MAIN-PROJECT REPORT

DASH FORGE – INTERACTIVE DATA ANALYSIS AND DECISION MAKER FOR INSURANCE DOMAIN

Submitted By

VISHMAYA V K
LMC22MCA2040

DEPARTMENT OF COMPUTER APPLICATIONS
(Affiliated to APJ Abdul Kalam Technological University, Kerala (KTU))

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY
KUTTICHAL, THIRUVANANTHAPURAM -695574
(MANAGED BY THE ARCHDIOCESE OF CHANGANASSERY)

DASH FORGE- INTERACTIVE DATA ANALYSIS AND DECISION MAKER FOR INSURANCE DOMAIN

A Project Report

Submitted By:

VISHMAYA V K – LMC22MCA2040

in partial fulfillment of the requirements for the award of the degree in

MASTER OF COMPUTER APPLICATIONS

at

DEPARTMENT OF COMPUTER APPLICATIONS

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY

KUTTICHAL, THIRUVANANTHAPURAM-695574

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, KERALA)

APRIL 2024

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY

KUTTICHAL, THIRUVANANTHAPURAM   - 695574

Affiliated to APJ Abdul Kalam Technological University, Kerala

DEPARTMENT OF COMPUTER APPLICATIONS

CERTIFICATE

This is to certify that the project work entitled "**DASH FORGE – AN INTERACTIVE ANALYSIS AND DECISION MAKER FOR INSURANCE DOMAIN**" is a Bona fide record of the work done by Ms. **VISHMAYA V K** , Reg No **LMC22MCA-2040**, student of Department of Computer Applications, Lourdes Matha College Of Science And Technology, Kuttichal, Thiruvananthapuram, affiliated to the APJ AbdulKalam Technological University, Kerala from January 2024 to April 2024 in partial fulfillment of the requirements for the award of the Degree of Master of Computer Applications from APJ Abdul Kalam Technological University, Kerala.

Prof. Bismi K Charleys   **Date:**

(Internal Guide)

Internal Examiner   **Prof. Bismi K Charleys**

(Head of the Department)

DECLARATION

I undersigned here by declared that the project report **"DASH FORGE – INTERACTIVE DATA ANALYSIS AND DECISION MAKER FOR INSURANCE DOMAIN"** submitted for partial fulfilment of the requirements for the award of degree of Master of Computer Applications of the APJ Abdul Kalam Technological University, Kerala. This submission represents my idea in my own words and, I have adequately and accurately cited and referenced the original sources. I also declare that I have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact of source in my submission. I understand that any violation of the above will be a cause for disciplinary action by the institute and/or the University.

VISHMAYA V K   Place: Trivandrum

Date :__/__/2024

ACKNOWLEDGEMENT

An endeavour over a long time can be successful only with advice and support of many well-wishers. I wish to place on record my profound indebtedness and gratitude to all those who have contributed directly or indirectly to make this project work a success.

At the very onset, I express my gratitude to God Almighty who sheltered me under his protective wings and showered on innumerable blessings throughout the period of this Master of Computer Application.

It is a great pleasure to express my sincere gratitude to **Rev.Dr.Bejoy Arackal**, Director and **Dr.Beshiba Wilson**, Principal Lourdes Matha College of Science and Technology for permitting to do this project with the fullest spirit.

I am highly obliged to **Prof. Bismi K Charleys** HoD of Computer Applications of Lourdes Matha College of Science and Technology, for being the source of inspiration throughout the course and for her valuable guidance.

With heart full of thanks, I would like to take up this opportunity to wish my Internal guide , **Prof. Bismi K Charleys** HoD and all staffs of Department of Computer Applications for their endless support, encouragements and suggestions in various stages of the development of this project.

With immense love and gratitude, I thank every unknown member of numerous amounts of open-source communities for all the selfless works and contributions they've made. Without them and their help, I wouldn't have made it here. Finally, I wish to express my sincere gratitude to all our friends who directly or indirectly contributed in this venture.

CONTENTS

ABSTRACT

The project aims to develop a data visualization and dashboard creation tool using Streamlit, pandas, Plotly Express, and Firebase. The tool allows users to import data from Excel sheets, perform various operations on the data, and visualize the analysis in interactive graphs and charts. Users can create customizable dashboards with KPI cards and multiple graphs, selecting from a range of chart types such as bar charts, pie charts, line charts, and more. dashboard tool provides a user-friendly interface for data exploration and analysis, enabling users to filter, group, and visualize data dynamically. It also includes features for user authentication, allowing users to save and access their dashboards securely. Additionally, the tool offers functionality to download the dashboard as a PDF for offline use. The project aims to provide a flexible and powerful tool for data visualization, suitable for a wide range of applications, including business analytics, data reporting, and decision-making

CHAPTER 1

INTRODUCTION

DEPARTMENT OF COMPUTER APPLICATION

1.1 GENERAL INTRODUCTION:

In the era of data-driven decision-making, the ability to visualize data effectively is crucial. Businesses and individuals alike rely on visual representations of data to understand trends, identify patterns, and make informed decisions. However, creating interactive and insightful data visualizations can be complex and time-consuming, often requiring specialized tools and expertise. To address this challenge, our project focuses on developing a user-friendly data visualization and dashboard creation tool. The tool leverages Streamlit, a Python library for building web applications, along with pandas for data manipulation, Plotly Express for interactive visualizations, and Firebase for user authentication and data storage. Users of the tool can easily import data from Excel sheets, perform various operations on the data, and create customizable dashboards with KPI cards and multiple graphs. They can choose from a variety of chart types, such as bar charts, pie charts, line charts, and more, to visualize their data in meaningful ways. The dashboard tool is designed to be intuitive and accessible, even for users with limited technical expertise. It provides a seamless user experience, allowing users to explore and analyze their data dynamically. Additionally, the tool offers features for user authentication, ensuring that dashboards are secure and can be saved and accessed by authorized users. Overall, our project aims to democratize data visualization, making it easy for anyone to create informative and visually appealing dashboards. Whether for business analytics, academic research, or personal projects, our tool empowers users to unlock the insights hidden in their data.

