;
  font-family: Arial, Helvetica, sans-serif;
}
.topnav {
  overflow: hidden;
  background-color:#e580ff;
}
.topnav a {
  float: left;
  color: black;
  text-align: center;
  padding: 14px 16px;
  text-decoration: none;
  font-size: 17px;
}
.topnav a:hover {
  background-color: rgb(238, 185, 240);
  color: black;
}
.topnav a.active {
  background-color: #aa0481;
  color: white;
}
</style>
```

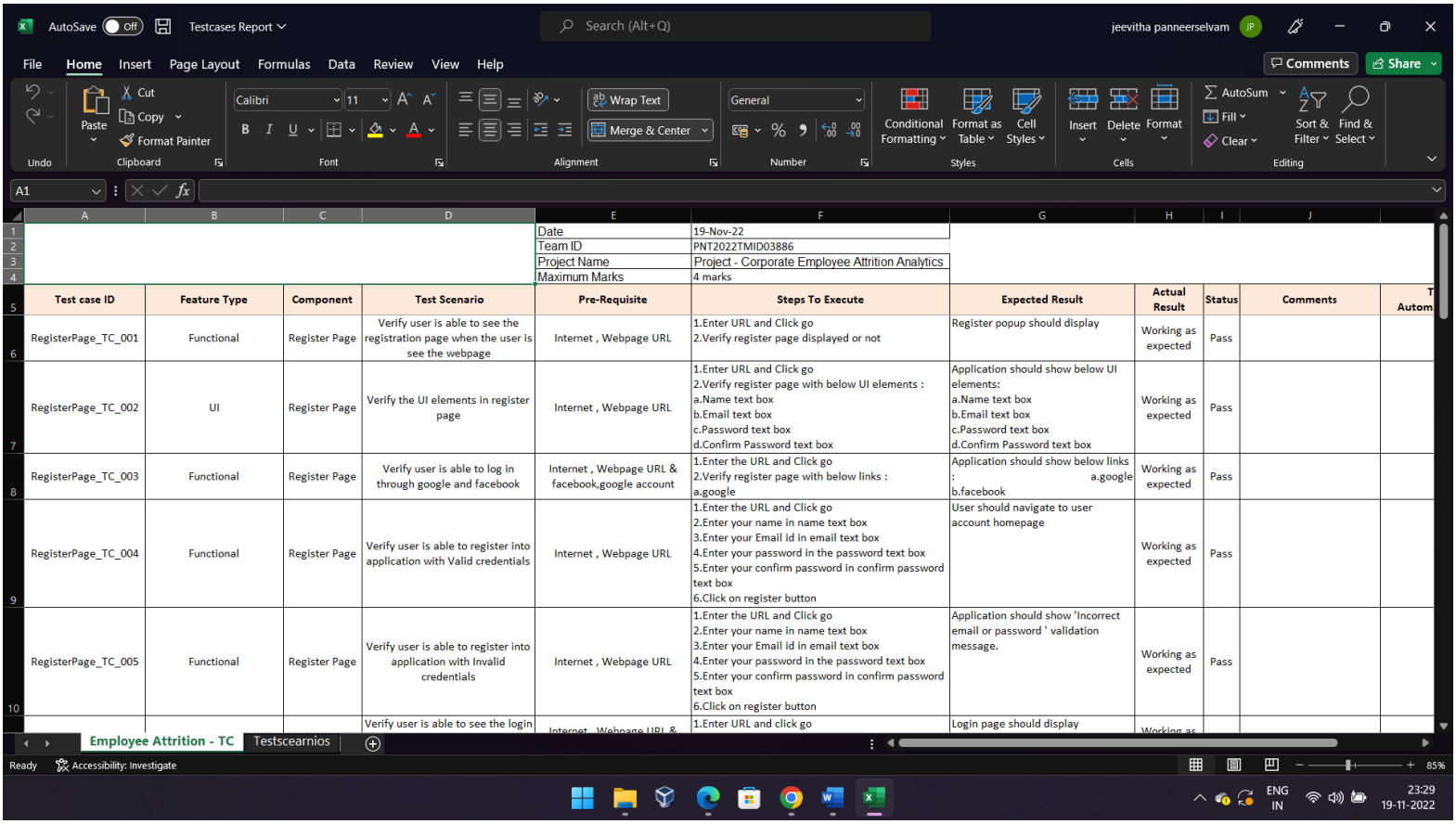
```
</head>
<body>
<div class="topnav">
  <a  href="dashboard.html">Dashboard</a>
  <a href="upload.html">Upload Dataset</a>
  <a href="report.html">Report</a>
  <a class="active" href="#about">Story</a>
  <a href="login.html" style="float: right;">Logout</a>
</div>
<iframe
src="https://ap1.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2F
Story%253A%2BAttrition%2BAnalytics&amp;closeWindowOnLastView=true&amp;ui_app
bar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;scene
Id=model000001849076dec5_00000002&amp;sceneTime=0" width="1500" height="1000"
frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe>
</div>
</div>
</div>
</div>
</body>
</html>
```

CHAPTER - 8
TESTING

8.1 Test Cases

A test case is a singular set of actions or instructions for a tester to perform that validates a specific aspect of a product or application functionality. If the test fails, the result might be a software defect that the organization can triage.

