Project Report

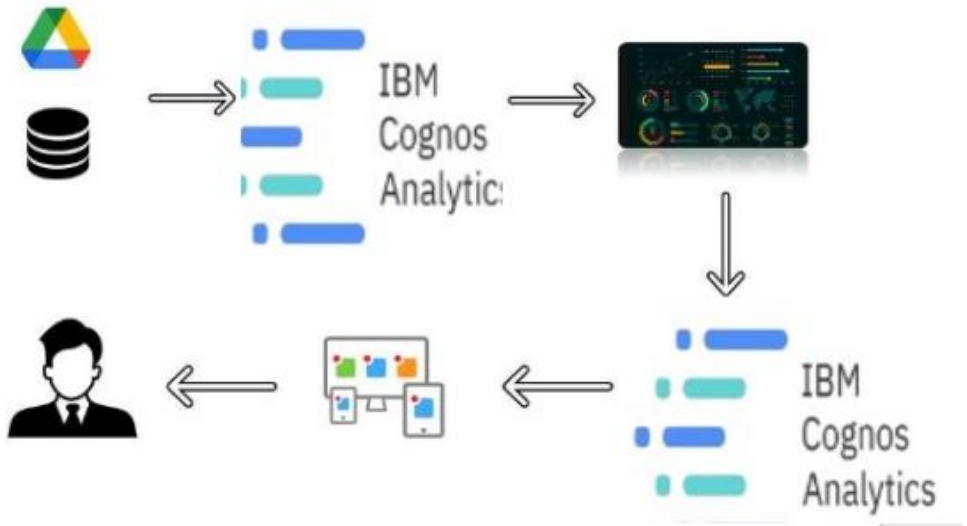
Project Title: Unveiling The Virtual Classroom: An In-Depth Analysis Of The Online Education System

1 Introduction: -

Online classes and technology have emerged as a superhero during the lockdown days. We have all been under house arrest but are still connected with the world of education. Due to the lockdown, students have not been able to stay connected with the outer world and the lack of exposure is evident. The only reprieve for the students' mental well-being has been the transition to online classes. Teachers made sure that the learning for students was not compromised, so they took a great leap forward to find solutions and create new learning environments for their students to ensure that learning never stops. With the rapid advancements in technology and the widespread availability of internet access, online education has gained significant popularity in recent years.

This project aims to delve deep into the various aspects of online education, examining its strengths, weaknesses, opportunities, and challenges. The outcomes of this project will provide valuable insights for educational institutions, policymakers, and online learning platforms to enhance the effectiveness and accessibility of online education. This analysis of the online education system aims to contribute to the ongoing dialogue on the future of education and help shape a more inclusive, engaging, and effective learning environment in the digital age.

1.1 Technical Architecture:



1.2 Solution Requirements

Service Used: IBM Cognos Analytics.

1.3 Project Objective

By the end of this project, you will:

- Know fundamental concepts and can work on IBM Cognos Analytics.
- Gain a broad understanding of plotting different graphs.
- Able to create meaningful dashboards providing valuable insights for educational institutions, policymakers and online learning platforms to enhance the effectiveness and accessibility of online education.

2. Project Flow

To accomplish this, we have to complete all the activities listed below,

- Define Problem / Problem Understanding
  - Specify the business problem
  - Business requirements
  - Literature Survey
  - Social or Business Impact.
- Data Collection
  - Collect the dataset
  - Connect data with IBM cognos
- Data Preparation
  - Prepare the Data for Visualization
- Data Visualizations
  - No of Unique Visualizations
- Dashboard
  - Responsive and Design of Dashboard
- Story
  - No of Scenes of Story
- Report
  - Creating a report
- Performance Testing
  - Amount of Data Rendered to DB ‘
  - Utilization of Data Filters
  - No of Calculation Fields
  - No of Visualizations/ Graphs
- Web Integration
  - Dashboard and Story embed with UI With Flask

- Project Demonstration & Documentation
    - Record explanation Video for project end to end solution
    - Project Documentation-Step by step project development procedure

2.1 Define Problem/Problem Understanding

A problem statement is a short, clear explanation of an issue or challenge that sums up what you want to change.

