

Naalaiya Thiran Project

Title: Corporate Employee Attrition

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Introduction

1.1 Project overview

Employee attrition has become a vital problem across the world. It is one of the crucial issues faced by business leaders within companies where they lose the most talented employees. A good employee is always an asset to the organization and their resignation can lead to various problems like financial losses, overall performance, and loss of acquired knowledge. Furthermore, hiring new employees is far exorbitant, taxing, and time-consuming in comparison to recruiting the existing one. It is very time-consuming to recruit a new employee as it takes him months for training, adjusting to the culture, rules, and environment. Therefore, upcoming trends and technology using Machine Learning Algorithms must be exploited for the benefit of business organizations. Knowing the reason beforehand for the employee attrition, companies can mitigate this loss. This analysis provides a conclusive review of employee attrition from the dataset 'IBM HR Analytics Employee Attrition Performance'.

1.1 Purpose

[1] Hardik P. K. (2016) , researched on “a study on employee attrition: with special reference to Kerala IT Industry”. His research examined the relationship between organizational factors and attrition of IT professional's. The result can conclude that the organizational factors played significant role in predicting the variance in turnover intention (attrition) of Kerala IT professionals. Therefore, the HR managers in IT organizations may take into consideration the problems with organizational factors of their workers to reduce the turnover intention of the skilled employees.

2. LITERATURE SURVEY

2.1 Existing Problem

- The Existing system includes only few attributes for analysis and also deals with qualitative observations and simple statistical analysis. The qualitative observations deal with data and can be observed through human senses. They do not involve measurements or number. Due to the increase in IOT and connected device, we now have access to so much of data and along with it an increase needs to manage and understand data

2.2 References

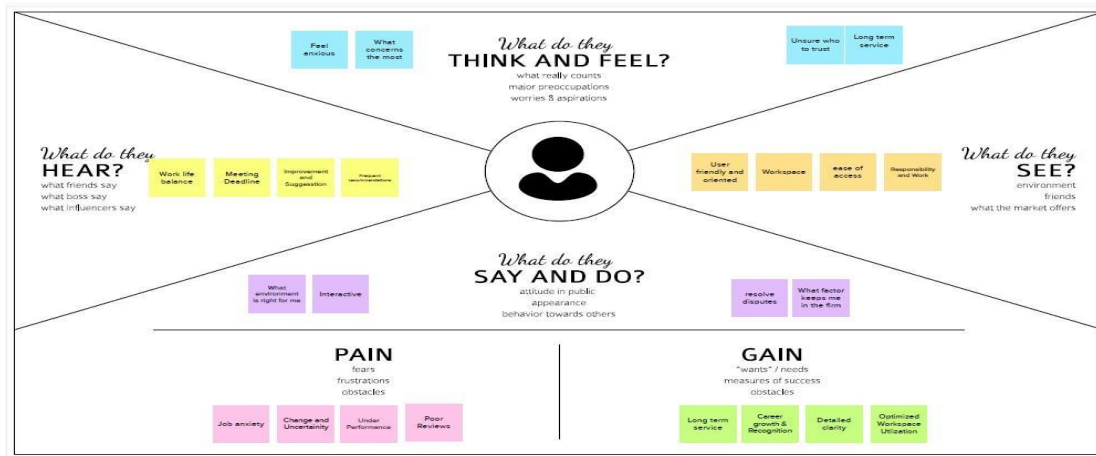
1. From Big Data to Deep Data to support people analytics for employee attrition prediction, Nesrine Ben Yahia, Hlel Jihen, Ricardo Colomo-Palacio(2021)
2. Machine Learning Approach for Employee Attrition Analysis. Dr. R. S. Kamath | Dr. S. S. Jamsandekar | Dr. P. G. Naik ,Published in International Journal of Trend in Scientific Research and Development (ijtsrd), (March 2019)
3. Investigation of early career teacher attrition(ECT) and the impact of induction programs in Western Australia, Janine E. Wyatt, Michael O'Neill (2021)
4. EMPLOYEE ATTRITION PREDICTION USING DEEP NEURAL NETWORK, Salah Al-Darraj, Dhafer G. Honi, Francesca Fallucchi, Ayad I. Abdulsada, Romeo Giuliano and Husam A. Abdulmalik,(3 November 2021)

