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Cloud Based Leave Management System using Salesforce and Tendency Analysis

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ABSTRACT—

Manual leave management systems in organizations often lead to time-consuming processes, potential errors, and difficulties in leave tracking. To overcome these challenges, organizations are increasingly adopting software systems for leave management, leveraging cloud-based technologies such as Salesforce. This paper focuses on implementing a leave management system using Salesforce cloud technology. The project aims to identify and manage employee leaves, while incorporating trend analysis and sentiment analysis to assess leave comments. The paper explores various techniques for trend analysis and sentiment analysis and discusses their integration with Salesforce. By analyzing leave comments, the project seeks to identify instances where employees may be taking undue advantage of leave policies or unhappy with the leave system. The research evaluates the efficiency of the technology employed in this system to provide insights for organizations seeking to improve their leave management processes through the integration of trend analysis, sentiment analysis and cloud-based technology.

Keywords—Leave type, Leave Management, Cloud based solutions, trend analysis, sentiment analysis

I. Introduction

Leave management systems play a crucial role in maintaining efficient operations and a productive work environment within organizations. Without an effective leave management system, several challenges and issues can arise. One significant problem without a leave management system is the reliance on manual and cumbersome processes to handle employee leave. Paper-based leave requests or spreadsheet-based tracking systems are prone to errors, delays, and miscommunication. This can lead to confusion, overlapping leave requests, and difficulties in accurately tracking and managing employee absences. Such inefficiencies can increase the administrative workload, decrease productivity, and contribute to employee dissatisfaction.

To address these challenges, organizations can leverage Salesforce technology for their leave management system. Salesforce offers numerous advantages in implementing an efficient and effective leave management system. Firstly, its cloud-based platform allows for easy access to the system from anywhere and at any time, enabling remote management of leave requests and approvals. This flexibility improves accessibility and ensures that leave-related tasks can be efficiently handled regardless of physical location or device. Salesforce's customization capabilities are another advantage, allowing organizations to tailor the leave management system to their specific needs. Custom objects, workflows, and approval processes can be created to automate and streamline the leave request approval process. Integration with calendar apps further enhances efficiency by preventing scheduling conflicts and facilitating effective leave planning. The powerful analytics and reporting features of Salesforce enable organizations to gain valuable insights into employee leave trends and utilization rates. By analyzing leave data, organizations can make data-driven decisions, optimize resource allocation, and proactively address any patterns or issues affecting leave management. Data security and privacy are also prioritized in Salesforce, with robust user roles and permissions that control access to leave-related data. This ensures the confidentiality of sensitive employee information and safeguards against unauthorized access or data breaches.

Trend analysis involves analyzing the tendency of employee expressed in text data, such as comments provided by employees when requesting leave. By applying trend analysis to the leave comments, organizations can identify patterns or trends that may indicate whether an employee is taking undue advantage of leave or expressing dissatisfaction with the leave management process. This analysis can help HR departments and managers gain a better understanding of employee sentiments, address any concerns or issues, and further optimize the leave management system.

To perform trend analysis on Salesforce-generated data, organizations can utilize various techniques and tools. Natural language processing (NLP) techniques, such as sentiment analysis algorithms or topic modeling algorithms, can be applied to analyze the text data. These algorithms can be trained on labeled datasets or pre-trained models to classify tendency or identify trends within the text data.

II. Methodology

a) Data Collection and Preparation:

1. Gathered employee information, including names, employee IDs, and any additional relevant details.

2. Collected leave-related information such as leave dates, leave types, and any comments or reasons provided by employees.

3. Clean and preprocess the collected data. Removed unnecessary characters, stop words, and other noise. Performed text normalization tasks like stemming or lemmatization.

b) Salesforce CRM for Leave Managemnt syatem

The first step is the requirements gathering phase, where the specific types of leaves, leave policies, and approval workflows needed by the organization are identified. Additionally, determining reporting needs, such as monitoring leave trends and conducting semantic analysis, is crucial for effective data analysis.

The next step in the methodology is system design. This involves defining the data model, which includes identifying necessary objects like Employee and Leave Request, and determining the relevant fields to store employee information, leave requests, balances, and approvals. Designing intuitive user interfaces with separate dashboards for users and administrators is also a critical aspect of system design. To ensure data privacy and control, configuring security and access controls with appropriate user roles, profiles, and permissions is essential.

