UNLEASHING THE POTENTIAL OF OUR YOUTH: STUDENT PERFORMANCE ANALYSIS

The project submitted in the internship of the requirements of the award of the degree

BACHELOR OF TECHNOLOGY

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Submitted by

CHEBROLU LAVANYA	206E1A0507
NANDIGAM BHAVANA	206E1A0524
JINNADA KALYANI	206E1A0511
KANCHIPATI MOHANA PRIYA	206E1A0513
KARRI CHAITANYA	216E1A0505

Under the esteemed guidance of Mrs. Bharathi Chamarthi

Assistant professor of

GONNA INSTITUTE OF INFORMATION TECHNOLOGY AND SCIENCES

(Approved by AICTE, New Delhi, affiliated to JNTU- Vizianagaram)

Gonnavanipalem, Aganampudi, Parawada (Mandal),VISAKHAPATNAM-530026

INTRODUCTION

The quality of a country's education system is widely regarded as a critical measure of its overall development and progress. Over time, the education sector has undergone significant transformations and is now recognized as an industry in its own right. However, like any other industry, it faces numerous challenges, particularly in the realm of higher education. Two prominent challenges in this context are the declining success rates of students and the increasing number of students who leave their courses without completion. One essential aspect of teaching is the analysis of student work. Teachers constantly assign, collect, and examine student work to evaluate their learning progress and make necessary adjustments to their teaching methods. This ongoing assessment of student learning enables teachers to engage in continuous quality improvement of their courses, ensuring that students receive the best possible education.

When analysing student performance, it is crucial to consider various factors that can influence their academic outcomes. One such factor is the educational background of the students' parents. Research has shown that parental education plays a significant role in shaping a child's academic achievement. Students with parents who have higher levels of education tend to have better educational outcomes due to factors like increased support, higher expectations, and access to resources.

Another factor that can impact student performance is the status of test preparation. Students who undergo dedicated test preparation courses or engage in effective study techniques o en have an advantage in exams. These courses provide strategies, resources, and practice materials to enhance students' understanding of the subject matter and their performance in assessments.

By analysing a dataset containing the marks secured by 1000 students from a school, this project aims to explore and establish correlations between student performance in exams. By uncovering these relationships, educators and policymakers can gain valuable insights into the factors that contribute to student success and take proactive measures to address challenges in the education system.

A country's growth is strongly measured by the quality of its education system. Education sector, across the globe has witnessed sea change in its functioning. Today it is recognized as an industry and like any other industry it is facing challenges, the major challenges of higher education being decrease in students' success rate and their leaving a course without completion.

Analysing student work is an essential part of teaching. Teachers assign, collect and examine student work all the time to assess student learning and to revise and improve teaching. Ongoing assessment of student learning allows teachers to engage in continuous quality improvement of their courses. Many factors can influence a student's performance, including the influence of the parents' educational background, test preparation and so on.

The dataset contains the marks secured by 1000 students from a school. This project analyses and correlates student performance with different attributes. The analysis aims to understand the influence of important factors such as parental level of education, the status of test preparation courses etc. on the performance of the students in the exams.

