TEAM ID - PNT2022TMID43140
Corporate Employee Attrition Analytics

1. INDRODUCTION
1.1 Project Description

Employee is the most important human capital asset who results to reflect the success oforganization. The brunt of globalization has resulted to mobilization of workforce from one organizationto another, region to region and sometime from one country to another. Hence, it has become greatestchallenge for HR manager to handle the loss of skilled employee's attrition. In HR practice, the term Employee Turnover and Attrition are interchangeable with respect to industry its causes. Attritionmeans reduction of employee through retirement, resignation, or death. Employee Attrition is seriousissue that addresses the voluntary or forceful termination of talent and skilled employee, which affectsthe goodwill and productivity of organization. Employee Attrition can be indicated that employees areleaving due work related or personal problem. In most of the research it hasbeen found that work relatedin the major cause for higher employee attrition rate High attrition result to loss on the cost of companyspent on recruitment andtraining. The impact of employee attrition leaves a long term negative

impression on goodwill of organization. In simple words, it can said that employee attrition is caused dueto non fulfillment of employee's perception or expectation towards employer or failure of employer'scommitment towards employees satisfaction.

1.2 Project Purpose

In currently a day's worker Attrition prediction become a serious drawback within theorganizations. worker Attrition may be a huge organizations specially once trained, technicaland key workers leave for a much better chance from the organization. This leads to loss to interchangea trained worker. Therefore, we tend to use this and past worker knowledge to research the commonreasons for worker attrition or attrition.

2. LITERATURE SURVEY

2.1 Existing problem

well-trained and well-adapted employee leaves the organization, it creates a vacuum.The paper aims at identifying factors affecting employee attrition like, growth opportunities,work environment, business travelopportunities, superior – subordinate relationship, recognition andappreciation, years since last promotion etc. These factors would then be used to predict employeeattrition. This prediction would help in retaining valuable employees by providing incentive

2.2 References

[01] Sandeep Yadav, Aman Jain, Deepti Singh, "Early Prediction of Employee Attrition using DataMining Techniques" in IEEE 2018.

[02] R Shiva Shankar, J Rajanikanth, V.V.Sivaramaraju, K VSSR Murthy, " PREDICTION OFEMPLOYEE ATTRITION USING DATAMINING", in IEEE

[03] Rachna Jain, Anand Nayyar," Predicting Employee Attrition using XGBoost Machine LearningApproach", in IEEE 2018

[04] Sarah S. Alduayj, Kashif Rajpoot, "Predicting Employee Attrition using Machine Learning",inIEEE 2018.