In software engineering, a test case is a specification of the inputs, execution conditions, testing procedure, and expected results that define a single test to be executed to achieve a particular software testing objective, such as to exercise a particular program path or to verify compliance with a specific requirement. Test cases underlie testing that is methodical rather than haphazard. A battery of test cases can be built to produce the desired coverage of the software being tested. Formally defined test cases allow the same tests to be run repeatedly against successive versions of the software, allowing for effective and consistent regression testing.



Date	19-Nov-22	
Team ID	PNT2022TMID03886	
Project Name	Project - Corporate Employee Attrition Analytics	
Maximum Marks	4 marks	

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Expected Result	Actual Result	Status	Comments	T Autom
RegisterPage_TC_001	Functional	Register Page	Verify user is able to see the registration page when the user is see the webpage	Internet , Webpage URL	1.Enter URL and Click go 2.Verify register page displayed or not	Register popup should display	Working as expected	Pass		
RegisterPage_TC_002	UI	Register Page	Verify the UI elements in register page	Internet , Webpage URL	1.Enter URL and Click go 2.Verify register page with below UI elements : a.Name text box b.Email text box c.Password text box d.Confirm Password text box	Application should show below UI elements: a.Name text box b.Email text box c.Password text box d.Confirm Password text box	Working as expected	Pass		
RegisterPage_TC_003	Functional	Register Page	Verify user is able to log in through google and facebook	Internet , Webpage URL & facebook,google account	1.Enter the URL and Click go 2.Verify register page with below links : a.google	Application should show below links : a.google b.facebook	Working as expected	Pass		
RegisterPage_TC_004	Functional	Register Page	Verify user is able to register into application with Valid credentials	Internet , Webpage URL	1.Enter the URL and Click go 2.Enter your name in name text box 3.Enter your Email id in email text box 4.Enter your password in the password text box 5.Enter your confirm password in confirm password text box 6.Click on register button	User should navigate to user account homepage	Working as expected	Pass		
RegisterPage_TC_005	Functional	Register Page	Verify user is able to register into application with Invalid credentials	Internet , Webpage URL	1.Enter the URL and Click go 2.Enter your name in name text box 3.Enter your Email id in email text box 4.Enter your password in the password text box 5.Enter your confirm password in confirm password text box 6.Click on register button	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass		
			Verify user is able to see the login	Internet , Webpage URL &	1.Enter URL and click go	Login page should display	Working as			

Fig 8.1 Test Cases

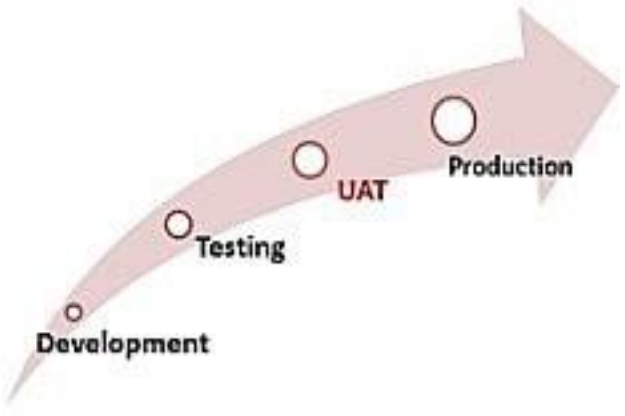
8.2 User Acceptance Testing

User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

User Acceptance Testing (UAT), or application testing, is the final stage of any software development or change request lifecycle before go-live. It is the final stage of any development process to determine that the software does what it was designed todo in real-world situations.

8.2.1 Purpose of UAT

The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.



