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ABSTRACT

It is a territory-wise, hierarchy-based and real-time system that works in 24x7 modes. This is a Field Force Management and Automation software powered with dynamic features such as online reporting to managers, SMS and Email alerts. Pharmaceutical Sales Automation integrates a Sales Lead Tracking System to list existing customers, potential customers and related products and services. It also builds direct relationship between corporate headquarters, regional offices and the remote medical representative at all level in the hierarchy. The software minimizes the unwanted barriers usually involved in the Daily Call Report process.

Users can log into the system and perform various tasks such as Daily Call Reports Submission, Submission, Stock & Sale Statements, Inter-Office Email, etc. The head office can view and manage all the reports at a glance anytime.

The PSA comes with three application

- Medical Representative
- MANAGER web application
- Administrative Module located at the Headquarters

App Features

- **Daily Routine**
  - ✓ Demand prediction using AI
  - ✓ Auto Sale Report prediction based on sale
  - ✓ AI based sales representative performance prediction
  - ✓ Daily Call Reports
  - ✓ Daily Expense Details.

- ✓ Next Day's Call Plan.
- ✓ Sales Submission details
- ✓ Quick message to team members

CHAPTER 1
INTRODUCTION

1.1 GENERAL INTRODUCTION

Pharma companies are required to continuously optimise their sales force resources (MR – medical reps) effectiveness, because companies invest heavily in the development and field marketing of new therapies. They are also increasingly focusing on Return on Investment, as they tighten their focus on profitability, as well as revenue growth. So, implementation of sales force automation software, streamline the sales activities.

Currently Medical Representatives placed any locality are required to submit their Monthly Sales and Stock Closing Reports to their Head offices on a daily basis. Previously the process was carried out manually, so that there was a chance to commit mistakes. With the use of pharma sales automation, the process of submitting Monthly Sales and Stock Closing Reports to the Headquarters has become effective and easy. The Medical Representatives get their Primary Sales and Opening Stocks from the organization and they have to just fill in the closing stock on the given form. Medical representative can get the list of doctors includes name, specialty, contact numbers, and visits timing from managers.

1.2 SCOPE OF THE PROJECT

The primary focus of sales managers should be to maximize profit for the team a while delivering the best possible value to customers. Who doesn't like a win-win scenario? Companies use sales forecasting to predict business performance in the coming quarters. It is a helpful tool for budgeting and setting expectations. An accurate sales forecast allows a company to gauge the interest in their products. Increased sales mean a higher demand for their products. It helps companies plan their supply to meet the increased demand. It is important to measure forecasting methodology to ensure companies are getting the most accurate prediction

possible. The traditional, annual-review-based way of evaluating employees simply doesn't work anymore, if it ever did. In fact, it's hard to think of anything businesses routinely do that's more universally unpopular. A recent global Mercer survey of HR leaders worldwide found that just 2% believe their current performance-management systems are very effective. Artificial intelligence can be applied to evaluating humans' performance also by replacing traditional annual-review approach. employers can do with annual reviews, replacing them with ongoing feedback in real time using AI.

CHAPTER 2
LITERATURE SURVEY

2.1 STUDY OF SIMILAR WORK

Vtiger Sales CRM, Vtiger offers a simple and easy way to crunch data, allowing you to fill out a quick form and create a monthly sales report, for example. You can also share these reports with the team and schedule future reports to populate automatically. The platform allows you to track many different metrics and apply filters to get even more details. Vtiger allows you to quickly create reports by filling out a form.

Vtiger Sales CRM key feature: Vtiger has tools that allow you to automatically assign leads to certain members of your sales team based on attributes like availability, location, and deal size.

2.1.1 EXISTING SYSTEM

Medical sales representatives are a key link between medical and pharmaceutical companies and healthcare professionals. They work strategically to increase the awareness and use of a company's pharmaceutical and medical products in settings such as general practices, primary care trusts and hospitals.

on the earlier days pharma companies communicates to its employee using the tele communication or by using the E-Mails. With the rise of the technologies the gradually depends on the different web technologies. The pharma companies are using their own websites by proving the login credentials to their employee for accessing the data. The companies cannot track the activities of their employees, the performance of the employees are currently evaluating based on their monthly task achievements or based on the annual reports. The employee performance prediction and medicine demand prediction are not possible on the existing system. The report generation is an important task for evaluating the performance of

the employees and the overall evaluation of the company status, which is doing, manually on the existing system.

Based on geographical location, and usually specializing in a particular product or medical area, medical sales representatives try to ensure clients are aware of, buy and subsequently use their company's products. They may also make presentations and organize group events for healthcare professionals, as well as working with contacts on a one-to-one basis.