The subsequent step is customization and configuration. This entails tailoring objects, fields, and page layouts to align with the specific requirements of the organization. Creating custom validation rules to enforce business rules, such as making certain fields mandatory for leave requests, helps maintain data integrity. Designing and configuring approval processes and criteria based on the organization's policies ensure a smooth workflow.

c) Trend Analysis:

Trend:

A trend refers to a general pattern or direction of change observed in a dataset over a specific period. In the context of a leave management system, trend analysis aims to identify patterns or trends related to employees' leave patterns, such as when they take leave, the duration of leave, or specific types of leave they tend to request. Trend analysis helps uncover insights into the historical patterns and behaviors of employees in relation to their leave usage.

There are several types of trend analysis algorithm, some of as follows:

1. Time Series Analysis

Time series analysis algorithm for trend analysis is a statistical approach used to examine and identify patterns, trends, and changes in a time series dataset. It focuses on understanding the long-term direction or tendency exhibited by the data over successive time periods.

Popular time series analysis algorithms include:

- Autoregressive Integrated Moving Average (ARIMA)
- Exponential Smoothing (ES)
- Seasonal Decomposition of Time Series (STL)
- ❖ Mathematical Model for Time Series Analysis:

Mathematically, a time series is given as

$$y_t = f(t) \qquad ……………..(i)$$

Here, y_t is the value of the variable under study at time t. If the population is the variable under study at the various time period $t_1, t_2, t_3, … , t_n$. Then the time series is

$$t: t_1, t_2, t_3, … , t_n \qquad ……………..(ii)$$

$$y_t: y_{t1}, y_{t2}, y_{t3}, …, y_{tn} \qquad ……………..(iii)$$

$$or, t_1, t_2, t_3, … , t_n \qquad ……………..(iv)$$

$$y_t: y_1, y_2, y_3, … , y_n \qquad ……………..(v)$$

- ❖ Additive Model for Time Series Analysis:

If y_t is the time series value at time t. T_t, S_t, C_t, and R_t are the trend value, seasonal, cyclic and random fluctuations at time t respectively. According to the Additive Model, a time series can be expressed as

$$y_t = T_t + S_t + C_t + R_t \qquad ……………(vi)$$

This model assumes that all four components of the time series act independently of each other.

❖ Multiplicative Model for Time Series Analysis:

Different assumptions lead to different combinations of additive and multiplicative models as

$$y_t = T_t + S_t + C_t + R_t \qquad ……………(vii)$$

The time series analysis can also be done using the model

$y_t = T_t + S_t \times C_t \times R_t$ or $y_t = T_t \times C_t + S_t \times R_t$ etc. ……………(viii)

2. Association Rule Mining

Association Rule Mining is a method for identifying frequent patterns, correlations, associations, or causal structures in data sets found in numerous databases such as relational databases, transactional databases, and other types of data repositories.

This algorithm can help discover relationships between different variables in a dataset. By applying association rule mining, we able to identify patterns such as frequent associations between medical leave and other factors such as specific departments, roles, or demographic attributes.

Association Rule Mining: Basic Definitions:

- Support Count(σ): It accounts for the frequency of occurrence of an item-set.

- Frequent Item-set: It represents an item-set whose support is greater than or equal to the minimum threshold.

- Association Rule: It represents an implication expression of the form X -> Y.

Here X and Y represent any 2 item-set.

Popular association rule mining algorithms include:

- Apriori Algorithm

- Eclat Algorithm

- FP-Growth Algorithm

d)   Sentiment Analysis

Sentiment:

Sentiment refers to the attitude, opinion, reason or emotion expressed in a piece of text. In the context of leave requests, sentiment analysis involves analyzing the text of the requests or related comments to determine the tendency expressed by the employees.

Numerous methodologies are available for analyzing tendency, but two main groups are used. The problems of Sentiment will be solved by the first group using by implementing the machine learning approach. The second group uses lexicon-based method which is a linguistically-inclined method. In both groups, many techniques exist.

Machine Learning Approach: This approach involves training a model on labeled data where sentiments are assigned to leave requests or related text. we can use algorithms such as Naive Bayes, Support Vector Machines (SVM), or Recurrent Neural Networks (RNN) to classify leave request sentiments according to tendency express by the employee.