2.3 Problem Statement Definition

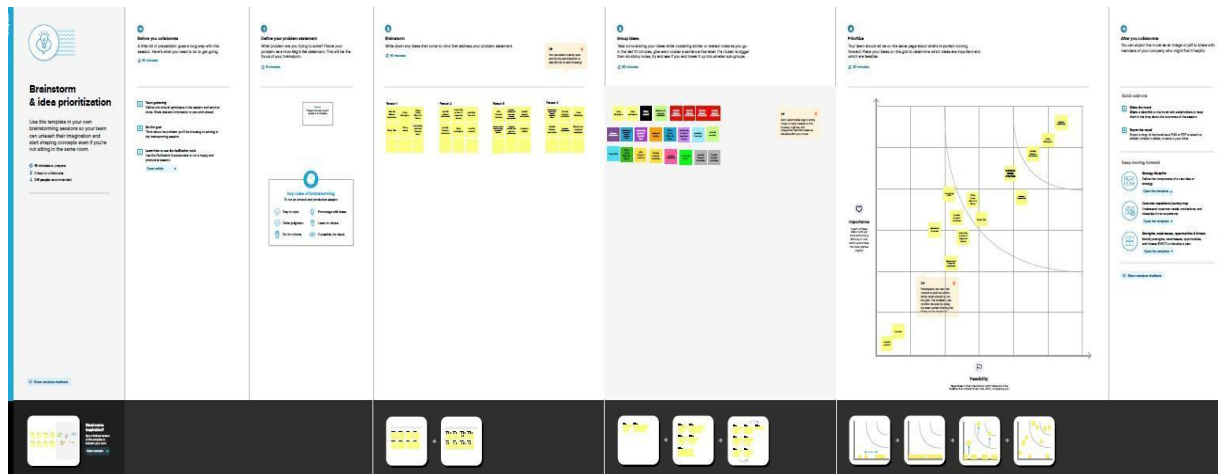
- To create a dashboard and perform analysis of employee attrition in corporates using IBM Cognos analytics platform.
- To reduce the employee attrition rate through data analytics, data visualization by analysing the major factors that causes attrition.

3. IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

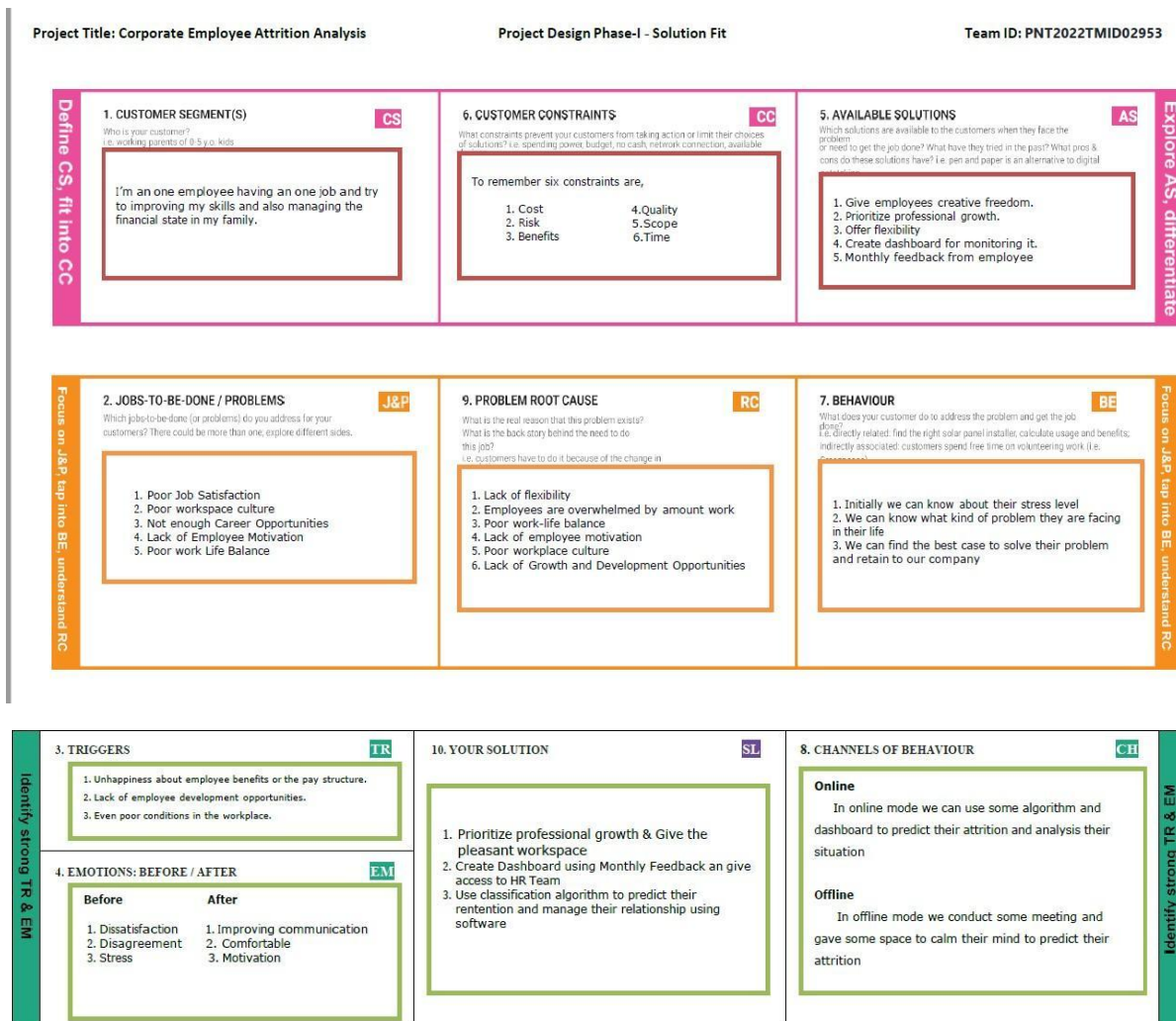


3.3 Proposed Solution

The Existing system includes only few attributes for analysis and also deals with qualitative observations and simple statistical analysis. The qualitative observations deal with data and can be observed through human senses. They do not involve measurements or number. Due to the increase in IOT and connected device, we now have access to so

much of data and along with it an increase needs to manage and understand data

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
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collect Dataset	Data from different sources are collected in order to get optimized result
Data cleaning	When combining data from multiple sources there are duplicated data and hence we clean the data 1st
Data modelling	Identify the relationship between various parameters.
Prediction and analysis	The length of stay is predicted with the Machine learning algorithm

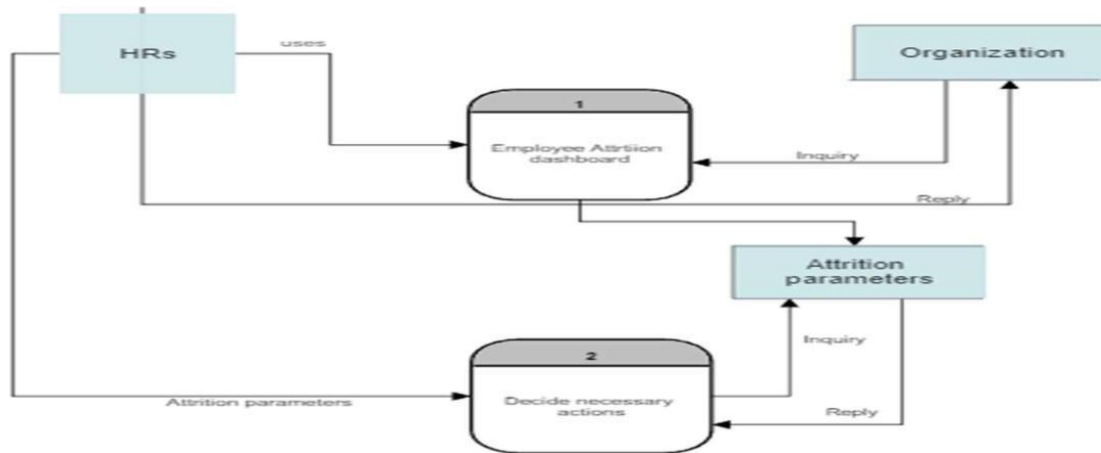
4.2 Non-Functional requirements

Non-Functional Requirement	Description
Usability	User can view and visualise the data through the interactive dashboard and predict the length of stay of patients with machine learning algorithm
Security	IBM Cognos provides better security. The dataset uploaded to the dashboard cannot be downloaded or accessed by external sources
Reliability	The dashboard and the prediction is very reliable and provide prediction with more accuracy
Performance	The length of stay of patients is predicted with more accuracy
Availability	The predicted length of stay and the visualization will be available in cognos analysis
Scalability	The software is scalable and extendable. Because it allow multiple user to handle the data at the same time