2.1.2 DRAWBACKS OF EXISTING SYSTEM

- In existing system all the above things are done manually and takes lot of time for paper work.
- Insufficient support for medical reps
- Mode of communication is not proper
- Medical rep/manager cannot be contacted using a single platform.
- Advance AI is not used to analyze the business
- Low customer satisfaction

CHAPTER 3
OVERALL DESCRIPTION

3.1 PROPOSED SYSTEM

Mobile application is now becoming an emerging trend in the field of advanced technology. The mobile device today is increasingly becoming a multitalented productivity and entertainment tool, next-generation networks, services, and device technologies will only amplify that perception. The Smartphone is emerging as the main technology platform in the mobile marketplace with worldwide sales of smart phones.

Smartphone and other mobile applications or "apps" are being utilized in many areas of healthcare: education, health management, data management, health information, and other workflow processes. Healthcare has exhibited a particular need for these technologies. Not only is the medical community using smart phones and their applications for basic work at a higher rate than the general population, but they are reporting using smart phones in replacement for some of the work that would have previously been done on a desktop or laptop computer.

Pharmaceutical Sales Automation integrates a Sales Lead Tracking System to list existing customers, potential customers and related products and services. It also builds direct relationship between corporate headquarters, regional offices and the remote medical representative at all level in the hierarchy. The software minimizes the unwanted barriers usually involved in the Daily Call Report process. Besides of this with the help of Artificial intelligence our proposed system can predict future Demand of products, projected Sales Reports based on previous sale and can predict representative performance. Sales forecasts can be used to identify benchmarks and determine incremental impacts of new initiatives, plan resources in response to expected demand, and project future budgets.

- In order to help sales representatives, track sales leads, sales, service requests, and other sales-related information, pharmaceutical companies adopt pharmaceutical Sales Force Automation systems

- Implementation of advanced mobile technology

- company can monitor all marketing activities

- can analyse performance of both manger and sales representative

3.2 FEATURES OF PROPOSED SYSTEM

Medicine demand prediction: The PSA system can predict the demand of the medicine of a particular period of time. For the effective prediction it needs more data.

Performance prediction: performance prediction is an important feature in PSA which help the authorities to predict the employee's performance based on their current performance evaluation

Enhancement: Enhance and upgrade the existing system by increasing its efficiency and effectiveness. The software improves the working methods by replacing the existing manual system with the computer-based system.

Automation: The PSA System automates each and every activity of the manual system and increases its throughput. Thus, the response time of the system is very less and it works very fast.

Accuracy: The PSA System provides the uses a quick response with very accurate information regarding the users etc. Any details or system in an accurate manner, as and when required.

User-Friendly: The web PSA System has a very user-friendly interface. Thus, the users will feel very easy to work on it. The software provides accuracy along with a pleasant interface. Make the present manual system more interactive, speedy and user friendly.

Availability: The transaction reports of the system can be retried as and when required. Thus, there is no delay in the availability of any information, whatever needed, can be captured very quickly and easily.

Maintenance Cost: Reduce the cost of maintenance.

3.3 FUNCTIONS OF PROPOSED SYSTEM

On the proposed system,

- Admin controls all users and entire activity of application, important features of the admin includes admin can add employees both managers and sales employees, edit/view employee details, can add new medicines, view/edit medicine details, stock update/view
- Manager should know all activities under his team. Important features of the manager include manager can view daily status reports from team members, add monthly sales report based on a region. through this company can analyse productivity of team, view sales reports and fix targets evaluate team members, add new jobs to team members
- sales executive's sales information from all regions, can update daily sales activity report, can view daily jobs assigned from manager/admin, can view general messages from admin
- predicts demand of specified products based on previous sales history using machine learning algorithms. A most common enterprise application of machine learning teamed with statistical methods is predictive analytics. It allows for not only estimating demand

but also for understanding what drives sales and how customers are likely to behave under certain conditions.

- Human Resources Management (HRM) has become one of the essential interests of managers and decision makers in almost all types of businesses to adopt plans for correctly discovering highly qualified employees. Three main DM techniques were used for building the classification model and identifying the most effective factors that positively affect the performance. The techniques are the Decision Tree (DT), Naïve Bayes, and Support Vector Machine (SVM). To get a highly accurate model, several experiments were executed.