.

DEPARTMENT OF COMPUTER APPLICATION

CHAPTER 2

LITERATURE SURVEY

2.1 A STUDY OF SIMILAR WORK :

The existing visualization tools offer a range of features and functionalities that cater to different user needs. These include the ability to create interactive and dynamic dashboards, a variety of visualization options such as charts, graphs, and maps, support for real-time data updates, and integration with various data sources. Additionally, these tools often provide collaboration features, such as the ability to share and collaborate on dashboards with team members, as well as options for embedding visualizations into websites or applications. However, some drawbacks of these tools include high costs for advanced features or enterprise-level use, limitations on data processing and visualization capabilities, and potential complexity in setting up and maintaining the software

2.1.1 EXISTING SYSTEM

- **Tableau:** Tableau is a leading data visualization tool used by organizations to create interactive and shareable dashboards. It offers a wide range of visualization options and allows users to connect to various data sources. However, Tableau can be expensive, especially for large-scale deployments. Additionally, the learning curve for Tableau can be steep for users who are not familiar with data visualization concepts.
- **Power BI:** Microsoft Power BI is another popular data visualization tool that offers similar features to Tableau. It allows users to create interactive reports and dashboards, and it integrates well with other Microsoft products. However, like Tableau, Power BI can be costly, particularly for enterprise-level usage. Users may also find the initial setup and configuration process to be complex.

DEPARTMENT OF COMPUTER APPLICATION

- **QlikView:** QlikView is a business intelligence tool that offers powerful data visualization capabilities. It allows users to create interactive dashboards and analyze data from multiple sources. However, QlikView can be expensive to implement and maintain, and it may require significant IT resources for deployment. Additionally, some users may find its interface to be less intuitive compared to other tools.

2.1.2 DRAWBACK OF EXISTING SYSTEM

- **Cost:** One of the main drawbacks of existing data visualization tools is their high cost, especially for enterprise-level deployments. The licensing fees for these tools can be prohibitive for smaller organizations or individual users.
- **Complexity:** Many existing data visualization tools have a steep learning curve, requiring users to undergo training to fully utilize their features. This complexity can be a barrier to adoption for users who are not data experts.
- **Limited Customization:** Some existing tools may offer limited customization options, making it difficult for users to create dashboards and reports that meet their specific needs. This can lead to frustration and inefficiencies in data analysis.
- **Scalability:** As organizations grow and their data needs evolve, existing data visualization tools may struggle to scale to meet these new requirements. This can result in performance issues and a lack of flexibility in data analysis.

DEPARTMENT OF COMPUTER APPLICATION

CHAPTER 3

OVERALL DESCRIPTION

3.1 PROPSED SYSTEM

The proposed dashboarding system will prioritize accessibility, ensuring that it is user-friendly and inclusive for all users. It will offer extensive customization options, allowing users to personalize their dashboards to meet their specific needs and preferences. Additionally, the system will support interactive elements, such as clickable charts and graphs, enhancing user engagement and enabling deeper data exploration. Scalability will be a key feature of the system, allowing it to handle large datasets and accommodate growing user bases without compromising performance or reliability. Users will also have the convenient option to export their dashboards as PDF files, making it easy to share and distribute information with others.Furthermore, the system will emphasize security, implementing measures to protect user data and ensure compliance with relevant regulations. It will also provide collaboration tools, enabling users to work together on dashboard projects and share insights with colleagues. Overall, the proposed system aims to provide a comprehensive and user-centric dashboarding solution for a wide range of applications and industries.

3.2 FEATURES OF PROPOSED SYSTEM

- **User-Friendly Interface:** The system will have an intuitive interface, making it easy for users to navigate and create dashboards without extensive training.

- **Customizable Templates:** Users will be able to choose from a variety of templates to create dashboards that suit their specific needs and preferences.

DEPARTMENT OF COMPUTER APPLICATION

- **Interactive Visualizations:** The system will support a wide range of interactive visualizations, such as charts, graphs, and maps, to help users analyze data effectively.

- **Real-Time Data Updates:** Users will have the option to connect their data sources and receive real-time updates, ensuring that their dashboards always reflect the latest information.

- **Collaboration Tools:** The system will include collaboration features, allowing users to share their dashboards with colleagues and work together on projects.

- **Data Security:** The system will prioritize data security, implementing measures to protect sensitive information and ensure compliance with relevant regulations.

- **Scalability:** The system will be designed to scale with the user's needs, accommodating larger datasets and more complex visualizations as required.

3.3 FUNCTIONS OF PROPOSED SYSTEM

- **Dashboard Creation:** Users can easily create customized dashboards by selecting visualizations, importing data, and arranging elements to suit their needs.

- **Data Import:** The system will support the import of data from various sources, including Excel sheets, databases, and external APIs.