Technical Architecture:
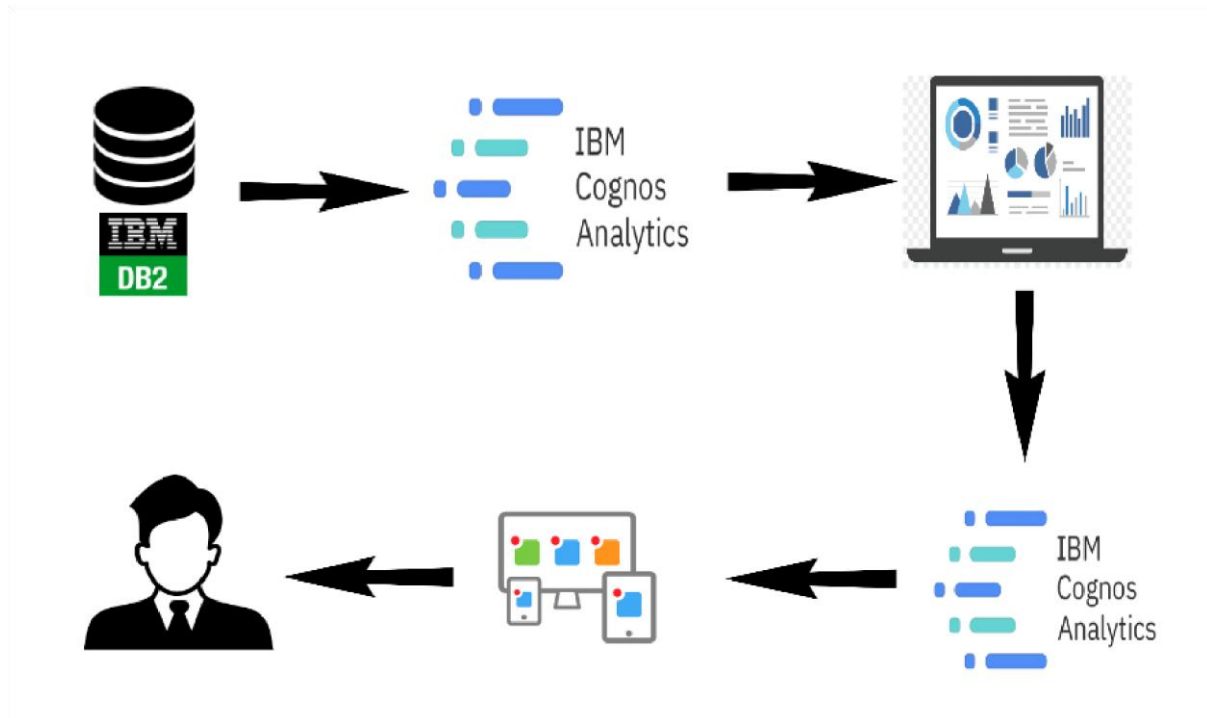
Project flow:

It includes various stages such as defining the problem, collecting and extracting data from

the database, data preparation, data visualisation, creating a dashboard, telling a story,

generating reports, performance testing, web integration, and finally, project

demonstration and documentation.

How define project flow:

Defining a project flow involves breaking down the project into logical steps and establishing the sequence in which those steps will be executed. Here's a general guideline to define a project flow

Project Objective: Clearly state the objective and purpose of the project. Understand what you want to achieve through this project.
Identify Key Task:List down all the major tasks or activities required to complete the project. These tasks should be specific and measurable.
Sequencing Tasks: Determine the order in which the tasks need to be performed. Identify any dependencies between tasks; some tasks may be dependent on the

completion of others.

Estimate Timeframes: Estimate the time required to complete each task. Consider factors like resource availability and potential challenges that might affect the timeline.

Allocate Resources: Determine the resources (e.g., people, tools, data) needed for each task. Make sure the required resources are available when needed.

Create Milestones: Break the project timeline into milestones. These are significant points in the project that mark the completion of key phases or tasks.

Risk Assessment: Identify potential risks that could impact the project. Develop a plan to mitigate or address these risks.

Communication Plan: Establish a clear communication plan to ensure that team members and stakeholders are kept informed about the project's progress.

Contingency Planning: Have a contingency plan in case unexpected challenges arise during the project.

Review and Adjust: Regularly review the progress of the project against the defined milestones and objectives. Be ready to make adjustments if necessary

Define Problem:

The project aims to analyse student performance data to understand the factors influencing academic achievement and identify opportunities for improvement.

It seeks to address disparities in student outcomes, ensuring that all youth have equal access to quality education and the support they need to succeed.

The problem encompasses finding effective ways to motivate and engage students in their learning journey, fostering a positive and conducive learning environment.

It involves exploring potential interventions and strategies to enhance teaching methods, curriculum design, and educational resources.

The project aims to empower educators and educational institutions with data-driven insights to make informed decisions that positively impact student learning outcomes.

It focuses on reducing dropout rates and increasing retention rates by identifying and addressing the root causes of disengagement or challenges in the learning process.

The problem encompasses promoting inclusive education, accommodating diverse learning styles and needs to ensure that every student has an equal opportunity to thrive academically.

By unleashing the potential of youth, the project seeks to cultivate a generation of well-equipped individuals capable of contributing positively to society and the workforce.

It involves utilising data analysis to track progress and measure the effectiveness of implemented interventions, enabling continuous improvement in the education system.

The project strives to build a culture of lifelong learning, encouraging students to set ambitious goals, embrace challenges, and develop a growth mindset. The problem "Unleashing the Potential of Our Youth: A Student Performance Analysis" suggests that there is a concern about the untapped capabilities and performance of students. The goal is to analyse student performance to identify areas where their potential could be further developed and optimised.

A problem definition typically provides a clear understanding of the issue at hand, outlining its main components and objectives. Though I don't have specific details

about the context or purpose of the analysis, based on th title, the problem definition might be as follows:

Problem Definition:
The problem at hand is to conduct a comprehensive analysis of student performance with the aim of unleashing the untapped potential of the youth. The analysis seeks to identify the factors that impact student performance positively or negatively and develop actionable insights to improve academic outcomes and overall student development.