2.2 IBM Cloud Account

Create and login to IBM Account.

2.3 IBM Cognos Analytics

Create Cognos Analytics Account.

3 Data Collection and Data Preparation

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes and generate insights from the data.

3.1 Understand The Dataset

Data contains all the meta information regarding the columns described in the CSV files. we have provided 1 CSV files:
Online Education System Review
ONLINE EDUCATION SYSTEM REVIEW.csv

Column Description for Online education system review:

Gender: Gender of the student

Home Location : Rural or Urban.

Level of Education : UG, PG or school

Age : age of the student

Number of subjects :

Device Type Used : device used to attend the online classes

Economic status : economic status of the family

Internet facility in your locality

Are you involved on any sports

Family Size

Do elderly people monitor you ?.

Study Time(hours)

Sleep time (hours)

Time spent on social media(hours)

Interested in gaming ?

Have a separate room for studying ?

Engaged in group studies ?

Average marks scored before pandemic in traditional classroom

Your interaction in online mode

Clearing doubts with faculties online ?

Interested in ?

Performance in online

Your level of satisfaction in online education

3.2 Loading The Dataset

Login to IBM Cognos, Launch IBM Cognos, now go to the **prepare data** section, click on upload option and upload the csv file

3.3 Prepare the Data For Visualization

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency. Data preprocessing can be performed in many ways using many different steps depending on your data here, we are going to do some part of data preparation on our data.

4 Data Visualization Charts

Data visualization is the process of creating graphical representations of data in order to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

The number of unique visualizations that can be created with a given dataset. Some common types of visualizations that can be used to analyze the online education data include bar charts, line charts, heat maps, scatter plots, pie charts, Maps etc. These visualizations can be used to compare performance, track changes over time, show distribution, and relationships between variables, breakdown of revenue and customer demographics, workload, resource allocation and location of hotels.

4.1 Column Chart

A Column chart can compare the data across different categories. The height of the bars represents the measured value of each category. It can be represented as vertical and horizontal type bar charts. The procedure to create a bar chart is given as follows.

Before creating our first visualization, click on explorations and select the data from ' My Content' and then select 'Add' you will be redirected to the exploration interface, then click on create and select 'single visualization' and then choose the visualization type

- Drag 'Your level of satisfaction with online education' into Bars
- Drag 'Age' into Rows.
- It creates a Bar chart by default.

4.2 **Bar Chart**:

A bar chart can compare data across different categories, The height of the bars represents the measured value of each category. It can be represented as vertical and horizontal type bar charts. The procedure to create a bar chart is given as follows.

Step 1) Go to a new exploration page by clicking on 'create +' option.

Drag 'Your level of satisfaction in online education' into Bars.

Drag 'internet facility in your locality' in length

It creates a bar chart by default

4.3 Bar chart:

A bar chart can compare data across different categories, The height of the bars represents the measured value of each category. It can be represented as vertical and horizontal type bar charts. The procedure to create a bar chart is given as follows.

Step 1) Go to a new exploration page by clicking on ‘create +’ option.

Drag ‘Level of Education’ into Bars

- Drag ‘Performance in online’ in length
- It creates a Bar chart by default.

4.4 Pie Chart:

A pie chart can show the segment-wise data. It can show the contribution of measure over different members in a dimension. The angle of the pie determines the measured value. Different colors can be assigned to pie to represent the members in a dimension.

Step 1) Go to a new exploration page by clicking on ‘create +’ option.

- Select pie chart after clicking on ‘create +’ option

Step 2) Drag Device type used to attend online classes’ in segment field and drag ‘Time spent on social media (hours) ‘ in size field

You will get the pie chart by default

4.5 Packed Bubble:

The packed bubble charts are used to display data in a cluster of circles. Dimensions define the individual bubbles, and measures define the size and color of the individual circles.

Step 1) Go to a new exploration page by clicking on ‘create +’ option. and from that select the ‘packed bubbles’ chart

- Drag ‘Engaged in group studies’ into Bubbles and color.
- Drag ‘Performance in online’ into Size.