[5] Nagadevara, Vishnuprasad. (2018). Early Prediction of Employee Attrition in SoftwareCompaniesApplication of Data Mining Techniques.
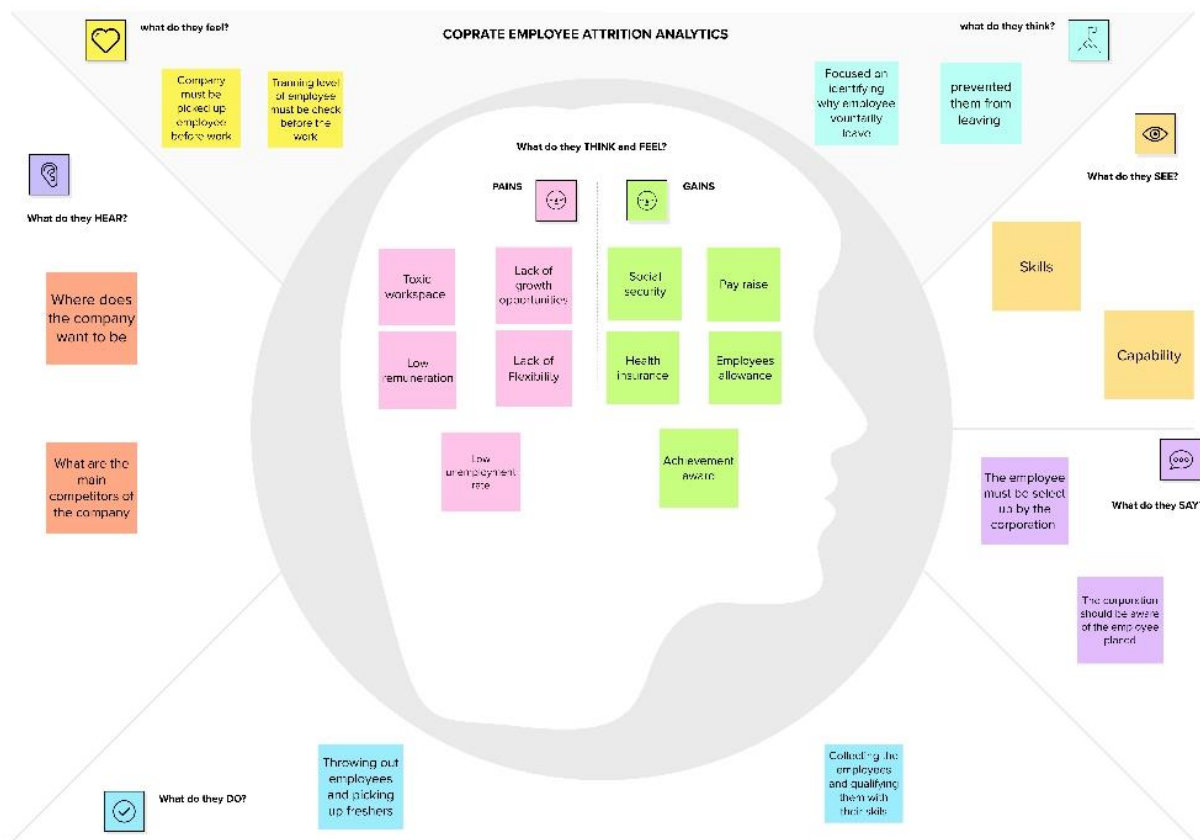
2.3 Problem Statement Definition

Attrition is critical in the industry these days. It's the major problem which highlights in all theorganizations. "Attrition is said to be the gradual reduction in

the number of employees throughretirement, resignation or death. It can also be said as Employee Turnover or Employee Defection" A well-trained and well adapted employee leaves the organization, it creates a vacuum. So, theorganization loseskey skills, knowledge and business relationships.

3.IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming
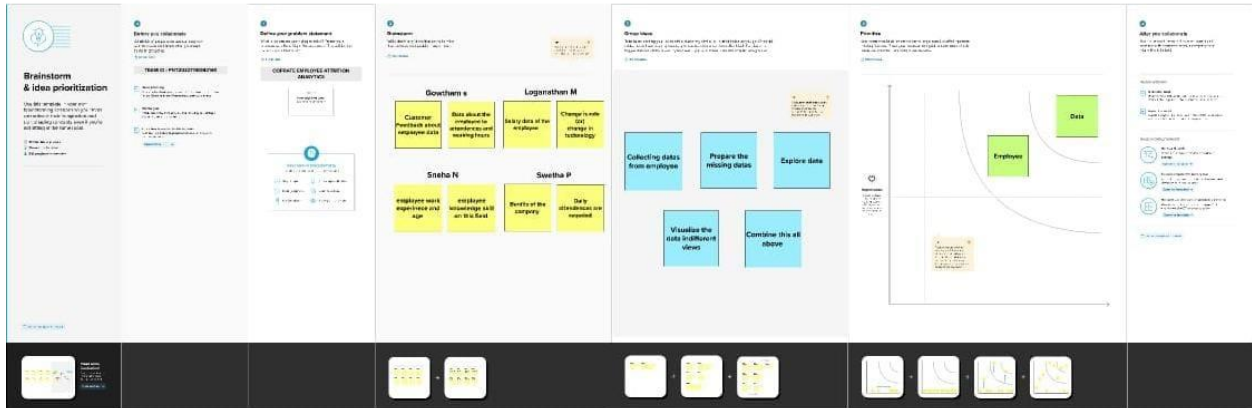
3.3 Proposed Solution

Proposed Solution Template:

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Talented persons to be granted and appricieted and retained
2.	Idea / Solution description	Data of the every employee to be recorded and analyzed
3.	Novelty / Uniqueness	Each and every data will be more accurate.
4.	Social Impact / Customer Satisfaction	HR of the company should easy to make the decision.
5.	Business Model (Revenue Model)	Talented persons of the company should be retained for the company growth
6.	Scalability of the Solution	The given solution to be more reliable and scalable.