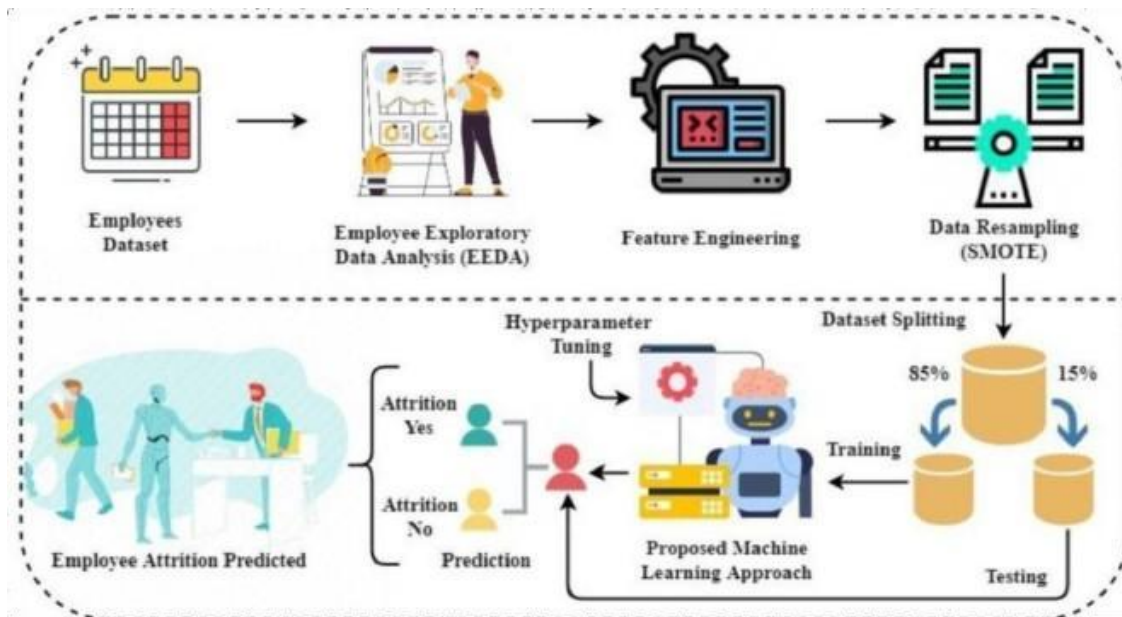
5. PROJECT DESIGN

5.1 Data Flow Diagrams

Example: DFD Level 0 (Industry Standard)



5.2 Solution & Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Employees	Registration	USN-1	The employees can register to be a part of the organization	I can access my account / dashboard	High	Sprint-1
		USN-2	As an employee, I will receive confirmation email	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As an employee, I can register for the application through G mail	I can get a verification link through email	Medium	Sprint-1
	Login	USN-4	As a employee, I can log into the application by entering email & password	I can enter the application	High	Sprint-2
	About	USN-5	I can view the Dashboard, Story and Report for attrition rates and determining the factors leading to them	I can get an idea about the project	Low	Sprint-2
	Launch	USN-7	As a HR, I can upload various analyzed parameters from the computer through link given in the PDF	I can choose any employee ('s all parameters) from my device	High	Sprint-2
	Link	USN-8	As a HR, I can review an employee's performance and offer appraisals biannually or Quarterly	I can view the employee's parameters on the dashboard along with the attrition rate.	High	Sprint-3
		USN-9	I can also upload csv format of employee retention parameters from cloud.	I can view the employee's parameters on the dashboard along with the attrition rate.	Medium	Sprint-3

6. PROJECT PLANNING

6.1 Sprint Planning & Estimation

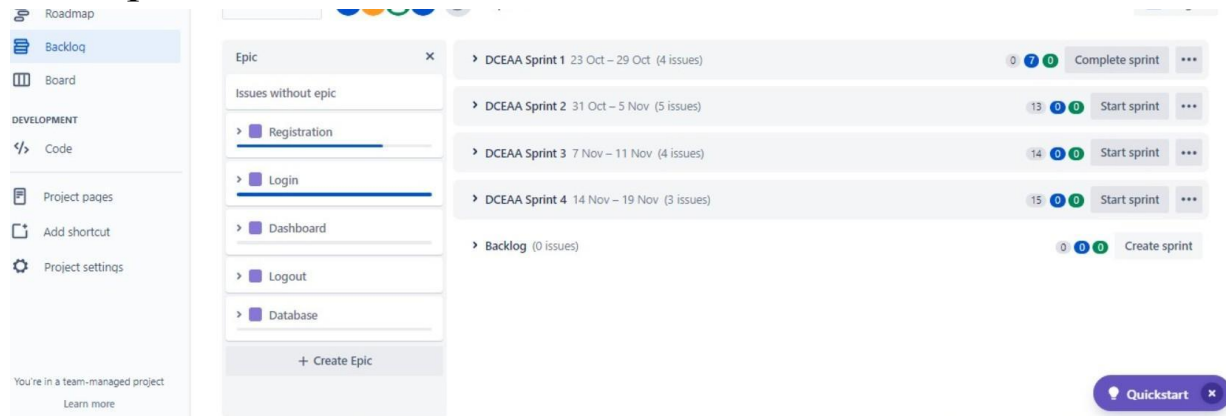
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Working with the data set	USN-1	Understanding the data set.	10	Medium	Menosha, Monisa, Noufina, Nandhini
Sprint-1	Working with the data set	USN-2	Loading the data set.	10	High	Menosha, Monisa, Noufina, Nandhini.
Sprint-2	Prepare the data	USN-3	Convert the data's into required format	10	Medium	Menosha, Monisa, Noufina, Nandhini
Sprint-2	Data exploration	USN-4	Explore the data's which is uploaded in the BM Cognos	10	Medium	Menosha, Monisa, Noufina, Nandhini
Sprint-3	Data visualization	USN-5	Creating the data visualization chart	10	High	Menosha, Monisa, Noufina, Nandhini
Sprint-3	Dashboard	USN-6	Creating a dashboard	10	High	Menosha, Monisa, Noufina, Nandhini
Sprint-4	Report	USN-7	Creating the report	10	High	Menosha, Monisa, Noufina, Nandhini
Sprint-4	Source code	USN-8	Source code	20	High	Menosha, Monisa, Noufina, Nandhini

