Dashboard for Monitoring the Real Time Data in Educational Organization

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***Abstract*—Nowadays, Data Analytics is playing a crucial role in many sectors including educational organizations. Analyzing data and presenting data as dashboards is one of the recent strategies. Dashboards help in saving time of the analyst working in the organizations, typically by highlighting overall statistics in graphs or summaries in tables. The dashboard makes it easy to understand the scenario and support the decision-making process effectively. We propose the dashboard mechanism to monitor the entire Academic and Administrative work of students and faculties that will help in reducing man-hours of any organization. The normal duties of the section head or organization head are to get the work done and represent the same to the higher authorities.The proposed system not only helps to showcase the statistical data in the form of graphs but also gives the facility to drill down the summary for in-depth analysis. It further helps in reducing man-hours and makes the section head work efficiently so as to answer the queries of the organization from anywhere.**

Keywords— data analytics, dashboard, google spreadsheet, organization, statistical data, decision making

I. INTRODUCTION

Dashboard can be defined as "a predominantly visual information display that people use to rapidly monitor current conditions that require a timely response to fulfill a specific role."[1] This definition entails single-paged, glance-able views of updating data.

Wexler et al. [2] offer a broader definition: "a visual display of data used to monitor conditions and/or facilitate understanding," which can include infographic elements or narrative visualizations (such as Figure 1 right).

Through both the domain review and the dashboard design survey, it became clear that the term dashboard is widely used to refer to many different sorts of entities, challenging the dashboard stereotype familiar to the visualization Community [4].

Figure 1. The UNHCR Refugees/Migrants Emergency Response dashboard (DB117, right) also is a juxtaposition of key metrics and simple visualizations, but includes annotations and guided narrative elements [1]

Consequently, the dashboard concept has evolved from single-view reporting screens to include interactive interfaces with multiple views and purposes, including communication, learning, and motivation, in addition to the classic notions of monitoring and decision support.

The basic intention in use of a dashboard drives the choices in its visual design and functional affordances. The factors presented here capture the roles of each dashboard in the process of analysis and communication. We find that the purpose of a dashboard has been substantially expanded from the colloquial "operational" dashboard to capture decision-making at higher levels.

the basic two purpose :

- **Decision Support (Strategic , Tactical , Operational):** The decision support dimension reflects on the sorts of actionable decisions that dashboards are designed to support. Dashboards may be created to help an organization choose and evaluate a strategy (e.g., "we want users from around the world to be able to buy from our website"), refine their tactics (e.g., "our CDN helps us keep the website globally available"), or evaluate their operations (e.g., "users in Seattle are seeing slow network response").
- **Communication and Learning:**

We encountered several examples of dashboards that did not solicit decision-making on any temporal scale. The communication and learning factor identifies dashboards that visually appear to be dashboards but may not function as a traditional dashboard.

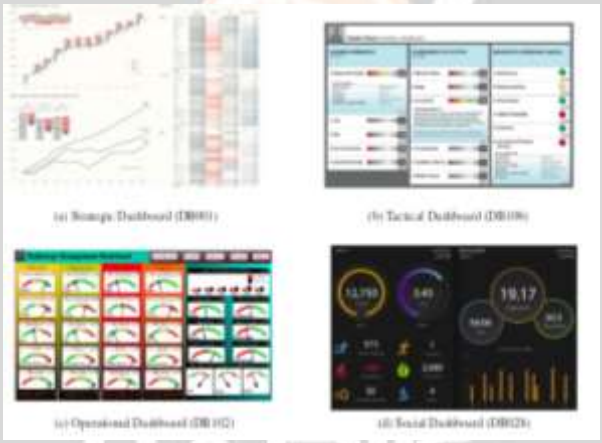

Fig. 2: Four dashboard examples demonstrating different attributes of dashboard design. A representative strategic dashboard (Fig. 2a) emphasizes the trends of paying subscribers along with monthly breakdowns for increases and decreases. Fig. 2b is a tactical dashboard that uses multiple metrics to summarize a student's performance in a class. The operational dashboard (Fig. 2c) shows performance metrics that may be actionable, but with no collective summarization. The social dashboard (Fig. 2d) uses social and personal data to situate the context of the personal workout data. We demonstrate common factors of designs in the survey and highlight relevant challenges through our literature review.

The decision-making process of any organization requires enormous amounts of data resources to determine the long-term direction of the organization it leads. Making the right decisions is supported by the speed of data availability and accuracy. All organizations need to use data and technology platforms to get information quickly and accurately. In fact, data is the result of processing various pieces of information available for a specific reason. It is highly desirable for departments in an organization to have a good visual representation of information to facilitate decision-making.The large amount of available data can make it difficult for organizations to sort and process more useful information. Raw information can be difficult to see. But, all of those rows and columns are frequently out of the way to handle and understand. This is where dashboards come into play. They turn information into data by making distinctive charts, tables, and other visual components to represent the decision making issue by analyzing.

