

I.INTRODUCTION

Employee attrition and candidate absconding are important business concerns for every arranging, one even bigger than attracting talent. Employee attrition is a serious issue, specially in today's knowledge-driven marketplace where employees are the most important human capital assets; attrition impacts an organization militant advantage. The tangible costs of employee attrition would be the cost of training new employees, the recruitment and selection costs, adjustment time, possible product and or service quality problems, costs of agency workers/ temp staff, the cost of training, the cost of loss productivity, the cost of lost knowledge and the cost of the position remaining vacant till a suitable switch is found. The intangible costs, which may be even more substantial than the tangibles, involve the effect of attrition on organizational culture, employee morale, social capital or organizational memory.

1.1. PROJECT OVERVIEW

Employee attrition costs would significantly take away the gainfulness and the competitive advantage of the firm. It is mode for every organization to understand what attracts and retains a potential candidate and predict attrition early in the recruitment process to curtail significant loss of productivity among hiring managers, recruiters and eventual loss of revenue and moneys. Employee attrition is a very big problem globally. Attrition rate is increasing day by day, and specially the software industry is affected the most in the present era. Why an Employee leaves a company is the question asked by most of the employers. Companies even hire Private HR professionals to study the company's work and find out why an employee is dissatisfied. HR department does the recruiting of new employees and then send them for training so that they can understand work and work culture and become better professionals. Each and every company faces employee turn over problem whether big or small. An employee leaves his present job for another job to get better pay package and good working conditions. Every Company calculates Employee attrition rate and takes measures to reduce it. To know about the attrition rate and the techniques followed by the company to overcome this barrier.

1.2. PURPOSE

Employees want to feel valued and that their efforts are noticed and acknowledged. Staff engagement is fuelled by meaningful appreciation, which raises employee morale. Employees that are engaged are less likely to hunt for new employment possibilities. Promoting professional development is crucial, and those who feel valued by the organisation are less likely to leave. Additionally, it implies that it will be simple to implement the Schneider Electric model of looking within and upskilling current talent if their jobs become obsolete. Every organisation is significantly impacted by employee wellness. Taking care of employees can completely change their lives, making them more content, effective, and less worried. When workers are heard, they also feel valued. Employee happiness is increased by actively seeking feedback and offering it (in a positive, constructive way). Promoting growth and fostering employee loyalty increases retention and lowers turnover. Making a career plan that takes the firm into account emphasizes a worker's potential future with the company. More than a pay check is what most employees desire. They seek perks and advantages that truly improve the quality of their lives. It also includes;

- Health insurance
- Paid time off
- Disability and life insurance
- Flexible and remote working options

2. LITERATURE SURVEY

2.1. EXISTING PROBLEM

Machine Learning Approach for Employee Attrition Analysis proposed by 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).

The right employees with the right abilities and placing them in the right positions at the right time and place is a major administrative choice. The authors present a machine learning method for attrition analysis and forecasting in human resources (HR). A platform for data science and machine learning called Kaggle is where the data for this inquiry was obtained. The current study examines the classification accuracy and displays performance estimation of various classification techniques. The model's effectiveness is assessed using the error matrix and the pseudo-R square estimate of error rate. The Random Forest model's performance accuracy demonstrated its suitability for categorization. This investigation comes to the conclusion that employee satisfaction is more important than other characteristics in determining employee attrition.

From Big Data to Deep Data to support people analytics for employee attrition prediction proposed by Nesrine Ben Yahia in 2021

People analytics aid firms and their human resources (HR) managers in reducing attrition by altering the methods for luring and keeping talent in the age of data science and big data analytics. Employee attrition poses a serious issue and a significant danger to firms in this situation since it impacts both their productivity and the continuity of their planning. Organizations face a serious challenge and significant risk from employee attrition since it impacts both their productivity and the continuity of their planning. The key contributions of this research in this area are as follows. First, we suggest an approach to people analytics, that switches from a big data context to a deep data context by focusing on data quality, rather than data quantity in order to anticipate employee turnover. To build a useful employee attrition model and discover the main employee characteristics that affect an employee's attrition, this deep data-driven methodology actually relies on a hybrid strategy.

Investigation of early career teacher attrition(ECT) and the impact of induction programs in Western Australia, Janine E. Wyatt, Michael O'Neill (2021)

This work focuses on establishing the ECT attrition rate and profiling ECTs who are more likely to leave teaching. When investigating ECT attrition it would be beneficial to know if attrition rates change over time, and about subsets of the teaching workforce. A binomial logistic regression was chosen as the dependent variable was dichotomous (stay or left) and it would describe the data and explain the relationship between the dependent binary variable and the independent variables.

Employee Attrition Prediction Using Deep Neural Network, Salah Al-Darran, Dhafer G. Honi, Francesca Fallucchi, Ayad I. Abdulsada, Romeo Giuliano and Husam A. Abdulmalik, (3 November 2021)

The proposed work utilizes the deep learning technique along with some preprocessing steps to improve the prediction of employee attrition. Extensive experiments have been conducted to show the practical value of our work. The prediction accuracy using the original dataset is about 91%, whereas it is about 94% using a synthetic dataset.

Prediction Of Employee Attrition Using Data mining proposed by R. Shiva Shankar; J. Rajanikanth; V.V. Sivaramaraju; K.V.S.S.R. Murthy (06-07 July 2018)

Employee Attrition is a big issue for the organizations specially when trained, technical and key employees leave for a better opportunity from the organization. This results in financial loss to replace a trained employee. Therefore, we use the current and past employee data to analyse the common reasons for employee attrition or attrition. For the prevention of employee attrition, we applied a well known classification methods, that is, Decision tree, Logistic Regression, SVM, KNN, Random Forest, Naive bayes methods on the human resource data. For this we implement feature selection method on the data and analysis the results to prevent employee attrition. This is helpful to companies to predict employee attrition, and also helpful to their economic growth by reducing their human resource cost.