- **PDF Export:** Users will have the option to download their dashboards as PDF files, making it convenient to share insights with others.

- **Data Visualization:** The system will offer a wide range of data visualization options, including charts, graphs, and maps, to help users analyze and present data effectively.

- **Data Interaction:** Users can interact with their data visualizations, such as filtering, drilling down, and highlighting, to gain deeper insights.

- **Dashboard Sharing:** Users can share their dashboards with others, either by exporting them as PDFs or by providing access to the live dashboard.

- **Data Security:** The system will implement security measures to protect user data, including encryption, access controls, and regular security audits.

3.4 REQUIREMENTS SPECIFICATION

1. **Accuracy**
   The proposed system should be accurate on generating results based on given inputs.
2. **Speed**
   The proposed system should be in real time for generating results.

DEPARTMENT OF COMPUTER APPLICATION

3. **Flexible**

   The proposed system should be flexible to new updates and patches in near future.

4. **Good Interface**

   The proposed system should maintain good interface even after upgradations.

3.5 FEASIBILITY STUDY

Feasibility Study in Software Engineering is a study to evaluate feasibility of proposed project or system. Feasibility study is one of stage among important four stages of Software

Project Management Process. As name suggests feasibility study is the feasibility analysis or it is a measure of the software product in terms of how much beneficial product development will be for the organization in a practical point of view. Feasibility study is carried out based on many purposes to analyze whether software product will be right in terms of development, implantation, contribution of project to the organization etc. In our proposed system the product is feasibility can be achieved in all four aspects Technical and Operational, Economical and behavioural

3.5.1 TECHNICAL FEASIBILITY

In Technical Feasibility current resources both hardware software along with required technology are analyzed/assessed to develop project. This technical feasibility study gives report whether there exists correct required resources and technologies which will be used for project development. Along with this, feasibility study also analyses technical skills and

DEPARTMENT OF COMPUTER APPLICATION

capabilities of technical team, existing technology can be used or not, maintenance and upgradation is easy or not for chosen technology etc. In this proposed system technical feasibility is achieved according to above criteria.

3.5.2 OPERATIONAL FEASIBILTIY

In Operational Feasibility degree of providing service to requirements is analyzed along with how much easy product will be to operate and maintenance after deployment. Along with this other operational scopes are determining usability of product, determining suggested solution by software development team is acceptable or not etc. The Operational feasibility can be ensured by the proposed system.

3.5.3 ECONOMICAL FEASIBILITY

Economic feasibility the most important and frequently used method for evaluating the effectiveness of the proposed system. It is very essential because the main goal of the proposed system is to have economically better results along with increased efficiency. Cost benefit analysis is usually performed for the expected from the proposed system. Since the organization is well equipped with the required hardware, the project was found to be economically feasible and the users who possess a device supports Windows operating system can easily use it.

3.5.4 BEHAVIOURAL FEASIBILITY

The proposed system satisfies behavioural feasibility because the system is providing with good and minimalistic GUI which can easily be understand for any end users and it's encapsulates the conversion procedure from the users. Hence it's easier to operate the system with ease.

DEPARTMENT OF COMPUTER APPLICATION

13

CHAPTER 4

OPERATING ENVIRONMENT

4.1 HARDWARE REQUIREMENTS

- **Processo**r: AMD Ryzen 5 5625U
- **Storage:** 512 GB Hard Disk space
- **Memory**: 8 GB RAM

4.2 SOFTWARE REQUIREMENTS

- **Operating System**: Windows 11
- **Platform**:   Windows
- **Technology used** : Streamlit, Firebase, HTML
- **IDE:** VS Code
- **Browser:** Chrome
- **Libraries Used:** Pandas, Plotly Express, PDFKit, Base64, BytesIO, PIL (Python Imaging Library), Kaleido

4.3 TOOLS AND PLATFORMS

4.3.1 STREAMLIT:

Streamlit is a powerful tool for building and sharing data applications quickly and easily. It simplifies the process of creating interactive web applications for data science and machine learning projects, allowing developers to focus on their ideas rather than the intricacies of web development. With Streamlit, developers can create custom web interfaces for their data projects, integrating features like interactive charts, data tables, and user inputs with minimal effort. Streamlit also offers convenient deployment options, making it simple to share applications with others. Overall, Streamlit is an excellent choice for developers looking to create

DEPARTMENT OF COMPUTER APPLICATION

dynamic and engaging data applications without the complexity of traditional web development.

4.3.2 FIREBASE:

Firebase is a comprehensive platform for building web and mobile applications. One of its key features is the Realtime Database, which provides a cloud-hosted database that synchronizes data across clients in real-time. This makes it ideal for applications that require real-time updates, such as collaborative tools or messaging apps. Firebase also offers authentication services, making it easy to implement user authentication and authorization in your applications. Additionally, Firebase provides hosting services, allowing you to deploy your web applications quickly and securely. With its suite of tools and services, Firebase simplifies the development and deployment of web applications, making it a valuable asset for developers.

4.3.3 HTML:

HTML (HyperText Markup Language) is the standard language used to create and design web pages. It provides the basic structure for web content, defining the elements that make up a web page, such as headings, paragraphs, images, and links. HTML is essential for creating accessible and well-structured web pages that are compatible with different browsers and devices. With HTML, developers can create visually appealing and interactive web pages, enhancing the user experience. Additionally, HTML supports the use of CSS (Cascading Style Sheets) for styling web pages, allowing developers to customize the appearance of their content. Overall,

DEPARTMENT OF COMPUTER APPLICATION

HTML is a fundamental technology for web development, providing the building blocks for creating engaging and functional web experiences.