UAT is performed by –

- Client
- End users

8.2.2 UAT Planning

The UAT test plan outlines the strategy that will be used to verify and ensure an application meets its business requirements. It documents entry and exit criteria for UAT, Test scenarios and test cases approach and timelines of testing.

Sprint	Functional Requirement (Epic)	UAT Task	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration Login Dashboard Logout	UAT Initiation	USN1 to USN-14	Preparing UAT Test scenario for user stories planned for current sprint	7	High	Jeevitha P Ranjanaa Y
Sprint-2	Registration Login Dashboard Logout	UAT Design	USN1 to USN-14	Preparing UAT Test Cases for user stories planned for current sprint	13	High	Snehaa S Nivedha B
Sprint-3	Registration Login Dashboard Logout	UAT Execution -I	USN1 to USN-14	Executing the Test cases using the test data and find out the status	14	High	Shwetha G Snehaa S Nivedha B
Sprint-4	Registration Login Dashboard Logout	UAT Execution -II	USN1 to USN-14	Executing the Test cases using the test data and find out the status	15	High	Ranjanaa Y Jeevitha P

8.2.3 Test Scenarios

Identify the test scenarios with respect to high-level business process and create test cases with clear test steps. Test Cases should sufficiently cover most of the UAT scenarios. Business Use cases are input for creating the test cases.

Register Page

1. Verify user is able to see register page
2. Verify user is able to register into application or not?
3. Verify user is able to navigate to create a account page?
4. Verify register page elements
5. Verify user is able to login through google, facebook applications
6. Verify user is able to get the verification through the gmail
7. Verify user is able to move the next page after the registration

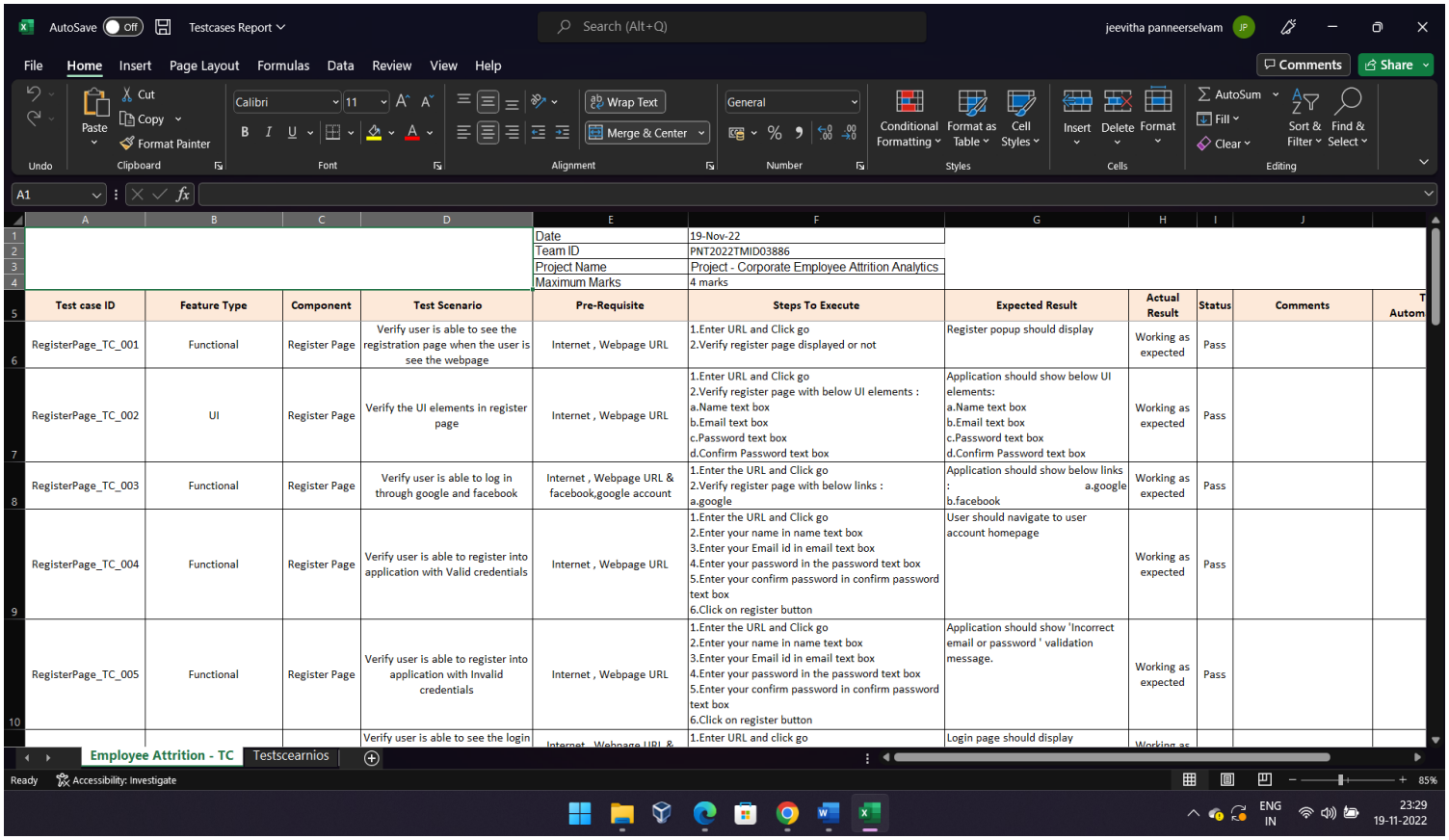
Login Page