2.2. REFERENCES

1. Machine Learning Approach for Employee Attrition Analysis proposed by 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).
2. From Big Data to Deep Data to support people analytics for employee attrition prediction proposed by Nesrine Ben Yahia in 2021.
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. Prediction Of Employee Attrition Using Data mining proposed by R. Shiva Shankar; J. Rajanikanth; V.V. Sivaramaraju; K.V.S.S.R. Murthy (06-07 July 2018)

2.3. PROBLEM DEFINITION

The most crucial component of every corporation is its workforce. Successful employees meet deadlines, generate revenue, and enhance the brand through satisfying encounters with clients. Employee attrition is a significant expense for an organization, and in many cases, the Human Resources department's top priority is to foresee such attritions. Predicting an organization's personnel turnover rate is the task at hand in this problem. The

platform affects the corporate HR manager. The boundaries of the problem are Management that faces the issues of employee attrition. In organizations, employees are leaving and it might be a concern for the organization. It is more cost-effective to keep the employees a company already has. It is very much important to fix the problem required for the growth of the organization. It is important to retain the employees. To solve this issue an automated system is introduced to identify different reasons for employees leaving the organization by environment, job satisfaction, work-life balance. Machine learning techniques are used to predict the employee attrition in an organization is the methodology used to solve the issue.

3. IDEATION & PROPOSED SOLUTION

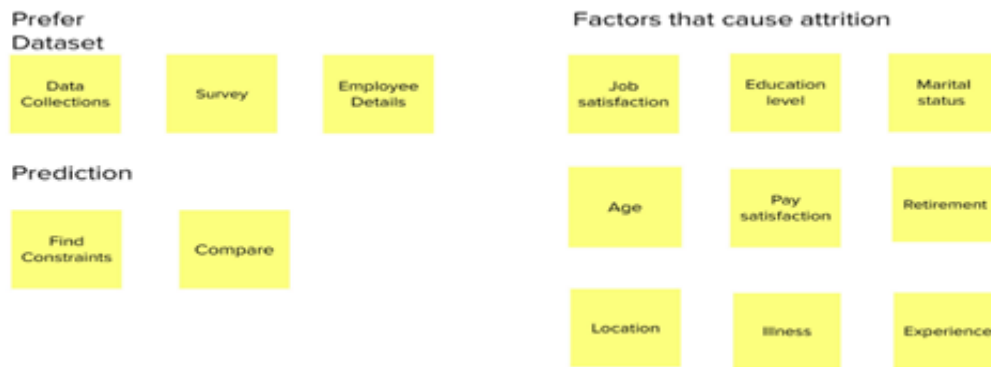
3.1. EMPATHY MAP CANVAS:

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. learns from experience, just like humans do. Deep learning techniques are used in difficult fields like computer vision and audio processing where the volume of data is particularly large.



3.2. IDEATION & BRAINSTORMING:

A growing company is facing a high attrition rate among their employees which in turn affects their business. So we are trying to identify the cause of employee attrition and ultimately, help the company to improve human retention strategy. Analyse and identify the cause and predict the employee who will leave and who will stay the company. Group of the cluster of similar ideas or related notes and label each other group of clusters.



3.3. PROPOSED SOLUTION:

The proposed system is being implemented using machine learning, one of the applications of artificial intelligence, as a solution to the issue. Based on employee happiness, the workplace environment, and other factors, the employee attrition analysis system will forecast the attrition rate. Finding an employee's mood is a difficult process. Identifying daily mood recognition, emotion detection, the surroundings, the need for a hike, employee contentment, employee contribution, and job development are other crucial factors. This predictor has been presented as a solution to all of these problems. The field of smart and contemporary employee sentiment analysis is currently undergoing a lot of research and development. The ensemble machine learning approach known as gradient boosting can be utilized to create the predictor model. These are the models used to forecast the attrition rate of employees. It is simpler for hr and management since it produces results with the least amount of effort and time when predicting the employee turnover rate and analysing mood and emotions. This deed greatly benefits both the business and society as a whole. In order to offer this crucial service to the environment and society, our employee attrition analysis system is in the form of a web application.

3.4. PROBLEM SOLUTION FIT:

A dashboard to track the numerous reasons why people leave their positions and to provide HR with advice on dealing with various attrition issues. Create a supervised machine learning model using regression algorithms to predict the cause of employee attrition based on the following factors. Execution, job satisfaction, affiliates, and the distance between homes and workplaces are all factors. Because it takes a long time to manually analyses the causes of employee attrition, the person might have quit before the cause was found, wasting important human resources . Significant human effort is needed. The algorithm acts in a way that minimises the time and effort needed by humans to manually compile and identify the many causes of employee attrition. Additionally, it draws attention to the key factors that contribute to employee attrition for the primary clients, the corporate HR departments. The most crucial factors that must receive urgent attention to lower attrition in the company are directly predictable by and visible to the customers.. The major goal of this research is to use Machine Learning (ML) algorithms to anticipate the primary causes of employee attrition in corporate firms. The project should take into account factors such as job progress, employee satisfaction, subsidiaries, and rewards, among others, and create a dashboard for simple comprehension of attrition statistics. Spending capacity, economic limitations, and insufficient resources.

4. REQUIREMENT ANALYSIS

We have used an implementation tools like, Python and flask,HTML. Also we creates an Dataset and Train the created Dataset and Testing is happen accordingly.

4.1. FUNCTIONAL REQUIREMENT:

In our implementation we required a registration page, about the employee details and search of the employee in datasets and we required a software to run our implementation. The software need to be installed in systems and the employee datasets need to be imported and updated frequently are the function requirements needed from the server side of the implementations.