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	20	4 Days	01 Nov 2022	04 Nov 2022	20	04 Nov 2022
Sprint-2	20	5 Days	05 Nov 2022	10 Nov 2022	20	05 Nov 2022
Sprint-3	20	4 Days	11 Nov 2022	14 Nov 2022	20	14 Nov 2022
Sprint-4	20	4 Days	15 Nov 2022	19 Nov 2022	20	19 Nov 2022

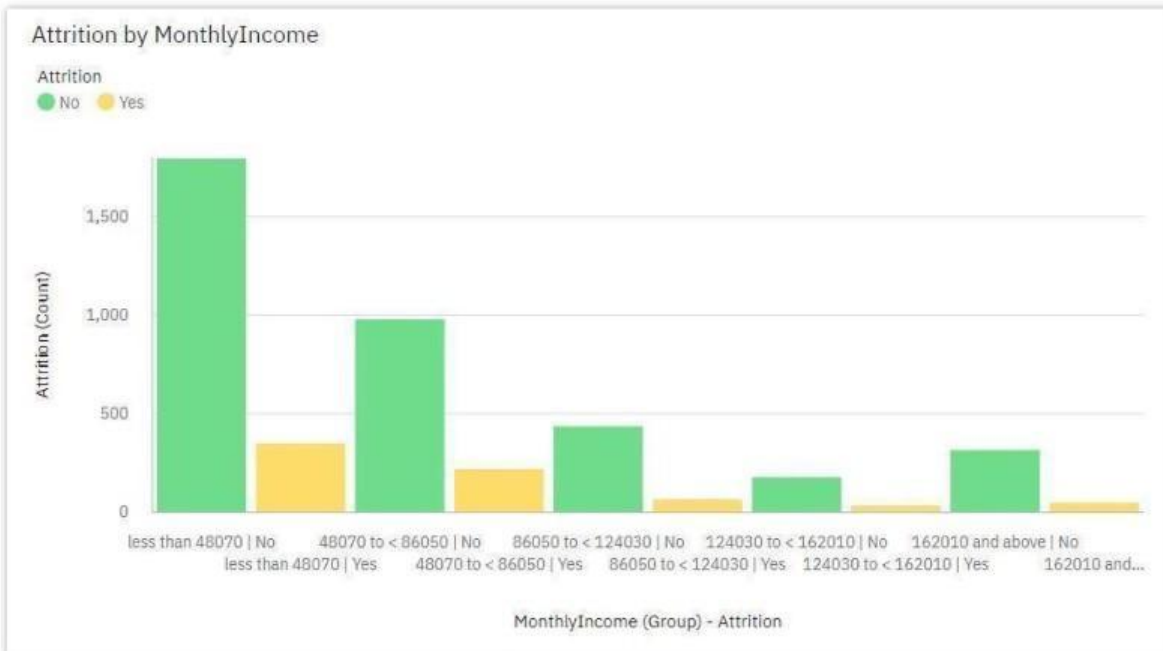
6.3 Reports from JIRA



7. RESULTS

7.1 Performance Metrics





8. ADVANTAGES &

DISADVANTAGES Advantages

Data Collection: The study is conducted among working IT professionals of two different categories. This categorisation mainly was focused on experience level and role in the organisation. It was important to know the views of candidates who seek for the job for various reasons as well as the views of interviewers involved in the process of hiring the candidates.