Lexicon-based Sentiment Analysis: This approach involves using predefined sentiment lexicons or dictionaries that contain words or phrases with assigned sentiment scores. By analyzing the text in leave requests or related comments, we can calculate sentiment scores based on the presence and polarity of words in the lexicon. Examples of lexicon-based sentiment analysis algorithms include VADER (Valence Aware Dictionary and Sentiment Reasoner) and SentiWordNet.

e)   Salesforce Integration with Trend Analysis and Sentiment Analysis:

1. Created custom Salesforce Lightning components or Visualforce pages to display sentiment analysis results within the Salesforce user interface.

2. Used Salesforce Apex code to integrate with external sentiment analysis services or libraries. Connected with pre-built sentiment analysis APIs or deploy your own machine learning model as a service.

3. Stored the sentiment scores or sentiment labels as part of the leave records in Salesforce.

f)   Reporting and Analytics:

1. Created reports and dashboards within Salesforce to provide insights into leave patterns and trend/sentiment analysis results.

2. Used the leave data and trend analysis results to identify trends in leave applications and sentiments expressed by employees.

3. Analyze the sentiment scores or labels to identify employees who may be taking undue advantage of the leave policy.

g) *Privacy and Compliance:*

1. Ensure that the trend analysis process respects employee confidentiality and data protection policies. Comply with privacy regulations and guidelines.

2. Anonymize or aggregate data as necessary to protect employee privacy while still enabling meaningful analysis.
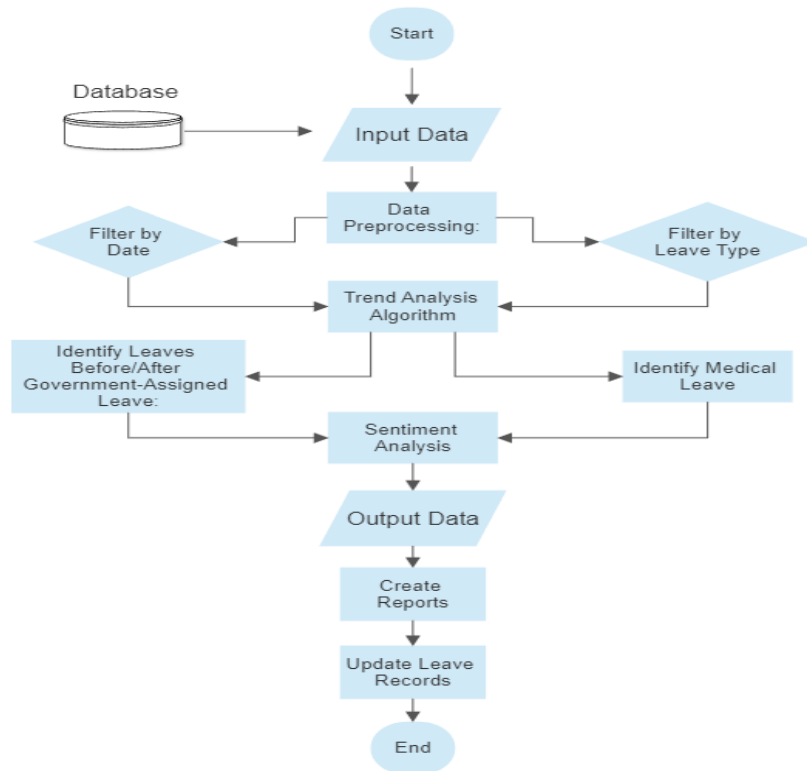
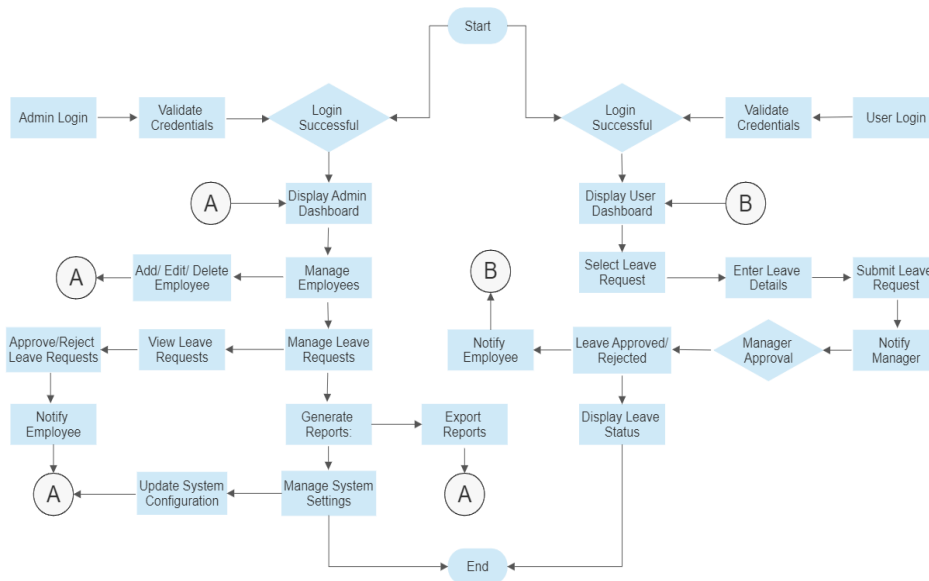Fig 1. Flow chart of Tendency Analysis using Trend and Sentiment Analysis Algorithm