1. Verify user is able to see login page
2. Verify user is able to log into application or not?
3. Verify user is able to navigate to create a account page?
4. Verify user is able to recovery password
5. Verify login page elements

Main Page

1. Verify user is able to see webpage dashbaord
2. Verify dashboard elements
3. Verify user is able to navigate one page to another page?
4. Verify user is able to see the notification bar
5. Verify user is able to see their account page
6. Verify user is able to see the Help & Support element
7. Verify user is able to see the navigation bar elements

8.2.4 Test Cases



				Date	19-Nov-22					
				Team ID	PNT2022TMID03886					
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Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Expected Result	Actual Result	Status	Comments	T Autom
RegisterPage_TC_001	Functional	Register Page	Verify user is able to see the registration page when the user is see the webpage	Internet , Webpage URL	1.Enter URL and Click go 2.Verify register page displayed or not	Register popup should display	Working as expected	Pass		
RegisterPage_TC_002	UI	Register Page	Verify the UI elements in register page	Internet , Webpage URL	1.Enter URL and Click go 2.Verify register page with below UI elements : a.Name text box b.Email text box c.Password text box d.Confirm Password text box	Application should show below UI elements: a.Name text box b.Email text box c.Password text box d.Confirm Password text box	Working as expected	Pass		
RegisterPage_TC_003	Functional	Register Page	Verify user is able to log in through google and facebook	Internet , Webpage URL & facebook,google account	1.Enter the URL and Click go 2.Verify register page with below links : a.google	Application should show below links : a.google b.facebook	Working as expected	Pass		
RegisterPage_TC_004	Functional	Register Page	Verify user is able to register into application with Valid credentials	Internet , Webpage URL	1.Enter the URL and Click go 2.Enter your name in name text box 3.Enter your Email id in email text box 4.Enter your password in the password text box 5.Enter your confirm password in confirm password text box 6.Click on register button	User should navigate to user account homepage	Working as expected	Pass		
RegisterPage_TC_005	Functional	Register Page	Verify user is able to register into application with Invalid credentials	Internet , Webpage URL	1.Enter the URL and Click go 2.Enter your name in name text box 3.Enter your Email id in email text box 4.Enter your password in the password text box 5.Enter your confirm password in confirm password text box 6.Click on register button	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass		
			Verify user is able to see the login	Internet , Webpage URL &	1.Enter URL and click go	Login page should display	Working as			

8.2.5 Test Analysis

This report shows the number of test cases that have passed, failed and untested

Section	Total Cases	Not Tested	Fail	Pass
Register Page	5	0	0	5
Login Page	5	0	0	5
Main Page	3	0	0	3
Upload Dataset	3	0	0	3
Dashboard	4	0	0	4
Report	3	0	0	3
Story	3	0	0	3
Help & Support	3	0	0	3

Logout	2	0	0	2

CHAPTER - 9
RESULTS

9.1 Performance Metrics

Performance metrics are defined as figures and data representative of an organization's actions, abilities, and overall quality. There are many different forms of performance metrics, including sales, profit, return on investment, customer happiness, customer reviews, personal reviews, overall quality, and reputation in a marketplace. Performance metrics can vary considerably when viewed through different industries.

Performance metrics are integral to an organization's success. It's important that organizations select their chief performance metrics and focus on these areas because these metrics help guide and gauge an organization's success. Key success factors are only useful if they are acknowledged and tracked. Business measurements must also be carefully managed to make sure that they give right answers, and that the right questions are being asked.