4.3.4 PANDAS:

Pandas is a powerful data manipulation and analysis library for Python. It provides data structures like DataFrames and Series that are ideal for working with structured data. With Pandas, developers can easily load, clean, transform, and analyze data, making it a valuable tool for data preprocessing and exploration. Pandas also offers a wide range of functions for data manipulation, including filtering, grouping, and merging, making it easy to perform complex operations on data sets. Additionally, Pandas provides IO tools for reading and writing data from various file formats, such as CSV, Excel, and SQL databases. Overall, Pandas is a versatile library that simplifies the process of working with data in Python, making it a popular choice among data scientists and analysts.

4.3.5 PLOTLY EXPRESS:

Plotly Express is a high-level data visualization library in Python that provides an easy-to-use interface for creating interactive plots and charts. It offers a wide range of chart types, including scatter plots, line charts, bar charts, and more, making it suitable for various data visualization tasks. Plotly Express simplifies the creation of interactive visualizations by providing a simple syntax for specifying plot attributes and adding interactive features like tooltips and zooming. It also supports customization options for colors, labels, and annotations, allowing developers to create visually appealing and informative visualizations. Overall, Plotly Express

DEPARTMENT OF COMPUTER APPLICATION

is a powerful tool for creating interactive and engaging data visualizations in Python, making it a valuable asset for data scientists and analysts.

4.3.6 PDFKit:

PDFKit is a Python library that allows you to create PDF documents from HTML and CSS. It can be used to generate PDF reports or snapshots of your dashboard, providing a convenient way to share or archive dashboard data.

4.3.7 Base64:

Base64 is a binary-to-text encoding scheme that is commonly used to encode binary data, such as images or PDF files, into a printable ASCII format. In the context of a dashboard project, Base64 could be used to encode images or other binary data for display in the dashboard interface.

4.3.8 BytesIO:

BytesIO is a Python module that provides a way to work with in-memory binary data. It can be used to read from or write to binary data as if it were a file, making it useful for tasks like reading and writing binary data in a dashboard application.

4.3.9 PIL (Python Imaging Library):

The Python Imaging Library (PIL) is a library for opening, manipulating, and saving many different image file formats. It can be used in a dashboard project to work with images, such as displaying image thumbnails or processing images uploaded by users.

DEPARTMENT OF COMPUTER APPLICATION

4.3.10Kaleido:

Kaleido is a Python library that provides a way to convert Plotly figures into static images or vector graphics. It can be used to export Plotly charts as images for inclusion in PDF reports or other documents, enhancing the reporting capabilities of a dashboard application.

4.4 MODULE DESCRIPTION

4.4.1 THE DASHBOARD CREATION MODULE:

- **Dashboard Rendering:** This module is responsible for rendering the dashboard UI based on the user's input and data visualization choices. It uses Streamlit, Plotly Express, and other libraries to create interactive charts, graphs, and tables.
- **Data Retrieval:** The module fetches data from various sources, such as Excel files, databases, or APIs, and preprocesses it using Pandas for analysis and visualization. It ensures that the data is formatted correctly for display on the dashboard.
- **User Interaction:** The module handles user interactions with the dashboard, such as selecting data filters, choosing visualization types, and exploring data. It uses Streamlit's interactive widgets to enable users to interact with the dashboard.
- **PDF Export:** This module allows users to export the dashboard as a PDF file for offline viewing or sharing. It uses PDFKit to convert the dashboard's HTML content into a PDF document.

4.4.2 THE AUTHENTICATION MODULE:

- **User Authentication:** This module manages user authentication and authorization. It allows users to sign up, log in, and manage their accounts securely. It uses Firebase authentication to authenticate users and store user credentials securely.

- **Access Control:** The module implements access control mechanisms to ensure that only authorized users can access certain parts of the dashboard or perform specific actions. It uses Firebase's database and security rules to enforce access control policies.

- **Session Management:** The module manages user sessions and ensures that users remain authenticated while interacting with the dashboard. It uses Firebase's session management features to handle session tokens and expiration.