4.6 Word Cloud:

A word clouds or tag clouds are graphical representations of word frequency that give greater prominence to words that appear more frequently in a source text

Step 1) Go to a new exploration page by clicking on ‘create +’ option. and from that select the ‘packed bubbles’ chart

- Drag ‘Average marks scored before pandemic in traditional classroom ‘ in both words field & size field

4.7 Table

A Table visualizes the measure & dimensions (data fields) in the form of rows and columns. It is better to use tables when the categories in the data field are limited

Step 1) Go to a new exploration page by clicking on ‘create +’ option. and from that select the ‘’Table’

Drag ‘Economic status’ , ‘Home Location’ & ‘ Performance in online’ in columns

- after that click the ‘three dots’ in the ‘performance in online ‘ field and click on ‘summarize’ option and then select ‘average’

4.8 Radial Chart:

A Radial/Circular Bar Chart simply refers to a typical Bar Chart displayed on a polar coordinate system, instead of a cartesian system. It is used to show comparisons among categories by using a circular shape.

Step 1) Go to a new exploration page by clicking on ‘create +’ option. and from that select the ‘’Radial’

5 Creating The Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data, and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

5.1 Responsiveness And Design Of Dashboard

The responsiveness and design of a dashboard for online education review data is crucial to ensure that the information is easily understandable and actionable. Key considerations for designing a responsive and effective dashboard include user-centered design, clear and concise information, interactivity, data-driven approach, accessibility, customization, and security. The goal is to create a dashboard that is user-friendly, interactive, and data-driven,

5.2 Create a Dashboard

Once you have created the explorations, you can create a dashboard by clicking the "present data" option & selecting the dashboard. you can drag the visualizations from the ‘pin’ option present at the left side of the screen

6 Story

A data story is a way of presenting data and analysis in a narrative format, with the goal of making the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage and explains the context for the data, a body that presents the data and analysis in a logical and systematic way, and a conclusion that summarizes the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualizations, and videos. Once you have created the explorations/visualizations, you can create a story by clicking the "present data" option & selecting the story

6.1 No. of Scenes of Story

The number of scenes in a storyboard for a data visualization analysis of the performance and efficiency of online education will depend on the complexity of the analysis and the specific insights that are trying to be conveyed. A storyboard is a visual representation of the data analysis process and it breaks down the analysis into a series of steps or scenes.

Level of satisfaction regarding online education by age

Time spent on social media with different devices

Correlation between economic status, home & student online performance

7 Report

A report is a document that presents information in a specific format and layout, usually based on data from a database or other data source. A report in IBM Cognos can contain various elements, such as tables, charts, graphs, and images, as well as text and data elements, and it is designed to be used by business users to help them better understand their data and make informed decisions. There are several different types of reports available in IBM Cognos, including list reports, crosstab reports, chart reports, and report studio reports, among others. The type of report that you choose will depend on the specific needs and requirements of your organization, as well as the data that you need to present.

You can create a story by clicking the "present data" option & selecting the report from that. after selecting the ‘report’ , choose the 2 by 2 template and click on create. select the data source by clicking on ‘Select a source +’ option and start building the report.

7.1 Creating a Report

We have created four visualizations in the report
To create a bar chart click on the ‘+’ symbol in the first box and select ‘visualizations option. After that select the ‘clustered column’’ option. Drag ‘level of education’ in bars and ‘performance in online’ in length. To create the second visualization(donut chart), click on ‘+’ in the second box. And click on ‘visualization’ option and from that select the donut chart drag ‘economic status’ into segments and ‘performance in online’ in size. for the fourth visualization click on ‘+’ option in the fourth box and select ‘visualization’. After that scroll down and select ‘ Tree map’. drag ‘interested in?’ in area hierarchy and ‘performance in online’ in size fields. Final Report will be shown.