3.4 Problem Solution Fit

4.

Project Title: Corportate Employee Attrition Analytics   Project Design Phase-I - Solution Fit Template   Team ID: PNT2022TMID431430

	1. CUSTOMER SEGMENT(S)	6. CUSTOMER CONSTRAINTS	5. AVAILABLE SOLUTIONS	
Define CS, fit into CC	Human resources managers of corporate industries.	To help them to retain the talented people for the organization growth	The have the datas of the employee to analyse them to make a solution	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS	9. PROBLEM ROOT CAUSE	7. BEHAVIOUR	
	Data to be clean and it doesn't contain any duplicate values and redundancy	When the employee of the company who has refive the company or the company has to fire the employees. The need to analyze each employee.	Get all clear and clean data and analyze through the application	
	Having more efficient data analysis and comparisions	Make the many data to different comparisions	Get visualized data to make the decision	
	4. EMOTIONS: BEFORE / AFTER			
	When the customer of the product who is using they had to take a clear decision			

REQUIREMENT ANALYSIS

4.1 Functional Requirement

Functional Requirements:

Following are the functional requirements of the proposed solution.

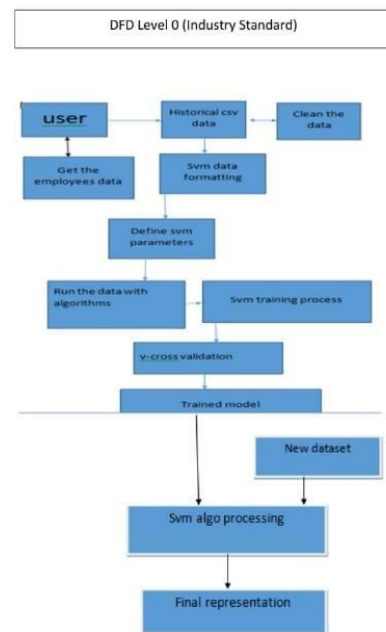| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Visiting website	Visiting website to view different employees attrition . Visiting website to view selected employees attrition.
FR-2	Analysing	Analysing performance of the employee. An analysing monetary detail of the employee. Analysing overtime working of the employee.

4.2 Non – Functional Requirement

Non-functional Requirements:

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

| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The UI should be simple enough for everyone to understand .
NFR-2	Security	The website must be secure enough to trust by the users.
NFR-3	Reliability	The UI should be able to withstand any errors in the data.
NFR-4	Performance	Data visualization of different attrition components are shown.
NFR-5	Availability	The UI should respond to the users within 2 seconds.
NFR-6	Scalability	Best algorithms are used analyse the attrition component.

5.PROJECT DESIGN

5.1 Data Flow Diagram

5.2 Solution &Technical Architecture

Technical Architecture:
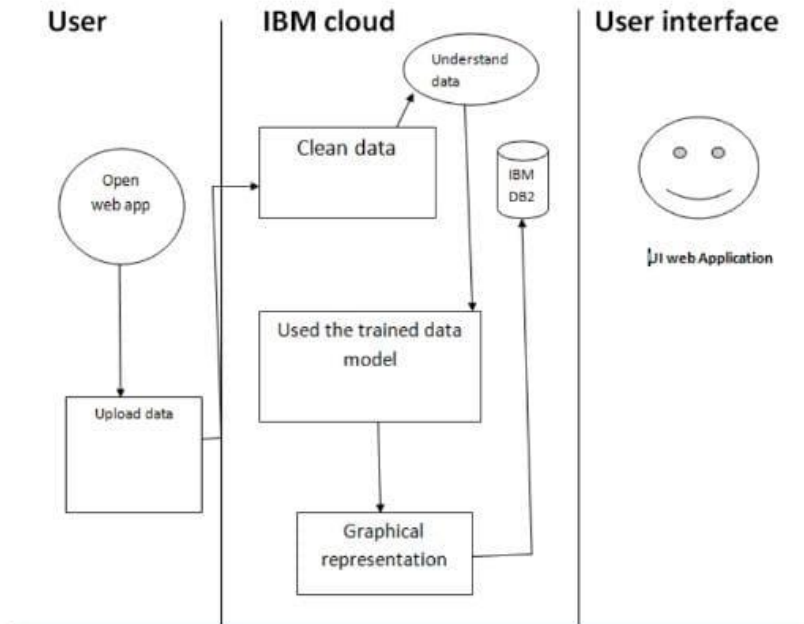
5.3 User Stories