Key Objectives:
1.   Analyse academic performance data: Collect and examine relevant data related to student academic achievements, including test scores, grades, and any other performance metrics available.

2.   Identify influencing factors: Explore potential factors that may affect student performance, such as teaching methodologies, learning environments, socioeconomic backgrounds, extracurricular activities, and support systems.

3.   Uncover patterns and trends: Use data analysis techniques to identify patterns, trends, and correlations between different variables to gain a deeper understanding of how various factors impact student performance.

4.   Develop improvement strategies: Based on the analysis results, formulate actionable strategies and interventions to enhance student performance, motivation, and engagement.

5.   Promote personalised learning: Explore ways to tailor educational approaches to individual student needs, strengths, and weaknesses to optimise their learning experience and potential.

6.   Empower educators and stakeholders: Provide valuable insights and recommendations to educators, parents, policymakers, and other stakeholders to support them in fostering an environment that nurtures the potential of the youth effectively.

To create a data-driven approach that not only boosts academic achievements but also fosters personal growth, critical thinking, creativity, and a sense of purpose among students, unleashing their full potential as they progress in their educational journey.

Specify the Business Problem

Business requirement of student performance analysis refers to the need of educational institutions or organisations to gather, analyse, and use data on students' academic performance to improve teaching and learning outcomes. This process involves collecting, analysing, and interpreting data on various aspects of student performance such as test scores, attendance, behavioural patterns, and demographic information. The business requirement of student performance analysis is crucial for educational institutions to provide high-quality teaching and learning outcomes and improve student success. The ultimate goal is to gain insights and improve performance through data visualisation techniques. The educational institution or organisation is facing challenges in optimising student performance and unlocking the full potential of their student population. Despite efforts to provide quality education and support, there are concerns about underperforming students and the inability to fully nurture the talents and abilities of the youth. This leads to several business-related issues, including:

1.   Low Academic Achievement: The institution might be experiencing consistently low academic performance, affecting its reputation and competitiveness in attracting new students and retaining existing ones.

2.   Student Engagement and Motivation: There could be a lack of student engagement and motivation, leading to higher dropout rates and reduced interest in learning, which hinders the overall success of the institution.

3.   Resource Allocation: Inefficient resource allocation may occur, as the institution may be investing resources in areas that do not yield the desired results in improving student performance.

4.   Parent and Stakeholder Concerns: Parents and other stak holders may express concerns about the institution's ability to adequately prepare students for future endeavours, impacting the institution's credibility and support.

5.   Long-Term Success: Failure to address student performance issues may lead to long-term challenges in developing a talented and skilled workforce that can positively contribute to society and the economy.

Business requirements:

1.   Data Collection: To conduct a comprehensive analysis, the first step is to collect relevant data. This may include student demographics, academic records, standardised test scores, attendance data, extracurricular participation, and any other relevant information that could influence student performance.

2.   Performance Metrics: Define specific performance metrics to evaluate student achievements accurately. These metrics may include GPA (Grade Point Average), exam scores, class ranks, and improvements over time.

3.   Factors Affecting Performance: Identify potential factors that could impact student performance. This might involve exploring teaching methodologies, classroom environment, curriculum effectiveness, teacher-student interactions, parental involvement, socio-economic backgrounds, and access to resources.

4.   Data Analysis Techniques: Employ various data analysis techniques such as descriptive statistics, correlation analysis, regression analysis, and machine learning algorithms to identify patterns, trends, and relationships within the data.

5.   Identifying At-Risk Students: Develop a model or method to identify students at risk of underperforming or dropping out based on historical data and early warning signs. This could help in implementing targeted interventions.

6.   Personalized Learning Strategies: Inves igate methods to personalise the learning experience for each student, recognizing their strengths, weaknesses, and learning styles to cater to their individual needs effectively.

7.   Intervention Strategies: Based on the analysis, develop actionable intervention strategies that can address the identified factors negatively impacting student performance. These strategies may involve academic support, counselling, mentoring, or specialised programs.

8.   Monitoring and Evaluation: Establish a system for continuous monitoring and evaluation of the implemented strategies to assess their effectiveness and make necessary adjustments.

9.   Stakeholder Engagement: Involve key stakeholders, including teachers, parents, school administrators, and policymakers, throughout the process to ensure their support, collaboration, and commitment to the project's goals.