DEPARTMENT OF COMPUTER APPLICATION

CHAPTER 5

DESIGN

5.1 SYSTEM DESIGN

System Design involves translating system requirements and conceptual design into technical specifications and general flow of processing. After the system requirements have been identified, information has been gathered to verify the problem and after evaluating the existing system, a new system is proposed. System Design is the process of planning of new system or to replace or complement an existing system. It must be thoroughly understood about the old system and determine how computers can be used to make its operations more effective. System design sits at technical the kernel of system development. Once system requirements have been analysed and specified system design is the first of the technical activities-design, code generation and test- that required build and verifying the software. System design is the most creative and challenging phases of the system life cycle. The term design describes the final system and the process by which it is to be developed. System design is the highlevel strategy for solving the problem and building a solution. System design includes decisions about the organization of the system into subsystems, the allocation of subsystems to hardware and software components and major conceptual and policy decision that forms the framework for detailed design
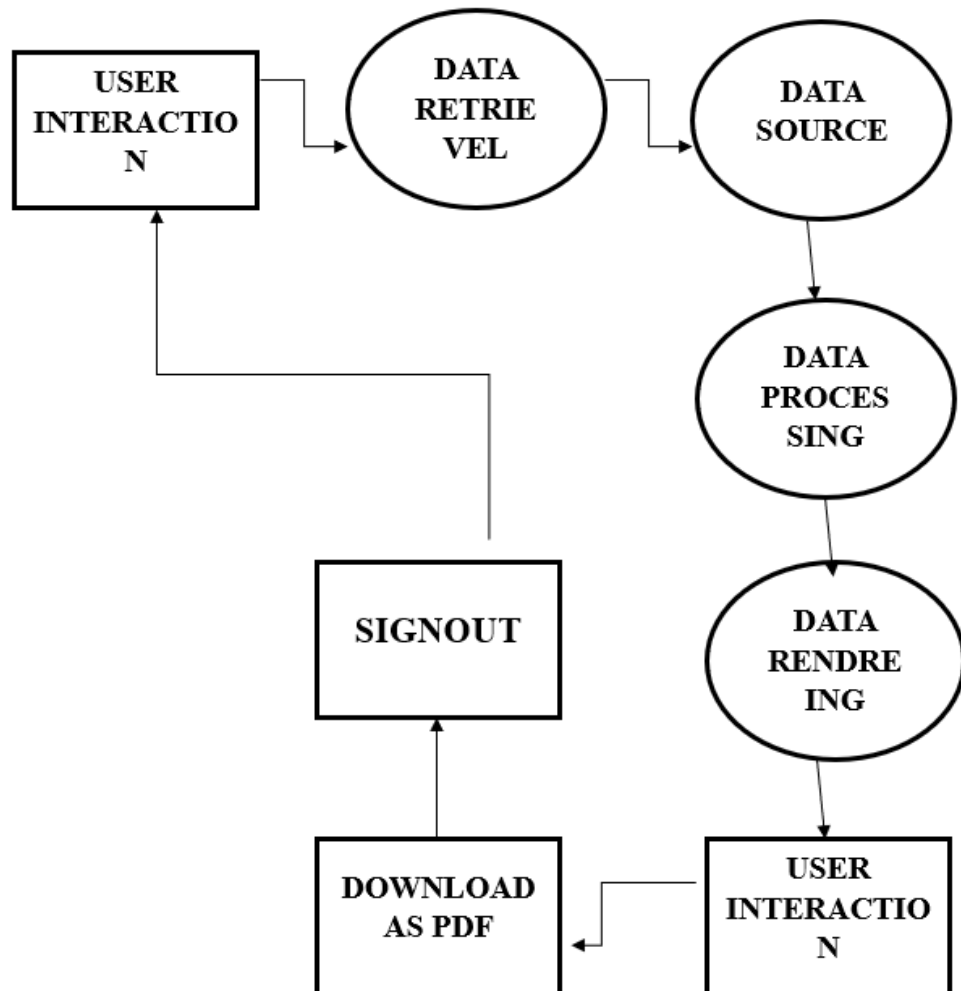
5.2 PROCESS FLOW:

Fig 1 : Process flow

5.3 DATABASE DESIGN

The most important aspect of building software systems is database design. The highest level in the hierarchy is the database. It is a set of inter-related files for real time processing. It contains the necessary data for problem solving and can be used by several users accessing data concurrently. The general objective of database design is to make the data access easy,

DEPARTMENT OF COMPUTER APPLICATION

inexpensive and flexible to the user. Database design is used to define and then specify the structure of business used in the client/server system. A business object is nothing but information that is visible to the users of the system. The database must be a normalized one Database management system (DBMS) allows the data to be protected and organized separately from other resources like hardware, software and programs. DBMS is a software package, which contains components that are not found in other data management packages. The significance of DBMS is the separation of data as seen by the programs and data as stored on the direct access storage devices, i.e., the difference between logical and physical data.

5.4 INPUT DESIGN

The input design is the process of converting the user-oriented inputs in to the computer-based format. The goal of designing input data is to make automation easy and free from errors as possible. The input design requirements such as user friendliness, consistent format and interactive dialogue for giving the right message and help for the user at right time are also considered for the development of the project.

The following points should be considered while designing the input:

• What data to input?

• What medium to use?

• How the data should be arranged or coded?

• The dialogue to guide users in providing input.

• Data items and transactions needing validation to detect errors.

• Methods for performing input validation and steps to follow when errors occur.

Inaccurate input data is the most common cause of error in processing data. Errors entered by the data entry operators can be controlled by the input design. The arrangement of messages as well as placement of data, headings and titles on display screens or source document is also a part of input design. The design of input also includes specifying the means by which end user and system operators direct the system what action to take. The input design is the link between the information system and the user. It comprises the developing specification and procedures for data preparation and those steps that are necessary to put transaction data into a usable form for processing data entry. The user interface design is very important for any application. The interface design defines how the software communicates within itself, to system that interpreted with it and with human who use it. The interface design is very good; the user will fall into an interactive software application. Input design is the process of converting useroriented inputs to a computer-based format. The data is fed into the system using simple interactive forms. The forms have been supplied with messages so that user can enter data without facing any difficulty. The data is validated wherever it requires in the project. This ensuresthat only the correct data have been incorporated into the system. Inaccurate processing of data is the most common cause of errors in data processing. Errors entered by data entry operators can be controlled by correct input design. This type of input design allows user to input only the required data into the processing units and also these input from check for validation of the input values, thus preventing errors. The input design is made into user-friendly

DEPARTMENT OF COMPUTER APPLICATION

atmosphere where the user can perform the daily routine work without any one help. The user-friendly environment created by the input design helps the end user to use the software in a more flexible way and even the wrong entries by the user is correctly pointed out to the user. The goal of designing input data is to make the automation easy and free from errors as possible. For providing a good input design for the application, easy data input and selection features are adopted.