9.1.1 Performance Metrics for Data Analytics

Performance metrics are data used to track processes within a business. This is achieved using activities, employee behavior, and productivity as key metrics. These metrics are then used by employers to evaluate performance. This is in relationto an established goal such as employee productivity or sales objectives.

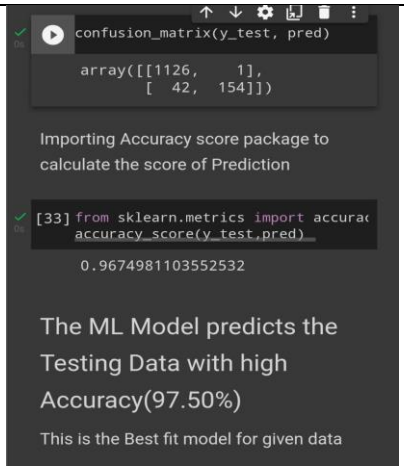
Parameter	Screenshot / Values
Dashboard design	14
Data Responsiveness	Good
Amount data to rendered (DB2 Metrics)	3 Datasets
Utilization of Data filters	Yes
Effective user story	4 Scenes
Descriptive reports	4 Reports

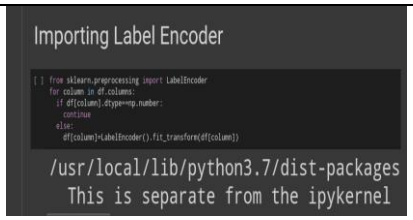
Model Performance Testing

9.1.2 Performance metrics for Machine Learning

Performance metrics are a part of every machine learning pipeline. They tell you if you're making progress, and put a number on it. All machine learning models, whether it's linear regression, or a SOTA technique like BERT, need a metric to judge performance.Every machine learning task can be broken down to either *Regression* or Classification, just like the performance metrics.

There are dozens of metrics for both problems, but we're gonna discuss popular ones along with what information they provide about model performance. It's important to know how your model sees your data!If you ever participated in a Kaggle competition, you probably noticed the evaluation section. More often than not, there's a metric on which they judge your performance.Metrics are different from loss functions. Loss functions show a measure of model performance. They're used to train a machine learning model (using some kind of optimization like Gradient Descent), and they're usually differentiable in the model's parameters.Metrics are used to monitor and measure the performance of a model (during training and testing), and don't need to be differentiable.

Parameter	Values	Screenshots
Metrics	**Classification Model** Confusion Matrix - Accuracy -Score- Classification Report	

Tune the Model	**Hyper parameters** Number of trees - Number of features		

Model Performance Testing

CHAPTER - 10
ADVANTAGES & DISADVANTAGES

10.1 Advantages

- Cost Reduction
- Experienced Employees
- Recruitment and Efficiency
- Increased Productivity
- Improved corporate culture
- Increases Revenue
- Improved Employee Engagement and Satisfaction

10.2 Disadvantages

- The employees provide data from their memory. The data furnished by the sample employees may not be accurate.
- The data are qualitative in nature which is collected from the employees.
- The population for the study was 100 only.
- The sample size for this study was small compared to the total employee's strength of the organisation.

CHAPTER - 11
CONCLUSION

Employee attrition is a very big problem not only in India but outside the world too. So the thing is, companies should take care of them in a friendly manner. Flexible working conditions, supervisor relationship, career growth and development, management support, motivation these are all helps to reduce the attrition rate. The study reveals the attrition of employees in the company. Through the study it has been assessed that the employees are having a safe and comfortable working environment in their company. The continued growth of the company depends upon attrition of their valuable employees who are the pillars of the organisation. The company should therefore address the gap in satisfying the employees' need and expectations towards their job and other related aspects which help the company to retain them more effectively. The company can also go for introducing new incentives schemes, transport facility, accommodation facility and to increase the bonus amount which helps the organisation to motivate their employees to work even more and this brings best result from the employees. The company can effectively retain all their valuable employees if they follow the above suggestions.

CHAPTER - 12
FUTURE SCOPE

The study only focused on employee attrition in the company. The further study may conduct in the impact of employees' retention and cause of employee's turnover in the same company. And also, there are several companies in the same industry. The comparative study may also be done in the same topic. It will be useful to the company and industry.

CHAPTER - 13
APPENDIX

13.1 Links:

Source Code - https://github.com/IBM-EPBL/IBM-Project-25472-1659964523/tree/main/Final%20deliverables

Git Hub Link - https://github.com/IBM-EPBL/IBM-Project-25472-1659964523