Fig 2. Propose methodology of Leave Management System

III. Implementation and Result

The leave management system in a software company comprises various components, including the user interface (UI), user roles and permissions, backend functionality, and a database. The UI consists of a dashboard that provides employees with an overview of their leave balance, recent leave requests, and notifications. The leave request form allows employees to submit leave requests, specifying the type of leave, duration, and reason. The leave calendar displays an interactive calendar showing the leave schedules for all employees, while notifications inform users about leave request status updates, approvals, and rejections.

In terms of user roles and permissions, there are three main categories: employee/user, supervisor/manager, and HR/admin. Employees/users can submit leave requests, view their own leave balance, check the status of their leave requests, and receive notifications. Supervisors/managers have the authority to review and approve/reject leave requests from their direct reports. They can also access and update employee profiles of their direct reports, view their leave balances, and request histories. The HR/admin role is responsible for managing the entire leave management system. They have the capability to access and update employee profiles for the entire organization, define and modify leave policies, and generate reports on leave usage, trends, and other relevant analytics. The employee leave records for a month generated by Salesforce, and an Excel sheet containing the records has been downloaded.

Emp_ID	Emp_Name	Emp_Dept	Emp_Type	Date Applicatio	Leave From Date	Leave to Date	No of Days	Reason	HR Remark	Manager Remark
NSC_0037	Ri***** *. **ey	Server Room	CL	1/1/2018	2/1/2018	3/1/2018	2	Parental responsibilities	Approved	Approved
NSC_0038	Sa*** ******* *****de	Server Room	SL	1/3/2018	1/4/2018	1/6/2018	2	Marriage Function	Approved	Approved
NSC_0039	Sa******* ****** ***he	Server Room	CL	4/1/2018	4/1/2018	5/1/2018	2	Family Emergency	Approved	Approved
NSC_0033	Di**** *. ***he	Maintainance	SL	1/4/2018	1/5/2018	1/6/2018	1	Study leave	Approved	Approved
NSC_0040	Sa**** ***** ****od	Development	ML	8/1/2018	9/1/2018	9/1/2018	1	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	10/1/2018	12/1/2018	13/1/2018	2	Medical Issue	Approved	Approved
NSC_0043	Sa**** **************	Development	CL	15/1/2018	16/1/2018	17/1/2018	2	Marriage Function	Approved	Approved
NSC_0035	Sa***** ***** **ke	Maintainance	SL	1/18/2018	1/19/2018	1/20/2018	1	Study leave	Approved	Approved
NSC_0042	Sh****** ******* ***il	Development	CL	18/1/2018	19/1/2018	20/1/2018	2	Medical Issue	Approved	Approved
NSC_0044	Ta***** ***** ******de	Server Room	ML	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0045	Vi******* *. ***le	Admin	CL	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0036	Ne** ******* ******re	Maintainance	CL	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0023	Ka****** *****ar	Development	CL	1/2/2018	2/2/2018	3/2/2018	2	Family Function	Approved	Approved
NSC_0024	Ch******** ********	Server Room	ML	6/2/2018	7/2/2018	8/2/2018	2	Medical Issue	Approved	Approved
NSC_0025	Di**** *. ***he	Management	CL	7/2/2018	8/2/2018	10/2/2018	3	Family Function	Approved	Approved
NSC_0040	Sa**** ***** ****od	Development	ML	8/2/2018	9/2/2018	10/2/2018	2	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	8/2/2018	9/2/2018	10/2/2018	2	Medical Issue	Approved	Approved
NSC_0072	Ha**** ******* ****ne	Admin	CL	10/2/2018	12/2/2018	13/2/2018	2	Medical Issue	Approved	Approved
NSC_0026	Ga*** ******* ****de	Server Room	CL	15/2/2018	15/2/2018	17/2/2018	3	Family Function	Approved	Approved
NSC_0027	Ga***** **********	Server Room	ML	17/2/2018	19/2/2018	20/2/2018	2	Medical Issue	Approved	Approved
NSC_0028	Ji**** ******* *****le	Development	CL	18/2/2018	19/2/2018	21/2/2018	3	Family Emergency	Approved	Approved
NSC_0029	Bh***** ***** ****an	Maintainance	CL	18/2/2018	19/2/2018	20/2/2018	2	Personal development	Approved	Approved
NSC_0030	Ch******* ********	Server Room	SL	2/19/2018	2/20/2018	2/21/2018	1	Study leave	Approved	Approved