5.5 OUTPUT DESIGN

Output generally refers to the results and information that are generated by the system. When designing output, system analyst must accomplish the following:

• Determine what information to present.
• Decide whether to display, print the information and select the output medium.

• Arrange the presentation of information in an acceptable format.

• Decide how to distribute the output to intended recipients.

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any systems, results of processing are communicated to the user and to other systems through outputs. In the output design, it is determined how the information is to be displayed for immediate need .The major idea of output is to convey information so its layout and design need careful consideration. Efficient, intelligible output design improves the system relationship with the users and help in making decisions. The output designs decide how well the implementation of the

DEPARTMENT OF COMPUTER APPLICATION

system has been useful to the user The output design should be understandable to the user and it must offer great convenience. The one who look into the reports or output will get the impression of how well the system performs. The objective of the output design is to convey the information of all the past activities, current status and emphasize important events. The output generally refers to the results and information that is generated from the system. Outputs from the computers are required primarily to communicate the result of processing to the users. They are also used to provide a permanent copy of these results for later consideration

5.6 PROGAM DESIGN:

1. **User Interface**:

   - The user interacts with the dashboard through a web interface created using Streamlit.

   - Users can upload Excel sheets containing data for visualization and analysis.

2. **Data Processing**:

   - Once the data is uploaded, the system processes it using Pandas for data manipulation and analysis.

   - Plotly Express is used to create various types of charts and graphs based on the processed data.

3. **Dashboard Rendering**:

   - The processed data and visualizations are rendered on the dashboard interface using Streamlit.

DEPARTMENT OF COMPUTER APPLICATION

- Users can customize the dashboard layout and select different visualization options.

4. **PDF Export**:

   - The system provides an option for users to export the dashboard as a PDF file.

   - PDFKit is used to convert the HTML content of the dashboard into a PDF format.

5. **Authentication**:

   - Firebase is utilized for user authentication, ensuring that only authorized users can access and modify the dashboard.

6. **Integration**:

   - The dashboard system integrates various technologies and libraries, such as Plotly Express for data visualization, Streamlit for web interface development, Firebase for authentication, and PDFKit for PDF export.

7. **Data Sources**:

   - The system supports multiple data sources, including Excel sheets and potentially other data storage solutions like databases.

8. **Scalability**:

   - The system is designed to be scalable, capable of handling large datasets and accommodating a growing user base.

DEPARTMENT OF COMPUTER APPLICATION

CHAPTER 6

FUNCTIONAL AND NON FUNCTIONAL REQUIREMENTS

FUNCTIONAL REQUIREMENTS:

- **Dashboard Creation:** Users should be able to create custom dashboards by selecting and arranging various charts, graphs, and data elements.

- **Data Visualization:** The system should support a variety of data visualization options, including bar charts, pie charts, line charts, and tables.

- **Data Import:** Users should be able to import data from Excel sheets or other data sources for analysis and visualization.

- **Interactive Elements:** The dashboard should support interactive elements such as filters, dropdowns, and sliders for data exploration.

- **PDF Export:** Users should have the option to export their dashboards as PDF files for sharing and offline viewing.

- **User Authentication:** The system should require users to sign in to access and create dashboards, ensuring data privacy and security.

- **Access Control:** The system should implement role-based access control to restrict access to certain features or data based on user roles.

- **Performance:** The system should be able to handle large datasets and provide fast response times for data visualization and analysis

DEPARTMENT OF COMPUTER APPLICATION

NON-FUNCTIONAL REQUIREMENTS:

- **Usability:** The system should be intuitive and easy to use, with a user-friendly interface.

- **Reliability:** The system should be reliable and available whenever users need to access it.

- **Scalability:** The system should be scalable to accommodate an increasing number of users and data sources.

- **Security:** The system should ensure data security and protect user information from unauthorized access.

- **Performance:** The system should be fast and responsive, providing real-time updates and visualizations.

- **Compatibility:** The system should be compatible with different browsers and devices to ensure a consistent user experience.

- **Maintainability:** The system should be easy to maintain and update with new features or data sources.

- **Accessibility:** The system should be accessible to users with disabilities, following accessibility standards and guidelines.

- **Documentation:** The system should be well-documented, with clear instructions for users and developers.

CHAPTER 7

TESTING

7.1 TESTING STRATEGIES

Testing strategies refer to the approach and plan devised to evaluate the quality, functionality, and performance of a software application. The goal is to identify and rectify defects, ensuring that the software meets the specified requirements and performs as expected. Testing strategies encompass a range of activities and methods to validate different aspects of the software. Testing strategies are often customized based on the project's specific requirements, development methodology, and goals. A well-planned testing strategy contributes significantly to the overall quality and success of a software application.

7.2 UNIT TESTING

In this testing we test each module individually and integrate the overall system. Unit testing focuses verification efforts on the smaller unit of software design in the module. This is also known as 'module' testing. The modules of the system are tested separately. The testing is carried out during programming stage itself. In this testing step each module is found to work satisfactory as regard to the expected output from the module. There are some validation checks for verifying the data input given by the user. It is very easy to find error and debug the system.