The research study involves reference of both primary and secondary data. Primary Data Primary data is collected through a field survey with the help of a structured self-administrated Questionnaire. The survey consisted of close ended questions by the means of convenience sampling. The scaling technique installed in the questionnaire is 5-point rating scale. Total 120 respondent were IT professionals belonging to the organisations from Nagpur, Pune and Mumbai cities in Maharashtra. Secondary Data Secondary data is collected by referring to the Journals, research papers and published data in the form of books and newspapers.

Type of Research

The research paper adopted the descriptive research design methodology. Sample Design, Sample Size and Sampling Method The sample selected for the study is an Indian Information Technology Industry. The nature of the sample is restricted to working professionals in Information Technology sector and is collected through the convenience sampling technique. The sample size was 120 respondents.

Limitations and Disclaimer

The research outcome is purely based on the experience, opinion, and the understanding level of the respondents. There is a scope of difference in results if the organisations under the survey are varied in geographical location. There may be limitations to generalize the findings of the survey completely

9. CONCLUSION

Employees as well as organizations must be clear with their expectations regarding the job profile. Any sort of mismatch leads to discrepancy and employees may fail to perform at their job. This eventually leads to attrition. Organizations should state the requirements and expectations unambiguously. This helps candidates decide upon to accept the job position or not. This eventually avoids further conflicts in the employment terms.

10. FUTURE SCOPE

Research findings suggest that attrition reasons in IT organizations primarily revolve around professional growth and challenges in the organization. Although economic factors happen to be the most influential factor, professionals may settle for second best criteria of their preference that is career growth and supportive work policies in the organization. On the other hand, candidates who aspire to have a better job than the one in hand are more interested in securing the next job. Young talent wants to work on latest technology and functional domain. IT professionals who are young career makers are less

influenced by Brand name or geographical area. Most of the IT professionals look for challenging role and position in the organization. Candidates as well as senior professionals believe that challenging work motivate them to maintain the interest in the work life. Employees as well as organizations must be clear with their expectations regarding the job profile. Any sort of mismatch leads to discrepancy and employees may fail to perform at their job. This eventually leads to attrition. Organizations should state the requirements and expectations unambiguously. This helps candidates decide upon to accept the job position or not. This eventually avoids further conflicts in the employment terms. Further this research can make more detailed conclusions over “mapping of candidates’ expectations with organizations’ requirement” by collecting the data focusing on all the steps of recruitment and selection process.

11. APPENDIX

Source Code

```

import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

```

DATASET 1

```
df1=pd.read_csv('/content/drive/MyDrive/attrition/employee_attrition_train.csv')
```

```

from google.colab import drive
drive.mount('/content/drive')

```

Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.mount("/content/drive", force_remount=True).

```
df1
```

	Age	Attrition	BusinessTravel	DailyRate	Department	DistanceFromHome	Education	EducationField	EmployeeCount	EmployeeNumber	...	RelationshipSatisfaction	Sta
0	50.0	No	Travel Rarely	1126.0	Research & Development	1.0	2	Medical	1	997	..	3	
1	36.0	No	Travel Rarely	216.0	Research & Development	6.0	2	Medical	1	178	..	4	
2	21.0	Yes	Travel Rarely	337.0	Sales	7.0	1	Marketing	1	1780	..	2	
3	50.0	No	Travel Frequently	1246.0	Human Resources	NaN	3	Medical	1	644	..	3	
4	52.0	No	Travel Rarely	994.0	Research & Development	7.0	4	Life Sciences	1	1118	..	4	
...
1024	NaN	No	Travel Rarely	750.0	Research & Development	28.0	3	Life Sciences	1	1596	..	4	
1025	41.0	No	Travel Rarely	447.0	Research & Development	NaN	3	Life Sciences	1	1814	..	1	
1026	22.0	Yes	Travel Frequently	1256.0	Research & Development	NaN	4	Life Sciences	1	1203	..	2	
1027	29.0	No	Travel Rarely	1378.0	Research & Development	13.0	2	Other	1	2053	..	1	
1028	50.0	No	Travel Rarely	264.0	Sales	9.0	3	Marketing	1	1591	..	3	