Fig 3. Screenshot of the employee leave record generated by Salesforce

The backend functionality of the system includes user authentication, which validates user credentials and assigns appropriate roles and permissions. Leave request management processes and stores leave requests, tracks their status, and sends notifications to users. Leave policy management defines and maintains company-specific leave policies, such as a casual leave, medical leave, compensatory leave, earned leave and study leave. Leave balance calculation calculates and updates leave balances based on company policies and previous leave usage. Reporting and analytics generate reports on leave trends, usage patterns, and other relevant metrics for HR/admin purposes.

The system's database consists of three main components: user data, leave requests, and leave policies. User data stores employee information, including profiles, roles, and permissions. Leave requests record the details of leave requests, including dates, types, status, and associated employee information. Leave policies store company-specific leave policies, including entitlements and rules.

After generating the employee's leave record, the paper moves towards tendency analysis to identify those who are taking undue advantage of leaves. The analysis consists of two parts: 1. Identifying employees taking leave adjacent to public holidays and 2. Identifying employees consistently taking medical leave.

Trend Analysis 1: Identifying employees taking leave adjacent to public holidays

In the first step of data preparation, the salesforce generated leave records is retrieved. Relevant data, such as employee ID, employee names, leave from dates and leave to dates is extracted. To facilitate analysis, the dates are converted into a suitable format.

The second step involves selecting a time series algorithm, and the most suitable one for this analysis is the Seasonal Decomposition of Time Series (STL). STL is a technique specifically designed to decompose a time series into its seasonal, trend, and residual components. By applying the STL algorithm to the employee leave record, we can effectively analyze the seasonal patterns present within the data. This analysis allows us to identify employees who consistently take a leave adjacent to public holidays, providing valuable insights into their leave behavior in relation to these specific time periods.