II. RELEVANT WORK

This study has opened up our minds to explore completely the concept of dashboard and its characteristics within the Educational organizations. To come across this issue, we began our studies by observing all factors, criteria and definition of dashboard. Some time recently we carried out the second stage of the study

which is collecting the suitable materials.

Dashboards are increasingly used in higher education to track classroom performance for a variety of stakeholders, including students, staff, and staff helping students make decisions [4].

Data visualization is a powerful tool for pulling usable information from enormous amounts of unstructured data. People have a hard time visualizing data in more than three dimensions, so high-dimensional data is projected onto a lower-dimensional region[6].

What is the difference between a dashboard and a report, and why is it important? Why not just create reports or invest in dashboards? The difference is a shift in perspective from periodic reporting (such as quarterly or yearly) to continuous monitoring (like daily or weekly). The way you and your team use dashboards and reports is what makes them so valuable.[7]

Dashboards and reports have similarities.

- Historical data is available.
- Trend analysis to see what has worked (or not worked) in the past to help you plan for the future.
- Bring together multiple metrics
- Make your data visual.
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- Distinctions between dashboards and reports
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- Dashboards are interactive, allowing you to segment, filter, and visualize data.
- Dashboards show real-time, dynamically updated data (as your data source updates, your dashboard does too).
- Reports disseminate information about well-known areas of interest or goals.
- Dashboards keep track of known areas of interest or goals.

Reports display a static image of the data, whereas dashboards allow users to dynamically manipulate and interact with the data. Dashboards are ideal for everyday analytics and BI needs, whereas reports are useful for capturing static data. Dashboards are also ideal for compartmentalization and improved monitoring of specific metrics and functions.[7]

Dashboards are a type of data visualization tool that can be modified to show particular metrics, data, and KPIs. These tools are usually dynamic and live, so data is updated in real-time and visuals can show changes from minute to minute. Furthermore, dashboards can be as narrow or broad as needed, allowing organizations to create multiple specific dashboards to better organize their analytics.[7]

In the Institute of Education, the head of the organization has to present the information of the organization to the various committees or to the management from time to time. Also the section head of the organization has to present the information to the various committees or to the management from time to time. Different committees are NAAC Committee, NBA Committee, LIC Committee etc. The data section head of the organization or department has to appear before such various committees from time to time.

While conducting a survey in the organization, it was observed that in order to manage the complete information of the organization, each organization uses a software called academiya in which we get a lot of data about the organization such as student attendance, student roll call list etc. but this software can not give the dashboard facility to organization head or section head.

we found that in google scholar various dashboards are used in educational organization and the survey of those dashboards as follows :

In general, there are three research strands in educational analytics. Learners are at the center of learning analytics (LA). Its top priority is improving the teaching and learning process. On the other hand, Educational Data Mining (EDM) aims to create techniques for investigating educational data in order to better understand students and to glean insights about both the students and the educational systems. Academic Analytics (AA) uses educational data insights to help strategic decision-making, address academic problems like attrition, and enhance marketing tactics.[8]

Even though LA, AA, and EDM have certain differences, they all face the same difficulties. However, a recent study by Leitner et al. (2020) pointed out that they rarely provide thorough explanations of the obstacles faced in productionizing these systems. Many studies have provided implementation details of LA products. This study identified the following seven major issues with implementing LA initiatives:

1. Goal and Gain: Controlling expectations of various stakeholders

2. Representation and Actions: LA products facilitate the development of practical understanding.

3. Data: communicating with students about how their data is being used and creating appropriate regulations to control data management procedures.

4. IT infrastructure: weighing the advantages and disadvantages of choosing internal or external service providers to implement and run the LA products.

5. Development and Operation: The process of creating and running a LA programme, including planning and execution.

6. Privacy: assuring both the safety of student data and adherence to increasingly strict international legal obligations.