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	Registration using Google	I can acess my account through google	High	Sprint-1
		USN-2	Create Credentials	I can acess my account through Credentials	High	Sprint-1
	Login	USN-3	Login through google or credentials		High	Sprint-1
	Dashboard		Used data , recent data , home , analysis data			
Customer (Web user)			Select data from files			
Customer Care Executive			Troubleshoot website issues			
Administrator			Maintain the DB			

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

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 users	2	High	Loganathan,swetha
Sprint-1	Login	USN-2	I can enter the creditials to login	1	High	Sneha
Sprint-1	Collect Data	USN-2	Collect data	2	High	Gowtham
Sprint-2		USN-3	Develop alogorithm	3	Low	Gowtham ,Loganathan
Sprint-2		USN-4	Create web app	2	Medium	swetha
Sprint-3		USN-5	Incorporate the algo and the process of database using cloud	3	High	Sneha swetha
Sprint-3	Dashboard	USN-6	Design and add the function of the dash board	2	High	Gowtham, Sneha
Sprint-4	Data process	USN-7	Create the visualize data in cognos	2	medium	Loganathan
Sprint-4	Final project	USN-8	Combination of All	3	High	Gowtham, loganathan ,swetha,sneha

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	5	6 Days	24 oct 2022	05 Nov 2022	5	05 nov 2022
Sprint-2	5	6 Days	31 Oct 2022	10 Nov 2022	5	10 nov 2022
Sprint-3	5	6 Days	07 Nov 2022	16 Nov 2022	5	14 nov 2022
Sprint-4	5	6 Days	14 Nov 2022	19 Nov 2022	5	18 nov 2022

6.3 Report from Jira

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.

7. CODING & SOLUTIONING

Employee Attrtion with ml deployment:

```html
<!DOCTYPE html>

<html >

<head>

<meta charset="UTF-8">

<title>Employee Attrition Prediction</title>

<link href='https://fonts.googleapis.com/css?family=Pacifico' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Arimo' rel='stylesheet' type='text/css'>

<link href='https://fonts.googleapis.com/css?family=Hind:300' rel='stylesheet' type='text/css'>
```

```html
<link href='https://fonts.googleapis.com/css?family=Open+Sans+Condensed:300' rel='stylesheet' type='text/css'>
```

```html
</head>
```

```html
<body>
```

```html
<div class="login">
```

```html
<h1>Predict Attrition</h1>
```

```html
<!-- Main Input For Receiving Query to our ML -->
```

```html
<form action="{{ url_for('predict')}}" method="POST" autocomplete="on">
```

```html
<strong>Age</strong> :<input type="number" name="Age" placeholder="18-80" required min="18" max="80"><br><br>
```

```html
<strong>BusinessTravel</strong> :<input type="radio" name="BusinessTravel" id="Rarely" value="Rarely">Rarely <input type="radio" name="BusinessTravel" id="Frequently" value="Frequently"> Frequently<input type="radio" name="BusinessTravel" id="No Travel" value="No Travel">No Travel<br><br>
```

```html
<strong>Daily Rate</strong> :<input type="number" name="Daily Rate" placeholder="100-1600" required min="100" max="1600" size="30"><br><br>
```

```html
<strong>Department</strong> :<input type="radio" name="Department" id="Research & Development" value="Research & Development">Research &Development <input type="radio" name="Department" id="Human Resources" value="Human Resources">Human Resources <input type="radio" name="Department" id="Sales" value="Sales">Sales<br><br>
```

```html
<strong>Distance From Home</strong> :<input type="number" name="Distance From Home" placeholder="1-29" required min="1" max="29"><br><br>
```