7.3 INTEGRATION TESTING

Data can be lost across an interface; one module can have an adverse effect on the other sub functions when combined by May not produce the desired major functions. Integrated testing is the systematic testing for constructing the uncover errors within the interface. This testing was done with sample data. The need for integrated test is to find the overall system performance

DEPARTMENT OF COMPUTER APPLICATION

7.4 SYSTEM TESTING

System Testing is the stage of implementation, which is aimed at ensuring that the system works accurately and efficiently as expected before live operation commences. It certifies that the whole set of program hang together. System testing requires a test plan that consists of several keys, activities and steps to run program, string, system and user acceptance testing. The implementation of newly designed package is important in adopting a successful new system.

Testing Objectives:

- Testing is the process of correcting a program with intend of finding an error.
- A good test is one that has a high probability of finding a yet undiscovered error.
- A successful test is one that uncovers an undiscovered error.

7.5 TESTING RESULTS

The primary goal of software implementation is the production of source code that is easy to read and understand. Clarification of source code helps in easier debugging, testing and modification. Source code clarification is enhanced by structural coding techniques, by good coding style, by appropriate supporting documents, by good internal comments and by the features provided in the modern programming language. In our implementation phase, source code contains both global and formal variables. It contains predefined functions as well as the user defined functions..

DEPARTMENT OF COMPUTER APPLICATION

7.6 TEST CASES:

Test Case No.	Test Case Name	Test Case Step	Expected Result	Status	Defects
1	User Authentication - Valid Credentials	Login with valid username and password	User is authenticated and granted access to dashboard	Pass	None
2	Data Upload - Valid File	Upload a valid Excel file	File is successfully uploaded and data is displayed	Pass	None
3	Dashboard Customization - Visualization	Change chart type, color scheme	Charts are displayed with selected visualization options	Pass	None
4	PDF Export	Export dashboard as PDF file	PDF file containing dashboard is generated and downloaded	Pass	None
5	Data Visualization - Interactivity	Test chart interactivity (e.g., tooltips, zooming)	Charts respond to user interactions as expected	Pass	None

DEPARTMENT OF COMPUTER APPLICATION

CHAPTER 8

RESULT AND DISCUSSION

8.1 RESULTS

The result of the proposed dashboard project is a user-friendly web application that allows users to create custom data visualizations and dashboards. Users can import data from Excel sheets or other sources, select from a variety of chart types, and arrange them on the dashboard. The dashboard supports interactive elements for data exploration and analysis, such as filters and dropdowns. One of the key features of the dashboard is the ability to export the created dashboards as PDF files, making it easy for users to share and distribute their insights. The system also includes user authentication and access control features to ensure data privacy and security. Overall, the dashboard provides a powerful yet intuitive tool for data visualization and analysis, catering to a wide range of users from individuals to small businesses and large enterprises.
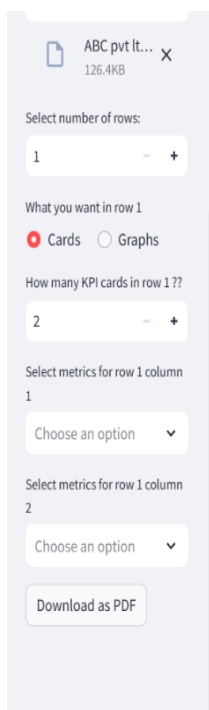
8.2 SCRRENSHOTS
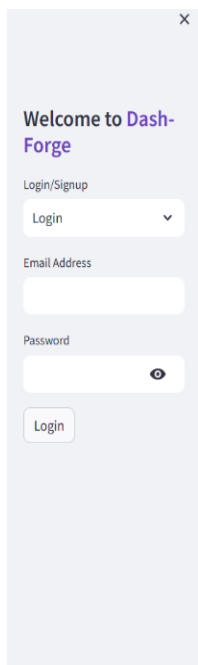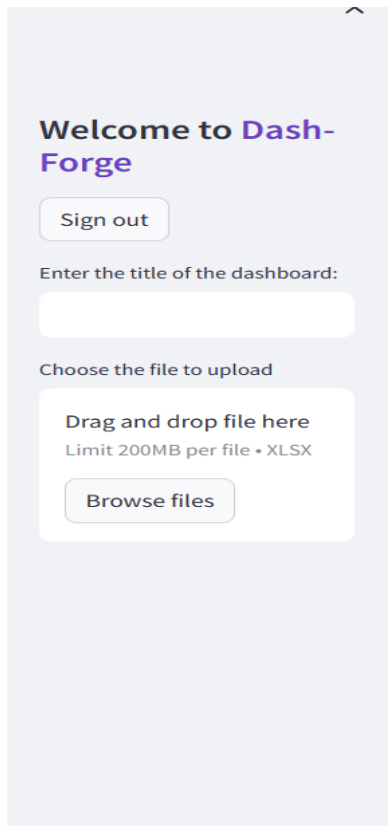
Fig 2 login/signup