3.4 FEASIBILITY STUDY

when a new project is proposed, it normally goes through a feasibility study before it is approved for development. A feasibility study is made to see if the project on completion will serve the purpose of the organization for the amount of work, time, and effort spent on it. Feasibility study let the developer to foresee the future of the project and its usefulness. A feasibility study is documented with a report showing all the ramifications of the project. feasibility study of the proposed system was carried out during the system analysis to see whether it was beneficial to the organization

3.4.1 Technical Feasibility

The project must be evaluated from the technical viewpoint first. The assessment of this feasibility must be based on an outline design of the system requirement in the terms of input, output, program, procedure and employee. Having identified an outline of the system the investigation must go to suggest the type of the equipment, required method developing the system, method of running the system once it has been designed. The project should be developed such that the necessary functions and performance are achieved within the

constraints. Though the system may become obsolete after some period of time, due to the fact that the newer version software supports the older version, this system may still be used. There are a number of technical issues, which are generally raised during the feasibility stage. A study of function, performance and constraints that may affect the ability to achieve an acceptable system.

The technical feasibility deals with hardware as well as software requirements. If the necessary are made available with the system then the proposed system is said to be technically feasible

3.4.2 Operational Feasibility

Proposed projects are beneficial only if they can be turned into information systems that will meet the operating requirements of the organisation. The test of feasibility asks if the system will work when it is developed and installed. The pharmaceutical sales automation satisfies all the operational conditions.

One of the main problems faced during development of a new system is getting the acceptance from the user. They were doubtful about the degree of security provided by our software. We have considered all the operational aspects. Thus, the project is operationally feasible. People are inherently resistant to change, and computers have been known to facilities change. An estimate should be made about the reaction of the user, employee towards the development of a computerized system

3.4.3 Economical Feasibility

Economic feasibility is an important task of system analysis. A system that can be developed technically and that will be used if installed must still be profitable for the organization. Financially benefits must equal or exceed the costs. The Pharmaceutical sales automation must be justified by cost and benefit. Criteria are to ensure that effort taken on the

project give the best return at the earliest. One of the factors, which affect the development of a new system, is the cost it would require. Since the system developed is part of a project work, there is no manual cost to spend for the system. Also, all resources are already available, giving an indication that the system is economically possible for the development. The analysis raises financial and economic questions during preliminary investigation to estimate the following:

1. The cost to conduct a full system investigation
2. The cost of hardware and software for the class of application of the project being considered.
3. The benefits in the form of reduced costs or fewer costly errors

3.4.4 Behavioural Feasibility

The system does not require much require much maintenance once it is implemented. As the system is fully GUI based so it would be easy for the user to get friendly with the system. The system is equipped with various design tools so that the user can make use of these as and when required, thus needing less help from outside for maintenance the system.

CHAPTER 4
OPERATING ENVIRONMENT

4.1 HARDWARE REQUIREMENTS

Processor	:	intel i5 5th Gen
RAM	:	Minimum 8 GB
Hard disk	:	500 GB
Display Type	:	LED Display
Screen Resolution	:	1920*1080 px
Drivers	:	USB 3.1, Type C 3.1
Dedicated Graphics Card	:	Nvidia Geforce 920m 2GB DDR4 4.2

4.2 SOFTWARE REQUIREMENTS

Operating System	:	Windows
IDE	:	Visual studio code/PyCharm
MySQL	:	MySQL 6.0 or higher
Scripting Languages	:	HTML, CSS, JavaScript
Web Browser	:	Google Chrome
Front-End	:	Python
Python Libraries	:	Scikit-learn, matplotlib, Django
Back-End	:	MySQL

4.3 TOOLS AND PLATFORMS

4.3.1 PYTHON

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming language. It was created by Guido van Rossum during 1985- 1990. Like Perl, Python source code is also available under the GNU General Public License (GPL). it is designed to be highly readable. It uses English keywords frequently where as other languages use punctuation, and it has fewer syntactical constructions than other languages.

Python strives for a simpler, less-cluttered syntax and grammar while giving developers a choice in their coding methodology. In contrast to Perl's "there is more than one way to do it" motto, Python embraces a "there should be one—and preferably only one—obvious way to do it" design philosophy.

Scikit learn

Scikit-learn (also known as sklearn) is a free software machine learning library for the Python programming language. It features various classification, regression and clustering algorithms including support vector machines, random forests, gradient boosting, k-means and DBSCAN, and is designed to interoperate with the Python numerical and scientific libraries NumPy and SciPy.

The scikit-learn project started as scikits.learn, a Google Summer of Code project by David Cournapeau. Its name stems from the notion that it is a "SciKit" (SciPy Toolkit), a separately-developed and distributed third-party extension to SciPy. The original codebase was later rewritten by other developers. In 2010 Fabian Pedregosa, Gael Varoquaux, Alexandre Gramfort and Vincent Michel, all from the French Institute for Research in Computer Science and Automation in Rocquencourt, France, took leadership of the project and made the first public release on February the 1st 2010. Of the various scikits,

scikit-learn as well as scikit-image were described as "well-maintained and popular" in November 2012. Scikit-learn is one of the most popular machine learning libraries on GitHub.