Education :<input type="number" name="Education" placeholder="1-5" required min="1" max="5">

Education Field : <input type="radio" name="Education Field" id="Life Sciences" value="Life Sciences">Life Sciences   <input type="radio" name="Education Field" id="Medical" value="Medical">Medical   <input type="radio" name="Education Field" id="Marketing" value="Marketing">Marketing   <input type="radio" name="Education Field" id="Technical Degree" value="Technical Degree">Technical Degree <input type="radio" name="Education Field" id="Human Resources" value="Human Resources">Human Resources <input type="radio" name="Education Field" id="Other" value="Other">Other

Environment Satisfaction :<input type="number" name="Environment Satisfaction" placeholder="1-4" required min="1" max="4">

Gender :<input type="radio" name="Gender" id="Male" value="Male">Male <input type="radio" name="Gender" id="Female" value="Female">Female

Hourly Rate :<input type="number" name="Hourly Rate" placeholder="30-100" required min="30" max="100">

Job Involvement :<input type="number" name="Job Involvement" placeholder="1-4" required min="1" max="4">

Job Level :<input type="number" name="Job Level" placeholder="1-5" required min="1" max="5">

Job Role : <input type="radio" name="Job Role" id="Sales Executive" value="Sales Executives">Sales Executive   <input type="radio" name="Job Role" id="Research Scientist" value="Research Scientist">Research Scientist <input type="radio" name="Job Role" id="Laboratory Technician" value="Laboratory Technician">Laboratory Technician   <input type="radio" name="Job Role" id="Manufacturing Director" value="Manufacturing Director">Manufacturing Director <input type="radio" name="Job Role" id="Healthcare Representative" value="Healthcare Representative">Healthcare Representative <input type="radio" name="Job Role" id="Manager" value="Manager">Manager   <input type="radio" name="Job Role" id="Sales Representative" value="Sales Representative">Sales Representative <input type="radio" name="Job Role" id="Research Director" value="Research Director">Research Director   <input type="radio" name="Job Role" id="Human Resource" value="Human Resources">Human Resources


```html
<strong>Job Satisfaction</strong> :<input type="number" name="Job Satisfaction" placeholder="1-4" required min="1" max="4"><br><br>


<strong>Marital Status</strong> :<input type="radio" name="Marital Status" id="Married" value="Married">Married <input type="radio" name="Marital Status" id="Single" value="Single">Single <input type="radio" name="Marital Status" id="Divorced" value="Divorced">Divorced<br><br>


<strong>Monthly Income</strong> :<input type="number" name="Monthly Income" placeholder="1000-20000" required min="1000" max="20000" size="30"> (1000-20000)<br><br>


<strong>Number of Companies Worked in</strong> :<input type="number" name="Number of Companies Worked in" placeholder="0-9" required min="1" max="9"><br><br>


<strong>Over Time</strong> :<input type="radio" name="Over Time" id="Yes" value="Yes">Yes <input type="radio" name="Over Time" id="No" value="No">No<br><br>


<strong>Performance Rating</strong> :<input type="number" name="Performance Rating" placeholder="1-4" required min="1" max="4"><br><br>


<strong>Relationship Satisfaction</strong> :<input type="number" name="Relationship Satisfaction" placeholder="1-4" required min="1" max="4"><br><br>


<strong>Stock Option Level</strong> :<input type="number" name="Stock Option Level" placeholder="0-3" required min="0" max="3"><br><br>


<strong>Total Working Years</strong> :<input type="number" name="Total Working Years" placeholder="0-40" required min="0" max="40"><br><br>


<strong>Training Times Last Year</strong> :<input type="number" name="Training Times Last Year" placeholder="0-6" required min="0" max="6"><br><br>
```

```html
<strong>Work Life Balance</strong> :<input type="number" name="Work Life Balance" placeholder="1-4" required min="1" max="4"><br><br>


<strong>Years At Company</strong> :<input type="number" name="Years At Company" placeholder="0-40" required min="0" max="40"><br><br>


<strong>Years In Current Role</strong> :<input type="number" name="Years In Current Role" placeholder="0-18" required min="0" max="18"><br><br>


<strong>Years Since Last Promotion</strong> :<input type="number" name="Years Since Last Promotion" placeholder="0-15" required min="0" max="15"><br><br>


<strong>Years With Curr Manager</strong> :<input type="number" name="Years With Curr Manager" placeholder="0-17" required min="0" max="17"><br><br>


<br><button type="submit" class="btnbtn-primary btn-block btn-large">Predict</button>
</form>


<br>
<br>
<h1>{{ prediction_text }}</h1>


</div>



</body>
</html>
```