DEPARTMENT OF COMPUTER APPLICATION

Fig 3 : data import

Fig 4 : card and graph creation

DEPARTMENT OF COMPUTER APPLICATION
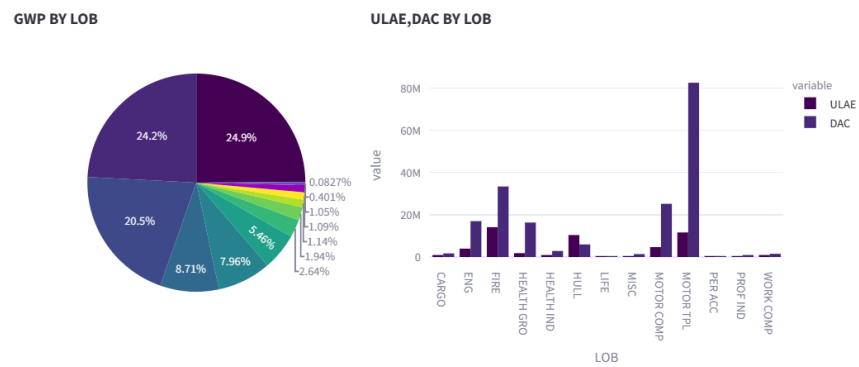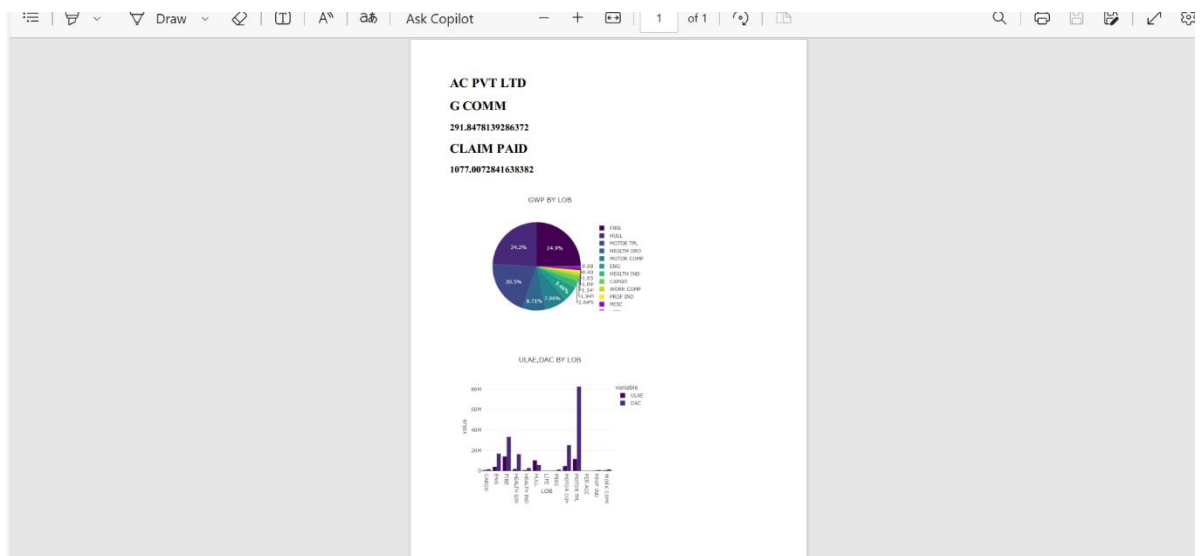
Fig 5 : download as pdf

Fig 6: pdf

39

CHAPTER 9

CONCLUSION

9.1 CONCLUSION :

In conclusion, the proposed dashboard system offers a user-friendly and customizable solution for data visualization and analysis. By leveraging technologies like Streamlit, Firebase, and various data visualization libraries, the system provides an intuitive interface for users to create interactive dashboards. The ability to download dashboards as PDF files enhances the sharing and distribution of information. Overall, the system aims to improve data analysis efficiency and accessibility for a wide range of user.

9.2 FUTURE ENHANCEMENT

- Advanced Data Analysis: Integrate more advanced data analysis capabilities, such as predictive analytics or machine learning algorithms, to provide deeper insights into the data.

- Real-Time Data Updates: Implement real-time data updates to ensure that the dashboard reflects the most current information.

- User Collaboration: Enable users to collaborate on dashboards, allowing for shared editing and commenting features.

- Custom Dashboard Templates: Provide users with pre-designed templates for common dashboard layouts and designs, making it easier to create professional-looking dashboards.

DEPARTMENT OF COMPUTER APPLICATION

- Integration with More Data Sources: Expand the range of data sources that can be integrated with the dashboard, including APIs, databases, and cloud storage services.

- Enhanced Visualization Options: Add more visualization options and customization features to allow users to create more complex and interactive visualizations.

- Mobile Compatibility: Optimize the dashboard for mobile devices, ensuring that users can access and interact with the dashboard on the go.

- Performance Optimization: Continuously optimize the performance of the dashboard to ensure fast loading times and smooth user experience, even with large datasets.

42

CHAPTER 10

BIBILIOGRAPGY

REFERENCES

1. "Data Visualization: A Handbook for Data Driven Design" by Andy Kirk

2. "Information Dashboard Design: The Effective Visual Communication of Data" by Stephen Few

3. "Python for Data Analysis" by Wes McKinney

4. "Firebase Essentials - Android Edition: A Fast-Paced Guide to Developing Android Apps with Firebase" by Neil Smyth

5. "Streamlit: A Practical Guide for Data Science Professionals" by Alan Buckley.

DEPARTMENT OF COMPUTER APPLICATION

APPENDIX

List of figures

Abbreviation and Notation

DFD (Data Flow Diagram): is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system without going into great detail, which can later be elaborated. DFDs can also be used for the visualization of data processing (structured design).

MASTER OF COMPUTER APPLICATIONS (MCA)

LOURDES MATHA COLLEGE OF SCIENCE AND TECHNOLOGY

(MANAGED BY THE ARCHDIOCESE OF CHANGANASSERY)

KUTTICHAL, THIRUVANANTHAPURAM -695574

PHONE : 0472-2853550,2853682,2853546

WEBSITE : www.lmcst.ac.in