7. Ethics: making sure LA products don't cause harm and provide users the option to refuse.

The issues listed above apply to all LA initiatives and are generic. We expand on two specific issues mentioned above (2 and 7) using recent research, and we specifically adapt them to the challenges that pertain specifically to LAD projects. We also suggest an extra obstacle to the first seven identified by Leitner et al., called Agility, with supporting literature (2020).[8]

Actions and representations

The visualization of dashboards is more science than art. To best match diverse data kinds to appropriate visual representations, the dashboard designer must have some knowledge of how the human visual cortex interprets various visual styles. Some types of data are quantitative, whereas others have properties that are ordinal or categorical. Different signals, such as opposing colors, differing spatial placements, or differences in symbols that signify length, size, form, and orientation, among other things, are the best ways to convey the values of each data type. Additionally, the designer must have technical skills for creating dashboards as well as domain experience in learning theories and paradigms (Klerkx et al., 2017).[8]

Ethics

Most people understand and appreciate the difficulties posed by the ethical use of data in LA products. They mainly concern what kinds of personal information should be gathered and processed by these systems, as well as what knowledge should be gained and with whom it should be shared. Institutions should be wary of invasive advising or inaccurate labeling that may result in learner resentment or demotivation as there are additional worries about potential effects on students when providing tailored information (Campbell et al., 2007). As a result, protecting students from danger and abiding by the law are essential.[8]

Many higher education institutions are using dashboards to show data and make it easily accessible to deans, their support teams, and other users throughout campus to facilitate decision-making and planning.Institutions must set up data governance frameworks, maintain data stewardship, and reach cross-institutional consensus on data definitions in order for these initiatives to be successful.Finding ways to combine data from various information systems is another major difficulty.[9]

Deans and administrators look for signals and trends in performance in areas ranging from student outcomes to financial measures to research endeavors in order to pinpoint problems and support decision-making at both the departmental and institutional levels. The introduction of well-liked data visualization tools and the storage of historical data should, in theory, make it simpler to integrate this data and present the results. That isn't always the case, though; problems with operational definitions, data gathering methods, and data representation techniques make integration and reporting duties more challenging.[9]

A. CHALLENGES IN PREVIOUS SYSTEM

In any educational organization every day a huge amount of data is created. and after some years the visiting committees need the data in the form of qualitative graphs.and college higher authorities to represent their data to the various committees,there is no such dashboard is available in educational organization , so the main challenge come into the picture i.e we need to develop dashboard for the improvement of the organizations considering the parameters like diversity, equity and inclusion[4]

We study whether there are any dashboards available in higher education. The answer is yes . But the challenging part is that the data is in ERP Systems. There is no standard way to visualize the organizational data for particular departments , so the challenging part is we have to focus on the parameters like how we are improving diversity, equity, and inclusion[4].

We study how the data is collected when the committee visits the college for grades. The coordinators of the particular department collect the data academic year wise. And create a report, but higher authorities require the visualization of that data, this is lacking in existing education systems.

We also study the deans information challenge article we summarize this are the takeaways from article :

1. Another major difficulty is figuring out how to combine data from various information systems.[9]

2. For the success of these efforts, institutions must establish data governance mechanisms and ensure cross-agency agreement on data governance and data definition.[9]

3. Many higher education institutions create data visualization dashboards and make them easily accessible to deans, support teams, and other users on campus to aid decision making and planning.

So we decided to develop a dashboard for educational organizations to monitor the real time data.

III. METHODOLOGY

When we implement any system we require a proper method .

We follow the Agile methodology.

Phase 1: Requirement Gathering

create a proper team they should be able to do the sheet creation. this is the first stage of our proposed system i.e information gathering

Phase 2 : Design of a system

We design web page for the system, create API and hosting on google Cloud

Phase 3 : Coding

We Use PhP, HTML, CSS to implement user interface, for communication of two applications (i.e google sheet and web pages) we use application programming interface.

Phase 4 : System Integration & Testing

The proposed dashboard focuses on the parameters diversity, equity and integration into the current system.

Phase 5 : User Acceptance Testing

Users accept the Dashboard and use it for improvement of educational organization.

IV. PROPOSED METHOD

When analytical data is needed in educational organizations, they focus on student and faculty development parameters. This data comes in the form of huge data sets. To address the issue of managing these massive data sets in a customized format, the researcher created a dashboard. This proposed system will help to visualize data in the proper format. When various committees like NAAC and NBA scrutinize the data, they can be provided with suitable links as per their requirements in the proposed dashboard.

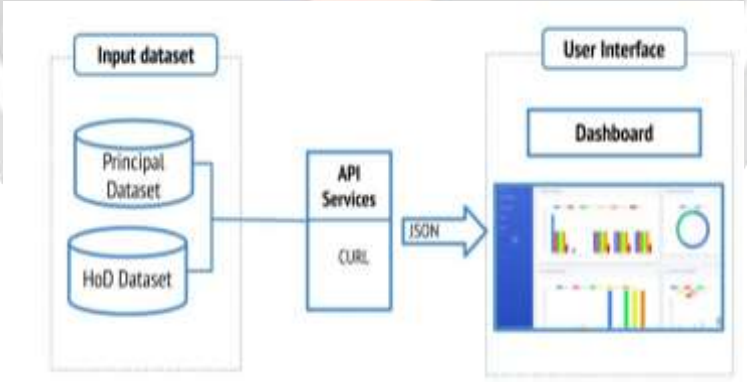

Fig. 1. Proposed system architecture

The above diagram gives us an idea of how we can use the dashboard in the higher education system. For this system, we first need an input dataset. We will take the spreadsheet as input, then perform some operations on it, such as data migration, data transformation, and data cleaning, before performing data analysis. The cleaned data is given to the analysis tool. Some processing will be done, and we will visualize the data on the dashboard.