Dashboard.html

```html
<!doctype html>
```

```html
<!-- Website template by freewebsitetemplates.com -->

<html>

<head>

        <meta charset="UTF-8">

        <meta name="viewport" content="width=device-width, initial-scale=1.0">

        <title>Data Analytics</title>

        <link rel="stylesheet" href="css/style.css" type="text/css">

        <link rel="stylesheet" type="text/css" href="css/mobile.css">

        <script src="js/mobile.js" type="text/javascript"></script>


        <meta name="viewport" content="width=device-width, initial-scale=1">

<style>

* {box-sizing: border-box;}

body {font-family: Verdana, sans-serif;}

.mySlides {display: none;}

img {vertical-align: middle;}


/* Slideshow container */

.slideshow-container {

  max-width: 1000px;

  position: relative;

  margin: auto;

}


/* Caption text */

.text {

  color: #f2f2f2;

  font-size: 15px;

  padding: 8px 12px;
```

```css
  position: absolute;

  bottom: 8px;

  width: 100%;

  text-align: center;

}


/* Number text (1/3 etc) */
.numbertext {

  color: #f2f2f2;

  font-size: 12px;

  padding: 8px 12px;

  position: absolute;

  top: 0;

}


/* The dots/bullets/indicators */
.dot {

  height: 15px;

  width: 15px;

  margin: 0 2px;

  background-color: #bbb;

  border-radius: 50%;

  display: inline-block;

  transition: background-color 0.6s ease;

}


.active {

  background-color: #717171;

}
```

```css
/* Fading animation */
.fade {
  animation-name: fade;
  animation-duration: 1.5s;
}

@keyframes fade {
  from {opacity: .4}
  to {opacity: 1}
}

/* On smaller screens, decrease text size */
@media only screen and (max-width: 300px) {
  .text {font-size: 11px}
}
</style>

</head>
<body>
```

```html
<div id="body">
<div class="header">
        <div>
                <h1>DATA ANALYTICS</h1>
        </div>
</div>
```

```
<div class="blog">

    <div class="featured">
        <ul>
            <h2>Sample images</h2>
<p>Analysis in cognos</p>

<div class="slideshow-container">

<div class="mySlides fade">
<div class="numbertext">1 / 3</div>
<img src="img1.png" width="700" height="700">
<div class="text">Caption Text</div>
</div>

<div class="mySlides fade">
<div class="numbertext">2 / 3</div>
<img src="img2.png" width="700" height="700">
<div class="text">Caption Two</div>
</div>

<div class="mySlides fade">
<div class="numbertext">3 / 3</div>
<img src="img3.png" width="700" height="700">
<div class="text">Caption Three</div>
</div>

</div>
<br>
```

```html
<div style="text-align:center">
<span class="dot"></span>
<span class="dot"></span>
<span class="dot"></span>
</div>

<script>
let slideIndex = 0;
showSlides();

function showSlides() {
  let i;
  let slides = document.getElementsByClassName("mySlides");
  let dots = document.getElementsByClassName("dot");
  for (i = 0; i < slides.length; i++) {
    slides[i].style.display = "none";
  }
  slideIndex++;
  if (slideIndex > slides.length) {slideIndex = 1}
  for (i = 0; i < dots.length; i++) {
    dots[i].className = dots[i].className.replace(" active", "");
  }
  slides[slideIndex-1].style.display = "block";
  dots[slideIndex-1].className += " active";
  setTimeout(showSlides, 3000); // Change image every 2 seconds
}
</script>
```



```html
                                <div>
                                        <h1>DATA ANALYTICS BY IBM
COGNOS</h1>


                                        <p>WE CAN SEE THE DASH BOARD BY
CLICKING THESE AND LOGON TO COGNOS</p>
                                        <a
href="https://login.ibm.com/authsvc/mtfim/sps/authsvc?PolicyId=urn:ibm:security:authentication:asf:b
asicldapuser&Target=https%3A%2F%2Flogin.ibm.com%2Foidc%2Fendpoint%2Fdefault%2Fauthorize%3F
qsId%3Dbcb0d44a-9f2d-48cf-bb43-311c1b29486d%26client_id%3DMyIBMLondonProdCI"
class="more">VIEW DASHBOARD</a>
                                </div>
                        </li>
                        <li>
                                <div>
                                        <h1>SAMPLES OF THE IBM
COGNOS</h1>


<iframe
src="https://us1.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FPhar
ma%2BDashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&a
mp;shareMode=embedded&amp;action=view&amp;mode=dashboard&amp;subView=model00000183
829e6992_00000000" width="320" height="200" frameborder="0" gesture="media" allow="encrypted-
media" allowfullscreen=""></iframe>
                                </div>



                        </li>
                </ul>


        </div>
```

```
                    </div>

                </div>

                <div id="footer">

                    <div>

                        <div class="connect">

                            <a href="http://facebook.com/"
class="facebook">facebook</a>

                            <a href="http://twitter.com/" class="twitter">twitter</a>

                            <a href="http://googleplus.com/"
class="googleplus">googleplus</a>

                            <a href="http://pinterest.com" class="pinterest">pinterest</a>

                        </div>

                        <p>&copy; 2023 Employee attrtion. All Rights Reserved.</p>

                    </div>

                </div>

            </div>

</body>

</html>
```