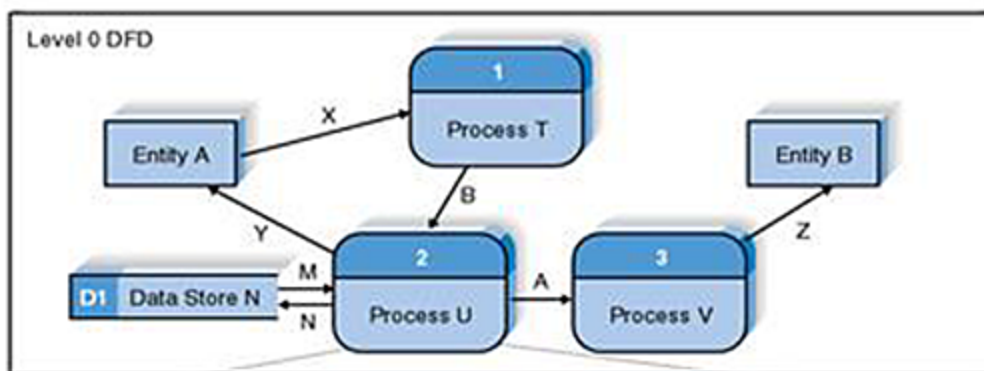
4.2. NON-FUNCTIONAL REQUIREMENTS:

In our implementation we required a registration page, about the employee details and search of the employee in datasets and we required a software to run our implementation. In our implementation the data are gets clean and exploration takes lace in our system project implementation and when the data uploaded the data gets cleaned and the data exploration process takes place and the search of the entered data and displays the output as status of employee.

5. PROJECT DESIGN

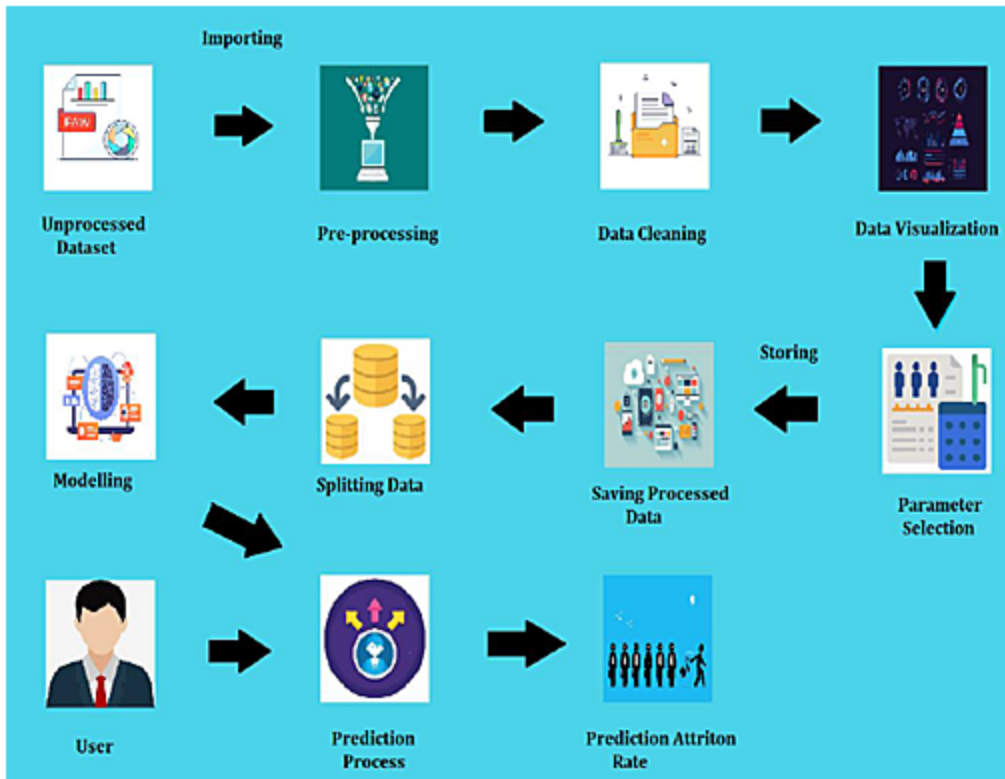
5.1. DATA FLOW DIAGRAMS:

A data flow diagram (DFD) is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. A data-flow diagram is a way of representing a flow of data through a process or a system. The DFD also provides information about the outputs and inputs of each entity and the process itself. A data-flow diagram has no control flow — there are no decision rules and no loops.



5.2. SOLUTION & TECHNICAL ARCHITECTURE:

The Architecture states how the project get implemented along with the datasets and the output prediction. Initially the unprocessed datasets gets imported to the system and data cleaning and data exploration takes place in the system architecture and save the processed data and splits the data as modules. The modelled data predicts the output process and the attrition rate of the employee.



5.3. USER STORIES:

The user type of employee with functional requirement of Registration with task employees can apply to join the company by filling out a form and receiving email authentication. Once sign up for the application, I will receive a confirmation email as an employee. User able to sign up for the application using g-mail as an employee. I may sign up for the application through phone number as a worker. The user type of employee with functional requirement of Login with task, I can access the application as an employee by providing my email address and password. The user type of employee with functional requirement of about with task I select "About" to learn how to anticipate the attrition rate of employees based on attributes such as the workplace, employee attitudes, daily employee engagement, and job progress. The user type of employee with functional requirement of Launch with task upload numerous computer-analysed parameters as an HR. The user type of employee with functional requirement of Predict with task predict using the predict button as an HR. Additionally, I can upload cloud-based employee retention criteria in csv format.

6. PROJECT PLANNING & SCHEDULING

6.1. SPRINT PLANNING & ESTIMATION:

As a user, I should be able to register in the application and the registered user should be authenticated and verified and logged in. As a user, able to upload the dataset and do exploratory analysis and Explore patterns, present the data using analytical tools and present the data using charts and graphs. As split the data into test and train data and create the model. This is model is used to predict the attrition rate of employee. As sprint is planned for four phases sprint 1, sprint 2, sprint 3 and sprint 4.

6.2. SPRINT DELIVERY SCHEDULE:

The delivery of each sprint duration of six days. Each end of six day the sprint will be delivered.