Numpy

NumPy, which stands for Numerical Python, is a library consisting of multidimensional array objects and a collection of routines for processing those arrays. Using NumPy, mathematical and logical operations on arrays can be performed.

It adds support for large, multi-dimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. The ancestor of NumPy, Numeric, was originally created by Jim Hugunin with contributions from several other developers. In 2005, Travis Oliphant created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors

Pandas

Pandas is an open-source, BSD-licensed Python library providing high-performance, easy-to-use data structures and data analysis tools for the Python programming language. Python with Pandas is used in a wide range of fields including academic and commercial domains including finance, economics, Statistics, analytics, etc. In particular, it offers data structures and operations for manipulating numerical tables and time series. It is free software released under the three-clause BSD license. The name is derived from the term "panel data", an econometrics term for data sets that include observations over multiple time periods for the same individuals.

Mathplotlib

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK+. There

is also a procedural "pylab" interface based on a state machine (like OpenGL), designed to closely resemble that of MATLAB, though its use is discouraged. SciPy makes use of Matplotlib.

Matplotlib was originally written by John D. Hunter, since then it has an active development community, and is distributed under a BSD-style license. Michael Droettboom was nominated as matplotlib's lead developer shortly before John Hunter's death in August 2012, and further joined by Thomas Caswell. Matplotlib 2.0.x supports Python versions 2.7 through 3.6. Python 3 support started with Matplotlib 1.2. Matplotlib 1.4 is the last version to support Python 2.6. Matplotlib has pledged to not support Python 2 past 2020 by signing the Python 3 Statement.

4.3.2 MYSQL

The back end is designed using MySQL which is used to design the databases. The world's second most widely used open-source relational database management system (RDBMS). The SQL phrase stands for Structured Query Language. The MySQL development project has made its source code available under the terms of the GNU General Public License, as well as under a variety of proprietary agreements. MySQL was owned and sponsored by a single for- profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation. MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack (and other 'AMP' stacks). LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Free-software-open source projects that require a full-featured database management system often use MySQL.

4.3.3 PYCHARM

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company

JetBrains. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems, and supports web development with Django as well as Data Science with Anaconda.

PyCharm is cross-platform, with Windows, macOS and Linux versions. The Community Edition is released under the Apache License, and there is also Professional Edition with extra features – released under a proprietary license. Pycharm have several features such as the Code Completion, SQLAlchemy as Debugger, Git Visualization in Editor, Code Coverage in Editor, Package Management, Local History, Refactoring, User Interface of PyCharm Editor.

CHAPTER 5
DESIGN

5.1 SYSTEM DESIGN

Design is the first step in the development phase for any engineered product or system. It may be defined as “the process of applying various techniques and principles for the purpose of defining a device, a process or a system in sufficient detail to permit its physical realization”. Computer software design, like engineering design approaches in other disciplines, changes continually as new methods, better analysis, and broader understanding evolve. Using one of the design steps produces a data design, an architectural design, and a procedural design.

Preliminary design is concerned with the transformation requirements into data. Detail design focuses on refinements to architectural representations that lead to their detailed data structure and algorithmic representation for the project

Modules

Admin

Admin controls all users and entire activity of application important features are

- can add employees both managers and sales employees
- edit/view employee details
- can add new medicines
- view/edit medicine details
- stock update/view

Manager:

Manager should know all activities under his team. Important features of this module are

- view daily status reports from team members

- add monthly sales report based on a region. through this company can analyse productivity of team
- view sales reports and fix targets evaluate team members
- add new jobs to team members

Sales Executives

sales executives application module is designed to get sales information

- can update daily sales activity report
- can view daily jobs assigned from manager/admin
- can view general messages from admin

Demand Prediction using AI

This module predicts demand of specified products based on previous sales history using machine learning algorithms. A most common enterprise application of machine learning teamed with statistical methods is predictive analytics**.** It allows for not only estimating demand but also for understanding what drives sales and how customers are likely to behave under certain conditions.

AI based Performance prediction

Human Resources Management (HRM) has become one of the essential interests of managers and decision makers in almost all types of businesses to adopt plans for correctly discovering highly qualified employees. Accordingly, managements become interested about the performance of these employees. Specially to ensure the appropriate person allocated to the convenient job at the right time. Three main DM techniques were used for building the classification model and identifying the most effective factors that positively affect the

performance. The techniques are the Decision Tree (DT), Naive Bayes, and Support Vector Machine (SVM). To get a highly accurate prediction results the average of these techniques are taken.