8. TESTING

8.1 Acceptance testing:

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

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 applicatio users	2	High	Loganathan,swetha
Sprint-1	Login	USN-2	I can enter the creditals to login	1	High	Sneha
Sprint-1	Collect Data	USN-2	Collect data	2	High	Gowtham
Sprint-2		USN-3	Develop alogothim	3	Low	Gowtham ,Loganathan
Sprint-2		USN-4	Create web app	2	Medium	swetha
Sprint-3		USN-5	Incorporate the algo and the process of database using cloud	3	High	Sneha swetha
Sprint-3	Dashboard	USN-6	Design and add the function of the dash board	2	High	Gowtham, Sneha
Sprint-4	Data process	USN-7	Create the visualize data in cognos	2	medium	Loganathan
Sprint-4	Final project	USN-8	Combination of All	3	High	Gowtham, loganathan,swetha,sneha

8.2 User Acceptance Testing:

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	3	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	24	14	13	26	78

9. RESULTS

9.1 Performance metrics:

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

10. ADVANTAGES AND DISADVANTAGES

10.1 Advantages:

- Toxic workspace
- Lack of opportunities
- Low remuneration
- Lack of flexibility
- Low un employment rate

10.2 Disadvantages:

- Social security
- Pay raise
- Health insurance
- Employee allowance
- Achievement award

11. CONCLUSION

Retention of talent and skilled employee is crucial dilemma for HR Manager especially inmanufacturing industry. This study has identified those complex factors which are key responsible foremployee attrition in selected organization. The education and experience of employee createsopportunity for new job in market and it helps to enhance better career opportunity. The ethical workculture, cordial employee relation and implementation of organizational policies are the most attractivearea of making employee to stay back in organization.

12. FUTURE SCOPE

No career growth or development opportunities: Global Talent Monitor's report on workforce activity shows that the lack of future career development remains a key driver of employee attrition — 40% of departing employees say it led them to be dissatisfied with their jobs, Gallup reports

13. APPENDIX

13.1 GitHub Account Link

https://github.com/IBM-EPBL/IBM-Project-37941-1660365518

13.2 Project Demo Link

https://drive.google.com/file/d/1ZvqHPap6MdJPzutcP2HqTX-8oK7JjLqs/view?usp=sharing