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)
Sprint-1	5	6 Days	24 Oct 2022	29 Oct 2022
Sprint-2	5	6 Days	31 Oct 2022	05 Nov 2022
Sprint-3	5	6 Days	07 Nov 2022	12 Nov 2022
Sprint-4	5	6 Days	14 Nov 2022	19 Nov 2022

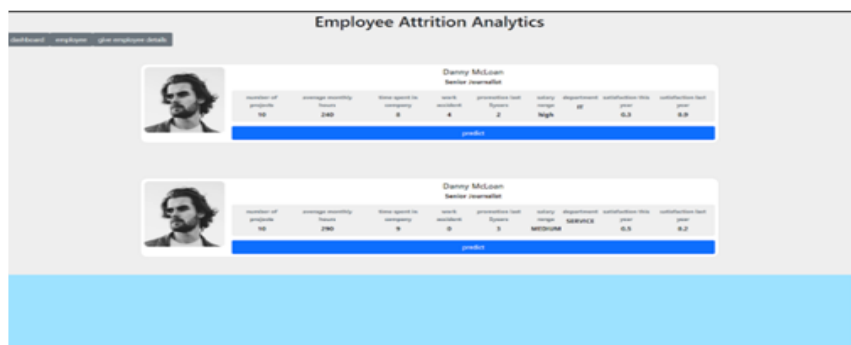
6.3. REPORTS FROM JIRA:

Employee attrition refers to a decrease in the number of employees working for a company that occurs when employees leave and aren't replaced. Customer attrition, on the other hand, refers to a shrinking customer base. The loss of employees can be a problem for corporations because it can mean the reduction of valued talent in the workforce. However, it can also be a good thing. Attrition can force a firm to identify the issues that may be causing it. It also allows companies to cut down labour costs as employees leave by choice and they're not replaced. Eventually, it can lead to the hiring of new employees with fresh ideas and energy. You can prevent customer attrition by making sure that your company offers the products and services that your customers want, provides them with excellent customer service, stays current with market trends, and addresses any problems that arise as a result of customer complaints.

7. CODING & SOLUTIONING

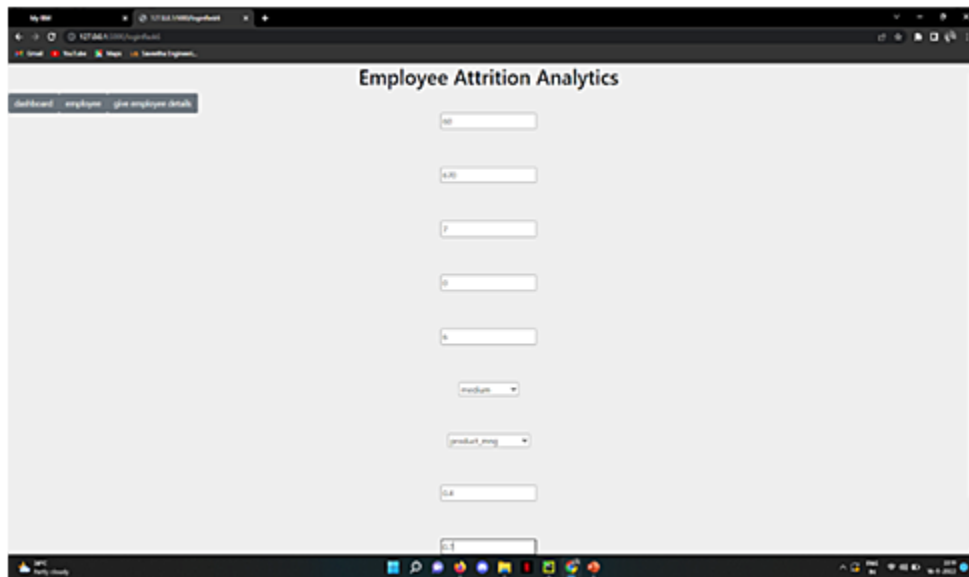
7.1. EMPLOYEE SEARCH (FEATURE 1):

In employee search feature we had implemented that a employee details has been updated with schemas like Employee Name, Number of projects he had worked and average monthly income, Total number of time he spent in the company as well as time spent in projects and the satisfaction level of employee.



7.2. EMPLOYEE DETAILS SEARCH PREDICTION (FEATURE 2):

In employee details search feature we had implemented that a employee details need to be entered manually with schemas like Employee Name, Number of projects he had worked and average monthly income, Total number of time he spent in the company as well as time spent in projects and the satisfaction level of employee the system will predict the status of employee and displays the status in the screen.



The screenshot shows a web browser window with the title "Employee Attrition Analytics". The browser's address bar shows "127.0.0.1:5000/employee". The page has a navigation bar with links: "dashboard", "employee", and "give employee details". The main content area contains a form with several input fields and dropdown menus. The fields are labeled: "id", "name", "age", "gender", "experience", "salary", "department", "product group", and "satisfaction". The "satisfaction" field is a dropdown menu with "medium" selected. The "product group" field is a dropdown menu with "product group" selected. The "satisfaction" field has a value of "0.6" displayed below it. The "product group" field has a value of "0.1" displayed below it. The browser's taskbar at the bottom shows various icons and the system clock.

7.3. DATABASE SCHEMAS:

In this implementation we had few database schemas like Satisfaction level of employee and Last Evaluation. In satisfaction level of employee schema the adaptive work of an employee is determined and shown in the datasets. In Last Evaluation schema the updated level of attrition rate of an employee is stated and determined through various datasets. Job satisfaction is defined as the level of contentment employees feel with their job. This goes beyond their daily duties to cover satisfaction with team members/managers, satisfaction with organizational policies, and the impact of their job on employees' personal lives. The indicator measures the extent to which the employees of the targeted businesses are satisfied with their job. It employs a methodology called Employee Satisfaction Index that is commonly used across different countries.