The proposed system divided into following components :

1. Input DataSet.
2. API Service.
3. User Interface[Dashboard]..

1.Input DataSet :

This is the minimum and core requirement of our system. We create a well formatted google sheet and share with our stakeholders for data collection. and this sheet is our input dataset

The second part is that our system is cloud based so we required Google Cloud Server for Data storage purposes. We purchased a google cloud server for the smooth implementation of the proposed system.also we use the google drive as a data storage.

2. API Service.

This is the heart of our system, here we apply some data visualization algorithms to analyze our data and display on our proposed dashboard

Algorithm 1 :

K nearest neighbor Algorithm :

We implement this algorithm in our proposed system because we extract the data from google sheet or visualize the data according to year, according to branch, according to gender.

1. Load the data set.

where data set is , Google Sheet

2. Choose the value of K.

where K = Academic year

3. For each point in test data:

- find the Euclidean distance to all training data points. - store the Euclidean distances in a list and sort it - choose the first k points

- assign a class to the test point based on the majority of classes present in the chosen points.

4. End.

Algorithm 2 :

Decision Tree Algorithm :

It's a graphical depiction for obtaining all feasible solutions to decisions depending on certain parameters.

1. Put the best data set attributes at the top of the tree.

2. Divide the dataset into sections. You must create subsets so that each subset contains data with the same property values.

3. Repeat steps 1 and 2 for each subset until all branches of the tree have leaf nodes.

Eg. We visualize the data according to year as well as department wise.

1. we gave the dataset i.e organizational data to top of the tree

2. We subdivide the dataset into sections i.e we subdivide data according to academic

year, then we create the subset of that

sections i.e we visualize the department

wise data.

3. Output :

With reference to the student stakeholder dashboard, which shows student strength, student results, placement statistics, and student achievement for the respective academic year.

With reference to the faculty stakeholder dashboard, which shows faculty responsibilities, faculty load, and faculty achievement of the respective faculties according to year.

We design, deploy to advance equitable outcomes and help dismantle inequities in educational organization. In the proposed dashboard we visualize the data in the various graphs and charts.

V. EXPECTED RESULT

The Proposed dashboard is expected to improve the parameters like diversity, equity, and inclusion as compared to the existing system.

Fig. 2. Student Dashboard

In order to address the diversity issue, We can make use of visualization of student enrollment for improving the admission of students according to areas, gender, merit

In order to address the equity issue, We can make use of visualization of Student result for improving the results of students according to subject and quality of results

In order to address the inclusion issue, We can make use of visualization of students Achievement for improving the participation in co-curricular and extra-curricular activities.

In order to address the inclusion issue, We can make use of visualization of staff Achievement for improving the research activities.

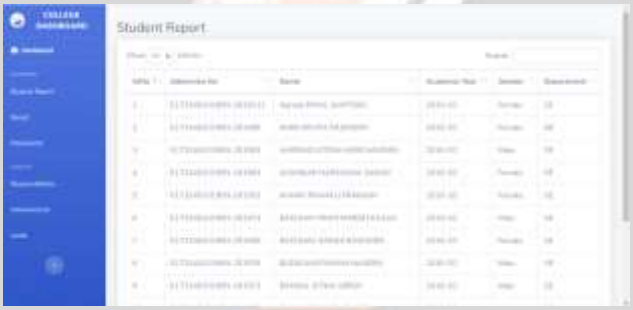

Fig. 3. Student Report

In above fig 3. We can visualize the student data in the form of a table and also we search the data using a search box.

VI. CONCLUSION

We proposed a dashboard that is useful for representing data in Visual form so as to make available all information at one place, which will save time, as well as represent all data in organized format. Because of central and accurate availability of data the Higher authorities can focus on improvement of organization in terms of administration, admissions and results. We conclude that, using the previous manual system we require manpower to get accurate data and accurate count of data, but using our dashboard we don't require any manpower to get data, we can easily visualize our organizational data.

Our contribution is that we develop the dashboard for educational organizations mostly for higher authorities like the Principal, Head of the department who take the decisions very quickly and accurately using the proposed dashboard for the focusing parameters in the previous system. Thus The proposed system is expected to solve the problems of diversity, equity and integration into the current system.

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