Emp_ID	Emp_Name	Emp_Dept	Emp_Type	Date Applicatio	Leave From Date	Leave to Date	No of Days	Reason	HR Remark	Manager Remark
NSC_0037	Ri***** *. **ey	Server Room	CL	1/1/2018	2/1/2018	3/1/2018	2	Parental responsibilies	Approved	Approved
NSC_0039	Sa******* ****** ***he	Server Room	CL	4/1/2018	4/1/2018	5/1/2018	2	Family Emergency	Approved	Approved
NSC_0043	Sa**** **************	Development	CL	15/1/2018	16/1/2018	17/1/2018	2	Marriage Function	Approved	Approved
NSC_0042	Sh****** ******* ***jl	Development	CL	18/1/2018	19/1/2018	20/1/2018	2	Medical Issue	Approved	Approved
NSC_0045	Vi******* *. ***le	Admin	CL	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0036	Ne** ******* ******re	Maintainance	CL	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0023	Ka****** *****ar	Development	CL	1/2/2018	2/2/2018	3/2/2018	2	Family Function	Approved	Approved
NSC_0025	Di**** *. ***he	Management	CL	7/2/2018	8/2/2018	10/2/2018	3	Family Function	Approved	Approved
NSC_0072	Ha**** ******* ****ne	Admin	CL	10/2/2018	12/2/2018	13/2/2018	2	Medical Issue	Approved	Approved
NSC_0026	Ga*** ******* ****de	Server Room	CL	15/2/2018	15/2/2018	17/2/2018	3	Family Function	Approved	Approved
NSC_0028	Ji**** ******* *****le	Development	CL	18/2/2018	19/2/2018	21/2/2018	3	Family Emergency	Approved	Approved
NSC_0029	Bh***** ***** ****an	Maintainance	CL	18/2/2018	19/2/2018	20/2/2018	2	Personal development	Approved	Approved
NSC_0031	Ne** ******* ******re	Admin	CL	22/2/2018	23/2/2018	24/2/2018	2	Marriage Function	Approved	Approved
NSC_0046	Ab******	Admin	CL	28/2/2018	2/3/2018	3/3/2018	2	Medical Issue	Approved	Approved
NSC_0047	Ab****** **** ****ur	Maintainance	CL	5/3/2018	6/3/2018	7/3/2018	2	Marriage Function	Approved	Approved
NSC_0049	Am*** ***** ****ge	Server Room	CL	8/3/2018	9/3/2018	10/3/2018	2	Parental responsibilies	Approved	Approved
NSC_0050	Ar*** *. *******ar	Development	CL	10/3/2018	12/3/2018	13/3/2018	2	Family Function	Approved	Approved
NSC_0053	Ka*** ****** ***he	Maintainance	CL	17/3/2018	20/3/2018	21/3/2018	2	Parental development	Approved	Approved
NSC_0054	Kh**** *. ***ne	Development	CL	20/3/2018	21/3/2018	23/3/2018	3	Marriage Function	Approved	Approved
NSC_0055	Ch***** ****** ****le	Maintainance	CL	22/3/2018	23/3/2018	24/3/2018	2	Marriage Function	Approved	Approved
NSC_0056	De*******	Development	CL	24/3/2018	26/3/2018	27/3/2018	2	Parental development	Approved	Approved
NSC_0045	Vi******* *. ***le	Admin	CL	28/3/2018	30/3/2018	31/3/2018	2	Personal development	Approved	Approved
NSC_0036	Ne** ******* ******re	Maintainance	CL	28/3/2018	30/3/2018	31/3/2018	2	Personal development	Approved	Approved

Fig 4. Screen shot of employees availing leaves adjacent to the public holidays

The employees with ID NSC_0045 and NSC_0036, named Vi******* *. ***le and Ne** ******* ******re, have been identified who take leave adjacent to public holidays.

Trend Analysis 2: Identifying Employees Continuously Taking Medical Leave

In the first step of the process, the salesforce generated leave records is retrieved. Relevant data, such as employee ID, employee names, leave from dates and leave to dates is extracted from the report. To focus specifically on medical leave instances, the data is filtered accordingly.

To identify employees who continuously take medical leave, Association Rule Mining, specifically the Apriori Algorithm, is employed. While the Seasonal Decomposition of Time Series (STL) algorithm is suitable for analyzing seasonal patterns and public holidays, the Apriori Algorithm enables the discovery of frequent patterns and associations within the employee leave records. By applying the Apriori Algorithm to the dataset, we can effectively identify employees who consistently take medical leave.