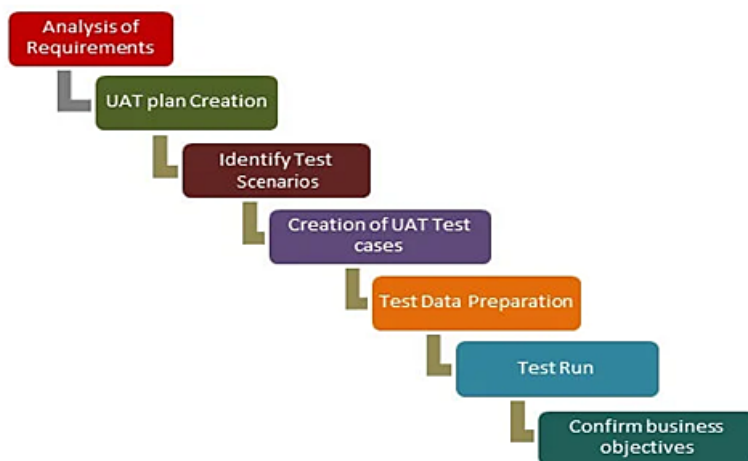
8. TESTING:

8.1. TEST CASES:

Test Scenario typically have the details of an employee and satisfaction level and last evaluation. Along to search an attrition analytics the test cases need to be entered manually, the cases like Number of projects that employee done, Average Monthly hours he worked in this company. Total time spent and work accident and, choose the salary ranges between high, medium and low as well as the department of employee worked on. The required test cases that need to be mentioned as requirements for this analysis.

8.2. USER ACCEPTANCE TESTING:

User Acceptance Testing arises once software has undergone Unit, Integration and System testing because developers might have built software based on requirements document by their own understanding and further required changes during development may not be effectively communicated to them, so for testing whether the final product is accepted by client/end-user, user acceptance testing is needed. The testing is done based on the process like Analysis of Business Requirements, Creation of UAT test plan, Identify Test Scenarios, Create UAT Test Cases, Preparation of Test Data(Production like Data), Run the Test casesRecord the ResultsConfirm business objectives.



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Accuracy score : 97.93333333333332					
	precision	recall	f1-score	support	
0	0.99	0.99	0.99	3432	
1	0.95	0.96	0.96	1068	
accuracy			0.98	4500	
macro avg	0.97	0.97	0.97	4500	
weighted avg	0.98	0.98	0.98	4500	

9. RESULTS

In the our implementation we have segregated as three phases in our system. The first phase is considered as Dashboard phase and the second phase namely Employee phase and final phase is Employee Attrition Analytics phase.

9.1. PERFORMANCE METRICS:

Dashboard: In the feature of dashboard the attrition where gets displayed in the dashboard schema. Based on several comparison the attrition rate percentage has been shown in the chart method. The representation attrition based on as follows:

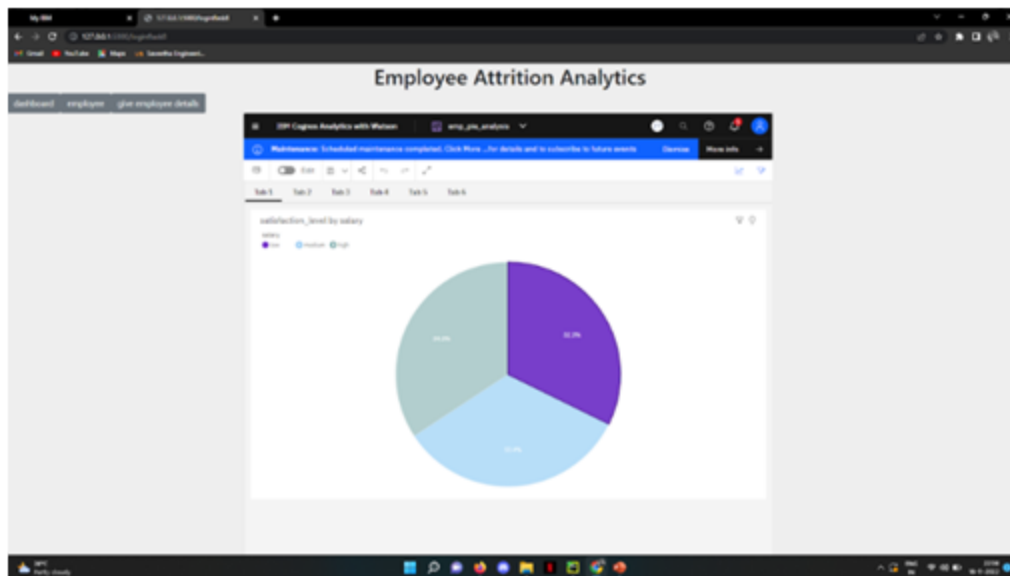


Fig 1: satisfaction level on salary

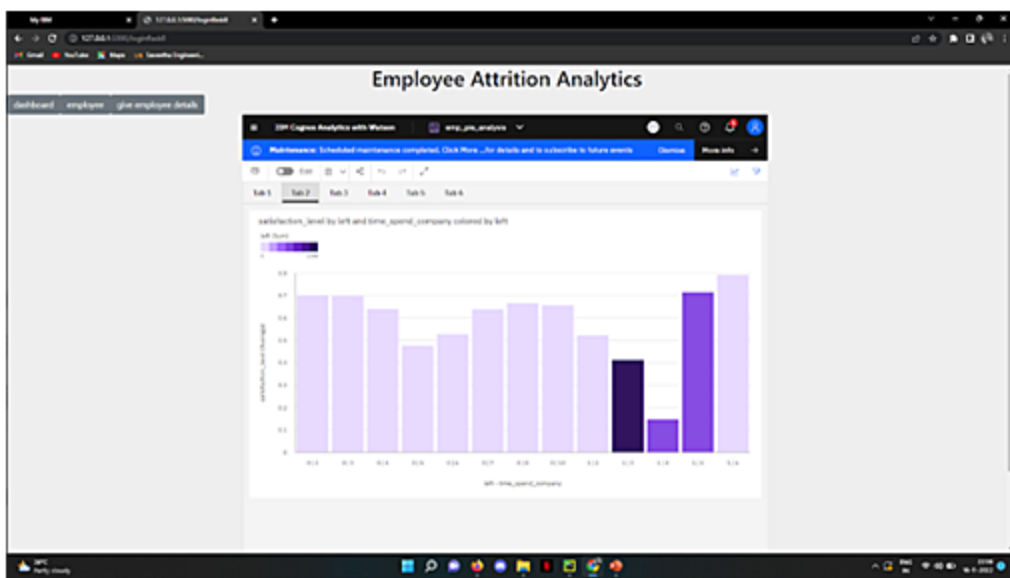


Fig 2: Satisfaction level on lay off from company

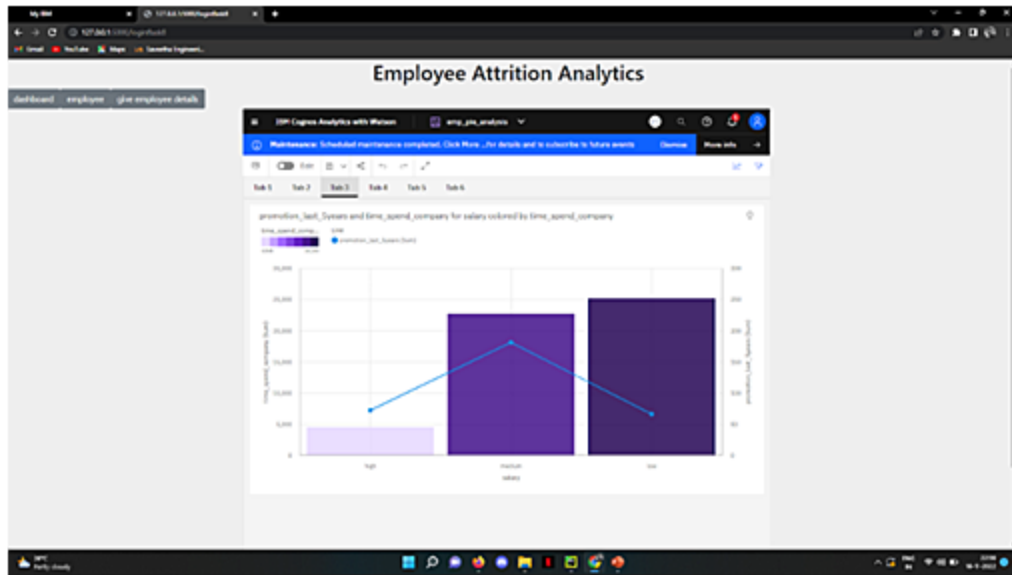


Fig 3: Promotion and Time Spent on company

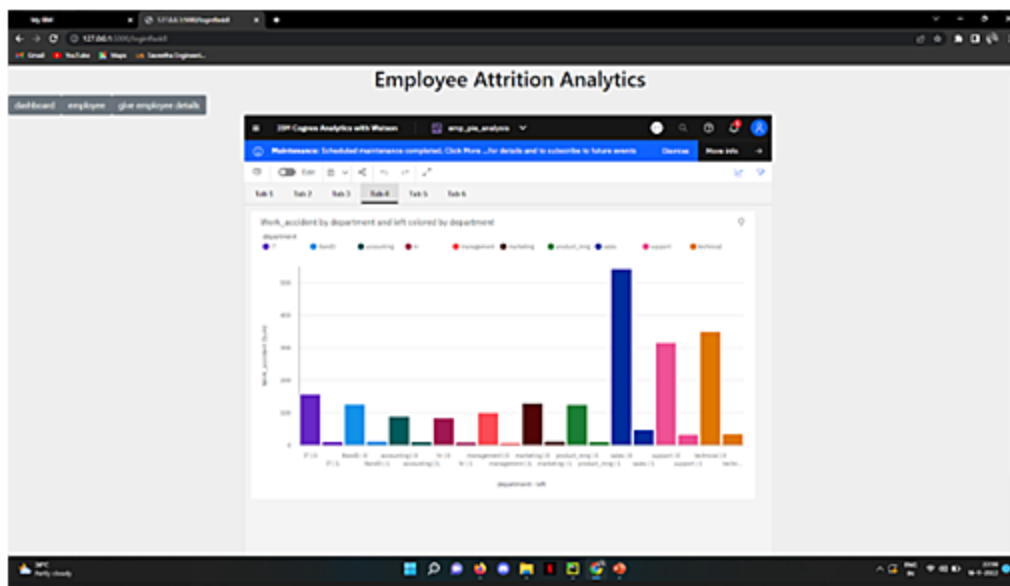


Fig 4: Work Accident in department

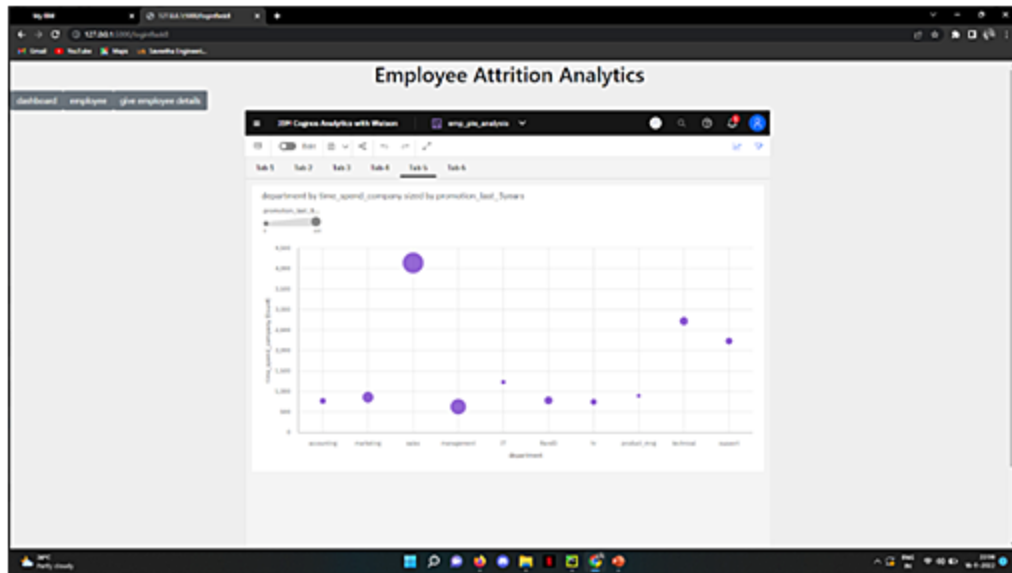


Fig 5: Time spent on Department and promotion

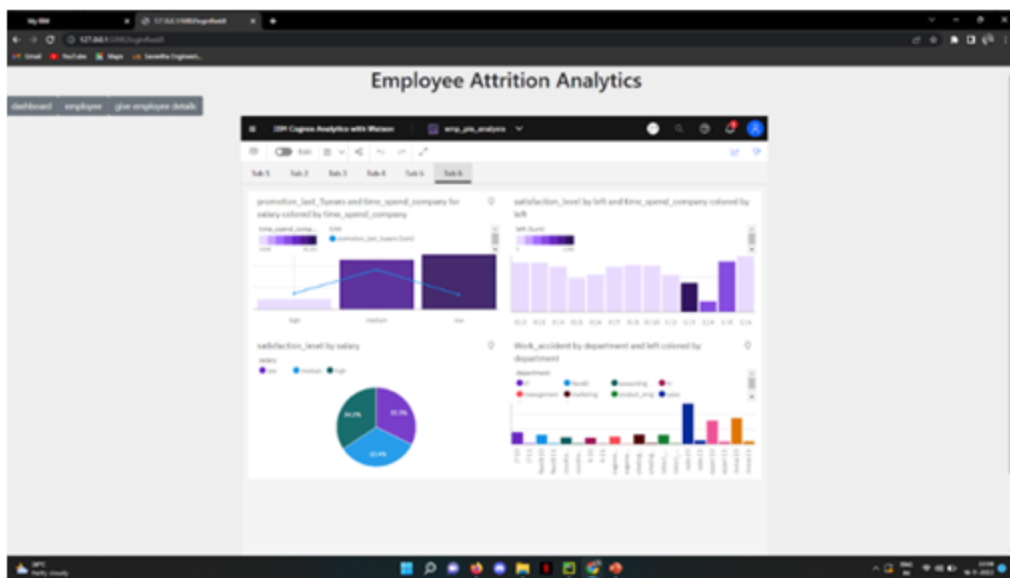


Fig 6: Overall Representation

Employee: In the employee feature the system will predict the status of the employee if the particular employee will