1029 rows × 35 columns

```
In [ ]: df1.columns
```

```
Out[ ]: Index(['Age', 'Attrition', 'BusinessTravel', 'DailyRate', 'Department',
              'DistanceFromHome', 'Education', 'EducationField', 'EmployeeCount',
              'EmployeeNumber', 'EnvironmentSatisfaction', 'Gender', 'HourlyRate',
              'JobInvolvement', 'JobLevel', 'JobRole', 'JobSatisfaction',
              'MaritalStatus', 'MonthlyIncome', 'MonthlyRate', 'NumCompaniesWorked',
              'Over18', 'OverTime', 'PercentSalaryHike', 'PerformanceRating',
              'RelationshipSatisfaction', 'StandardHours', 'StockOptionLevel',
              'TotalWorkingYears', 'TrainingTimesLastYear', 'WorkLifeBalance',
              'YearsAtCompany', 'YearsInCurrentRole', 'YearsSinceLastPromotion',
              'YearsWithCurrManager'],
              dtype='object')
```

```
In [ ]: df1.dtypes
```

```
Out[ ]: Age                float64
Attrition                object
BusinessTravel            object
DailyRate                float64
Department                object
DistanceFromHome          float64
Education                 int64
EducationField            object
EmployeeCount             int64
EmployeeNumber            int64
EnvironmentSatisfaction    int64
Gender                    object
HourlyRate                int64
JobInvolvement            int64
JobLevel                 int64
JobRole                   object
JobSatisfaction            int64
MaritalStatus             object
MonthlyIncome             int64
MonthlyRate               int64
NumCompaniesWorked        int64
Over18                    object
OverTime                  object
PercentSalaryHike         int64
PerformanceRating         int64
RelationshipSatisfaction   int64
StandardHours             int64
StockOptionLevel          int64
TotalWorkingYears         int64
TrainingTimesLastYear     int64
WorkLifeBalance           int64
YearsAtCompany            int64
YearsInCurrentRole        int64
YearsSinceLastPromotion   int64
YearsWithCurrManager      int64
dtype: object
```

```
In [ ]: df1.shape
```

```
In [ ]: df1.info()
```

```
RangeIndex: 1029 entries, 0 to 1028
Data columns (total 35 columns):
 #   Column                Non-Null Count  Dtype
---  -
 0   Age                    893 non-null   float64
 1   Attrition              1029 non-null  object
 2   BusinessTravel         1024 non-null  object
 3   DailyRate              1002 non-null  float64
 4   Department             1029 non-null  object
 5   DistanceFromHome       934 non-null   float64
 6   Education               1029 non-null  int64
 7   EducationField         1029 non-null  object
 8   EmployeeCount          1029 non-null  int64
 9   EmployeeNumber         1029 non-null  int64
10   EnvironmentSatisfaction 1029 non-null  int64
11   Gender                 1029 non-null  object
12   HourlyRate             1029 non-null  int64
13   JobInvolvement         1029 non-null  int64
14   JobLevel               1029 non-null  int64
15   JobRole                 1029 non-null  object
16   JobSatisfaction        1029 non-null  int64
17   MaritalStatus          1024 non-null  object
18   MonthlyIncome          1029 non-null  int64
19   MonthlyRate            1029 non-null  int64
20   NumCompaniesWorked     1029 non-null  int64
21   Over18                 1029 non-null  object
22   OverTime               1029 non-null  object
23   PercentSalaryHike      1029 non-null  int64
24   PerformanceRating      1029 non-null  int64
25   RelationshipSatisfaction 1029 non-null  int64
26   StandardHours          1029 non-null  int64
27   StockOptionLevel       1029 non-null  int64
28   TotalWorkingYears      1029 non-null  int64
29   TrainingTimesLastYear  1029 non-null  int64
30   WorkLifeBalance        1029 non-null  int64
31   YearsAtCompany         1029 non-null  int64
32   YearsInCurrentRole     1029 non-null  int64
33   YearsSinceLastPromotion 1029 non-null  int64
34   YearsWithCurrManager   1029 non-null  int64
dtypes: float64(3), int64(23), object(9)
memory usage: 281.5+ KB
```

```
In [ ]: df1.describe()
```


Out[]:

	Age	DailyRate	DistanceFromHome	Education	EmployeeCount	EmployeeNumber	EnvironmentSatisfaction	HourlyRate	JobInvolvement	JobLevel	...	Relat
count	893.000000	1002.000000	934.000000	1029.000000	1029.0	1029.000000	1029.000000	1029.000000	1029.000000	1029.000000	...	...
mean	37.930571	800.528942	9.930407	2.892128	1.0	1024.367347	2.683188	66.680272	2.713314	2.043732	...	...
std	9.395978	408.109828	8.421791	1.053541	0.0	606.301635	1.096829	20.474094	0.710146	1.118918	...	...
min	18.000000	102.000000	1.000000	1.000000	1.0	1.000000	1.000000	30.000000	1.000000	1.000000	...	...
25%	31.000000	458.250000	2.000000	2.000000	1.0	496.000000	2.000000	48.000000	2.000000	1.000000	...	...
50%	37.000000	801.500000	8.000000	3.000000	1.0	1019.000000	3.000000	67.000000	3.000000	2.000000	...	...
75%	44.000000	1162.000000	16.000000	4.000000	1.0	1553.000000	4.000000	84.000000	3.000000	3.000000	...	...
max	60.000000	1496.000000	29.000000	5.000000	1.0	2068.000000	4.000000	100.000000	4.000000	5.000000	...	...

8 rows × 26 columns



In []: df1.isnull().sum()

Out[]:

Age	136
Attrition	0
BusinessTravel	5
DailyRate	27
Department	0
DistanceFromHome	95
Education	0
EducationField	0
EmployeeCount	0
EmployeeNumber	0
EnvironmentSatisfaction	0
Gender	0
HourlyRate	0
JobInvolvement	0
JobLevel	0
JobRole	0
JobSatisfaction	0
MaritalStatus	5
MonthlyIncome	0
MonthlyRate	0
NumCompaniesWorked	0
Over18	0
OverTime	0
PercentSalaryHike	0
PerformanceRating	0
RelationshipSatisfaction	0
StandardHours	0
StockOptionLevel	0
TotalWorkingYears	0
TrainingTimesLastYear	0
WorkLifeBalance	0
YearsAtCompany	0
YearsInCurrentRole	0
YearsSinceLastPromotion	0
YearsWithCurrManager	0
dtype: int64	

```
In [ ]: df1['NumCompaniesWorked']=df1['NumCompaniesWorked'].fillna(df1['NumCompaniesWorked'].mean())
```

```
In [ ]: df1['TotalWorkingYears']=df1['TotalWorkingYears'].fillna(df1['TotalWorkingYears'].mean())
```

```
In [ ]: df1.isnull().sum()
```

```
Out[ ]: Age      136
Attrition      0
BusinessTravel  5
DailyRate      27
Department     0
DistanceFromHome 95
Education      0
EducationField  0
EmployeeCount   0
EmployeeNumber  0
EnvironmentSatisfaction 0
Gender          0
HourlyRate      0
JobInvolvement  0
JobLevel        0
JobRole         0
JobSatisfaction  0
MaritalStatus   5
MonthlyIncome   0
MonthlyRate     0
NumCompaniesWorked 0
Over18          0
OverTime        0
PercentSalaryHike 0
PerformanceRating 0
RelationshipSatisfaction 0
StandardHours   0
StockOptionLevel 0
TotalWorkingYears 0
TrainingTimesLastYear 0
WorkLifeBalance 0
YearsAtCompany  0
YearsInCurrentRole 0
YearsSinceLastPromotion 0
YearsWithCurrManager 0
dtype: int64
```

```
In [ ]: df1
```

```
Out[ ]:   Age  Attrition  BusinessTravel  DailyRate  Department  DistanceFromHome  Education  EducationField  EmployeeCount  EmployeeNumber  ...  RelationshipSatisfaction  Sta
0  50.0      No      Travel Rarely    1126.0  Research & Development      1.0      2      Medical      1      997  ...      3
1  36.0      No      Travel Rarely    216.0  Research & Development      6.0      2      Medical      1      178  ...      4
2  21.0     Yes      Travel Rarely    337.0      Sales      7.0      1      Marketing      1      1780  ...      2
3  50.0      No  Travel Frequently    1246.0  Human Resources      NaN      3      Medical      1      644  ...      3
4  52.0      No      Travel Rarely    994.0  Research & Development      7.0      4      Life Sciences      1      1118  ...      4
...  ...  ...  ...  ...  ...  ...  ...  ...  ...  ...  ...  ...
1024  NaN      No      Travel Rarely    750.0  Research & Development      28.0      3      Life Sciences      1      1596  ...      4
1025  41.0      No      Travel Rarely    447.0  Research & Development      NaN      3      Life Sciences      1      1814  ...      1
1026  22.0     Yes  Travel Frequently    1256.0  Research & Development      NaN      4      Life Sciences      1      1203  ...      2
1027  29.0      No      Travel Rarely    1378.0  Research & Development      13.0      2      Other      1      2053  ...      1
1028  50.0      No      Travel Rarely    264.0      Sales      9.0      3      Marketing      1      1591  ...      3
```

1029 rows x 35 columns