Emp_ID	Emp_Name	Emp_Dept	Emp_Type	Date Applicatio	Leave From Date	Leave to Date	No of Days	Reason	HR Remark	Manager Remark
NSC_0040	Sa**** ***** ****od	Development	ML	8/1/2018	9/1/2018	9/1/2018	1	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	10/1/2018	12/1/2018	13/1/2018	2	Medical Issue	Approved	Approved
NSC_0044	Ta***** ***** ******de	Server Room	ML	24/1/2018	26/1/2018	27/1/2018	2	Personal development	Approved	Approved
NSC_0024	Ch******** ********	Server Room	ML	6/2/2018	7/2/2018	8/2/2018	2	Medical Issue	Approved	Approved
NSC_0040	Sa**** ***** ****od	Development	ML	8/2/2018	9/2/2018	10/2/2018	2	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	8/2/2018	9/2/2018	10/2/2018	2	Medical Issue	Approved	Approved
NSC_0027	Ga***** **********	Server Room	ML	17/2/2018	19/2/2018	20/2/2018	2	Medical Issue	Approved	Approved
NSC_0048	Ab****** ******	Admin	ML	8/3/2018	9/3/2018	10/3/2018	2	Medical Issue	Approved	Approved
NSC_0040	Sa**** ***** ****od	Development	ML	8/3/2018	9/3/2018	10/3/2018	2	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	10/3/2018	12/3/2018	13/3/2018	2	Medical Issue	Approved	Approved
NSC_0057	Dh******* ****** ****re	Development	ML	28/3/2018	30/3/2018	31/3/2018	2	Medical Issue	Approved	Approved
NSC_0058	Ga**** *. **de	Maintainance	ML	28/3/2018	30/3/2018	31/3/2018	2	Medical Issue	Approved	Approved
NSC_0040	Sa**** ***** ****od	Development	ML	11/4/2018	12/4/2018	13/4/2018	2	Medical Issue	Approved	Approved
NSC_0034	Ga*** ******* ****de	Maintainance	ML	11/4/2018	12/4/2018	13/4/2018	2	Medical Issue	Approved	Approved
NSC_0058	Ga**** *. **de	Maintainance	ML	11/4/2018	12/4/2018	13/4/2018	2	Medical Issue	Approved	Approved

Fig 5. Screen short of employees for availing frequent medical leave.

The employees with ID NSC_0040 and NSC_0034, named Sa**** ***** ****od and Ga*** ******* ****de have been identified as employees who take continuous medical leave on the same date of each month.

After identifying the trends in the employee leave records, we had proceed with sentiment analysis on the identified trends to provide suggestions to HR/Managers regarding employee leave.

Sentiment analysis on identified trends:

The following steps are performed to conduct sentiment analysis on the identified trends.

Firstly, relevant data associated with each trend is collected, including leave comments or feedback provided by the employees. If the data is not already labeled with sentiment labels, manual labeling is done.

Once the data is collected, it undergoes preprocessing to clean the text. Unnecessary information, special characters, and punctuation marks are removed, and the text is converted to lowercase. It is then tokenized into individual words, and stop words are eliminated to prepare it for sentiment analysis.

Next, relevant features are extracted from the preprocessed text data. Techniques like bag-of-words representation or word embedding's are utilized to convert the text into numerical vectors suitable for sentiment analysis.

Then suitable sentiment analysis algorithm or model is selected based on the available data and problem requirements. This includes machine learning approach Naive Bayes algorithm.

The labeled data is split into training and testing datasets. The sentiment analysis model is trained using the training data, where the extracted features and their corresponding sentiment labels are used to train the model. The performance of the model is then evaluated using the testing data, by calculating metrics such as accuracy, precision, recall, and F1-score.

Once the model is trained and evaluated, it is applied to the text data associated with each trend. The sentiment of the text data is analyzed to determine the tendency of the employee.

Interpreting the sentiment analysis results within the context of each identified trend provides a deeper understanding of the tendency expressed by employees regarding leave, adjacent to public holidays and continuous medical leave. The sentiment distribution is analyzed, patterns or insights are identified, and these findings can be used to make informed decisions, provide suggestions, or take appropriate actions regarding employee leave behavior for both trends.

IV. Conclusion

In conclusion, this research paper has demonstrated the implementation of a leave management system using Salesforce cloud technology, incorporating trend and sentiment analysis for assessing leave comments. By leveraging the advantages of Salesforce's cloud-based platform, customization capabilities, and analytics features, organizations can streamline their leave management processes, improve efficiency, and make informed decisions based on data-driven insights. The integration of trend and sentiment analysis adds value by identifying patterns and tenancy expressed in leave comments, enabling the identification of leave abuse instances and opportunities for process optimization. Future research can focus on advanced trend analysis techniques

and the impact of trend analysis on employee satisfaction, while continuously improving the system's accuracy and efficiency. Overall, the integration of Salesforce and trend and sentiment analysis provides a comprehensive solution for efficient leave management, data-driven decision-making, and enhanced employee satisfaction.

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