layoff form the company or will stay in this company. This prediction will calculate based on the attrition rate as well as satisfaction level of the employee.

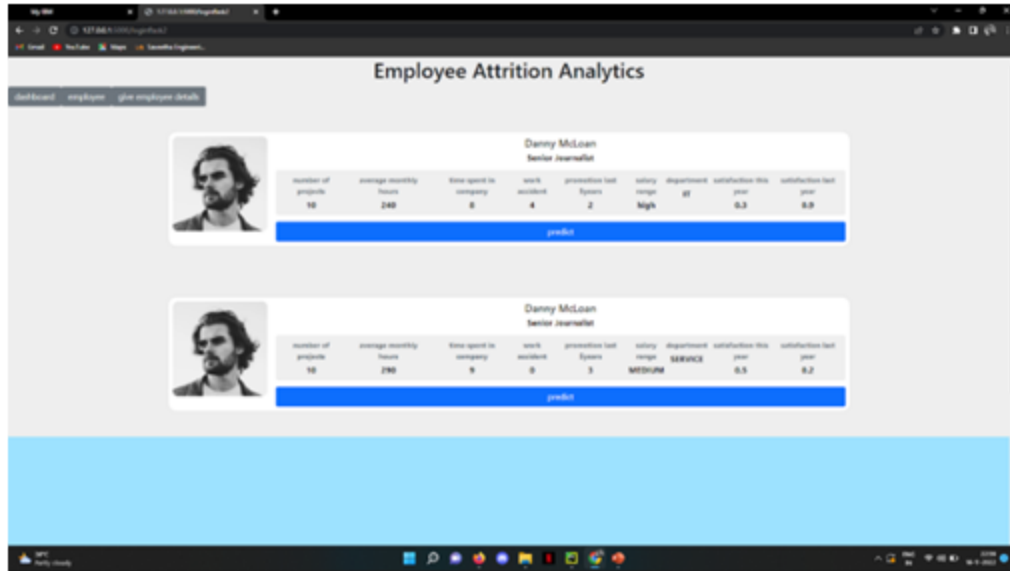


Fig 7: Employee Phase

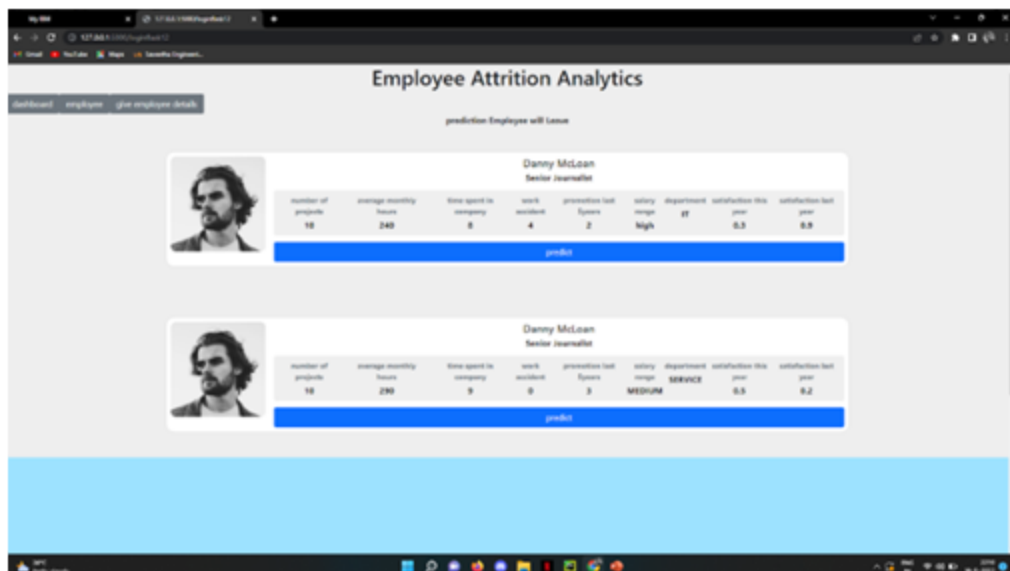


Fig 8: Predicted Employee Status

Employee Attrition Analytics: In this phase the user enters the details of an employee manually. After entering the details manually the particular employee will layoff form the company or will stay in this company. This prediction will calculate based on the attrition rate as well as satisfaction level of the employee.