8 Performance Testing

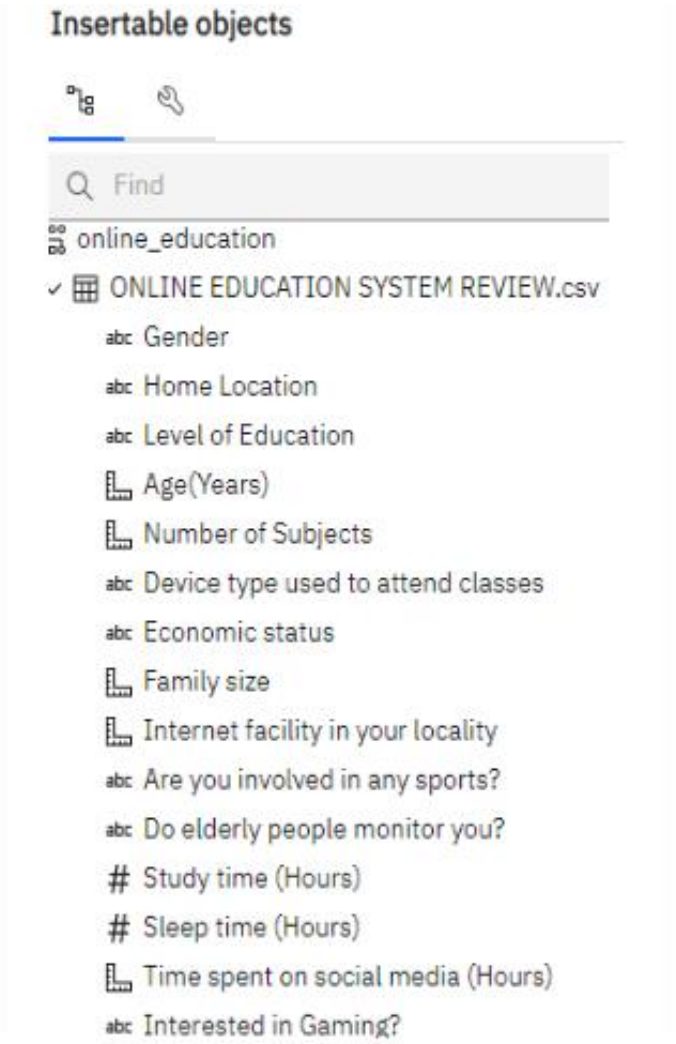
Performance testing is a non-functional software testing technique that determines how the stability, speed, scalability, and responsiveness of an application holds up under a given workload.

8.1 Utilization of Data Filters

Data filters are used to customize our visualization to achieve desired output

We can apply filters while building visualizations . In explorations, filters are present at bottom of the 'Fields' option

8.2 No. of Calculation Fields



8.3 No. of Visualizations/Graphs

- Column Chart: Age(Years) by Your level of satisfaction in Online Education
- Bar Chart: Internet facility in your locality by Your level of satisfaction in Online Education
- Bar chart: Performance in online by Level of Education
- Pie Chart: Time spent on social media (Hours) by Device type used to attend classes
- Packed bubbles : Engaged in group studies? colored by Engaged in group studies? sized by Performance in online
- Wordcloud: Average marks scored before pandemic in traditional classroom
- Table: Economic status, Home Location and Performance in online
- Radial Chart:
- Line Chart: Performance in online by study time(hours)
- Line Chart: Performance in online by sleep time(hours)

9 Web Integration

Publishing helps us to track and monitor key performance metrics, to communicate results and progress. help a publisher stay informed, make better decisions, and communicate their performance to others.

Integrating dashboards/stories/reports to web

step 1: Go to dashboard/story/report and click on share button on the top ribbon

go to the ‘link’ option and copy the embed code

9.1 Dashboard and Story Embed with UI with Flask

Explanation video link: (Reference Video to Embed Dashboard & Story) -

https://drive.google.com/file/d/1n_1q1rDRKH0m8hxmlZB_3nCRjSzkCcGK/view?usp=sharing

Download Flask Application Files - Link

10 Project Demonstration and Documentation

Below mentioned deliverables to be submitted along with other deliverables

10.1 Record Explanation Video for Project End To End Solution

Record explanation Video for project end to end solution

10.2 Project Documentation step by step project development procedure

Create document as per the template provided

11 Conclusion

Unveiling The Virtual Classroom: An In-Depth Analysis Of The Online Education System using IBM Cognos have been used for the required solution. In this project some important visualization has been analyzed , creating a dashboard and thereby valuable insights for educational institutions, policymakers, and online learning platforms to enhance the effectiveness and accessibility of online education has been provided.