The screenshot shows a web browser window with the title "Employee Attrition Analytics". The browser address bar shows "127.0.0.1:5000/employee". The page has a navigation bar with "dashboard", "employee", and "give employee details" (the active page). The main content area contains a vertical stack of input fields: "Number of Project", "Average Monthly Hours", "Time Spent in Company", "Work Accident", "Promotion, Left, Salary", "Choose salary", "Choose department", "Satisfaction level", and "Test evaluation". The Windows taskbar at the bottom shows the system clock as 10:41 AM on 10/10/2023.

Fig 9: Employee Attrition Analytics

The screenshot shows the same web application, but now displaying the output of the model. The input fields from the previous screen are now populated with values: "100", "4.00", "2", "10", "4", "medium", "product_mng", and "0.8". The "Test evaluation" field at the bottom now displays the result "0.8". The browser address bar and navigation bar remain the same. The Windows taskbar at the bottom shows the system clock as 10:42 AM on 10/10/2023.

Fig 10: Model Employee Data

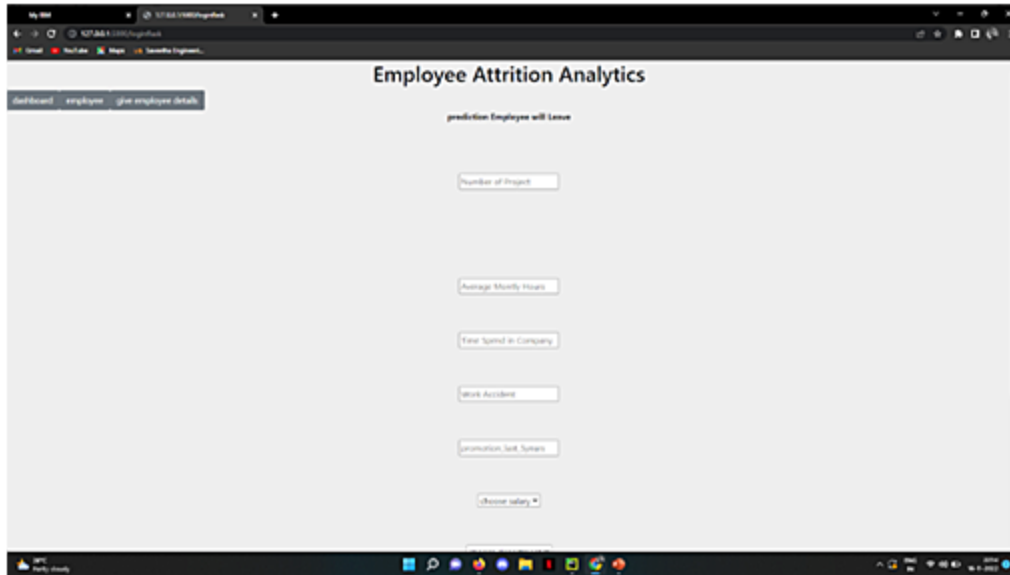


Fig 11: Predicted Model Employee Data

10. ADVANTAGES & DISADVANTAGES

The metrics offer accuracy in terms of the reasons given by employees themselves. Apart from this, a wider avenue for change and dynamism also emerges from analysis of attrition. Employers may choose to implement a hiring freeze to prevent a layoff. Layoffs, which occur due to a change or decrease of the business reduce employee morale and make it difficult to hire for other positions. When employees leave by choice, the company can decrease costs while moving forward with other hiring decisions. By choosing to not refill a position, employers can assign new duties to other employees, change departmental work flows or shift resources within an organization. Attrition offers opportunities for new ideas and dynamics. It can refresh an organization and offer current employees new opportunities. Decreased overall performance: The whole business process is affected when an employee leave the organization. Daily task management.

11. CONCLUSIONS

High attrition destroys the value of going offshore. It causes companies to lose knowledge, incur training fees, get caught up in the never-ending cycle of hiring, and fall behind on scheduled projects. Employee recruiting and retention are big issues for IT organizations, so create a work environment where the employees are involved in the development of rewards programs. Although companies may say they know about all these offshore employee retention strategies, few practice them in their captive centre or measure whether their external vendors are practicing them. The retention activities are time-consuming. Developing a thorough recruiting process, setting up a career advancement program, and conducting a formal employee satisfaction survey all take time. Unfortunately, it's a "no pain, no gain" situation. Companies are realizing that these programs are worth the effort, as they watch their best employees leave to work for the competition. Invest in your offshore employees and they in turn will help deliver outstanding returns.

12. FUTURE SCOPE

While the usage of BI and AI will continue to develop, there are other HR trends for 2019 that are worth paying attention to. Robotic process automation makes life easier for industries worldwide as it accelerates the processes and tends to perform in a more accurate manner than people do. The most basic RPA example is chatbots – but basically, any process can be automated to some extent. Employee management can deploy RPA as well: for example, you may implement a corporate chatbot that will be able to answer the most common questions in no time and in a precise manner. Many HR specialists still spend an awful amount of time on CV screening and candidate selection. Thus, development companies are starting to come up with solutions that free the HRs from this mundane work by automating the screening and selection processes. Such apps normally allow to set the desired parameters for candidate screening and are able to process a great number of resumes within mere minutes.