10.   Ethical Considerations: Address any ethical considerations related to data privacy and confidentiality to ensure compliance with regulations and protect students' sensitive information.

11.   Long-Term Vision: Develop a vision for the institution's future, aligning educational goals with broader societal needs and aspirations to create a positive impact on the community and the nation as a whole.

Literature survey:

Existing approaches or methods to solve the problem of analysing student performance and understanding the factors influencing it include: Individualised Learning: Adopting

personalised learning approaches that cater to the specific needs and learning styles of students. This includes providing customised study materials, adaptive learning platforms, and differentiated instruction to ensure students receive the necessary support and resources for their academic growth. Early Intervention Strategies: Identifying struggling students at an early stage and implementing targeted interventions o address their sp cific needs. This can involve additional tutoring, mentoring, or academic support programs to improve their performance and prevent further decline. Test Preparation Support: Offering resources and support for test preparation, including providing study materials, practice exams, and guidance on effective study techniques. This helps students build confidence, reduce test anxiety, and improve their performance in exams. Quality Teaching and Professional Development: Investing in the professional development of teachers to enhance their instructional practices, assessment strategies, and classroom management techniques. This ensures that educators are equipped with the necessary skills and knowledge to effectively engage and support students in their learning journey. Monitoring and Feedback Systems: Implementing systems to regularly monitor student progress and provide timely feedback. This can include formative assessments, regular reporting to parents, and feedback loops that enable students to understand their strengths and areas for improvement. Collaboration and Partnerships: Promoting collaboration between schools, educators, parents, and relevant stakeholders to create a supportive and conducive learning environment. This can involve establishing partnerships with community organisations, leveraging technology platforms for collaborative learning, and sharing best practices among educational institutions. By employing these approaches and methods, educators, policymakers, and stakeholders can gain a comprehensive understanding of student performance and the factors that influence it. This allows for targeted interventions, policy changes, and resource allocation to unleash the full potential of our youth and ensure a high-quality education system that nurtures and supports student success.

As part of the solution, data analysis techniques were applied to comprehensively analyse student performance and gain a deep understanding of the factors influencing it. Through the utilisation of various visualisations, such as heatmaps, bar charts, scatter plots, pie charts, stacked area charts, and donut charts, insightful patterns and trends were uncovered. The creation of a heatmap allowed for a visual representation of maths, reading, and writing scores across different race/ethnicity categories, enabling the identification of any disparities or notable trends. Grouped bar charts were employed to compare course completion rates across different levels of education, providing valuable insigh s into areas where students may have encountered challenges or succeeded. By utilising scatter plots, the relationship between writing and reading scores was explored, revealing potential correlations or patterns that shed light on how these two variables interact. Pie charts were used to clearly illustrate the proportion of students who completed the course versus those who did not, offering a comprehensive understanding of the overall completion rates. Stacked area charts facilitated a comparison of cumulative scores for different genders over time, highlighting any discrepancies and informing further actions. Additionally, donut charts were employed to depict the distribution of lunch waivers among various race/ethnicity categories, providing insights into socioeconomic factors that may have impacted student performance. These data analysis techniques and visualisations allowed educators, policymakers, and stakeholders to make informed decisions and implement targeted interventions to unlock the full potential of students. By identifying patterns, disparities, and influential factors, the aim was to foster a high-quality education system that supports student success.

Social or Business impact:

Student performance analysis can have significant social and business impacts, as it directly influences both the educational outcomes and the overall development of the youth. Let's explore the social and business impacts in more detail:

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Social Impact:

1.   Enhanced Educational Outcomes: By analysing student performance, educational institutions can identify areas of improvement and implement targeted interventions. This, in turn, leads to improved educational outcomes, higher academic achievement, and a more knowledgeable and skilled student population.

2.   Reduced Achievement Gap: Student performance analysis helps in identifying at-risk students and understanding the factors contributing to their struggles. Addressing these issues through tailored interventions can help reduce the achievement gap between students from different socio-economic backgrounds or learning abilities.

3.   Personalised Learning: Implementing personalised learning strategies based on performance analysis allows educators to cater to individual student needs, enhancing their learning experiences and ensuring better academic progress.

4.   Early Intervention and Support: Early warning systems can identify struggling students, enabling timely intervention and support to address academic or personal challenges they may face.

5.   Increased Student Motivation: When students see their progress being monitored and receive personalised support, it can boost their motivation and self-confidence, leading to greater engagement and interest in their studies.

6.   Holistic Development: Performance analysis can go beyond academic achievements and include extracurricular activities, personal growth, and social skills. This holistic approach fosters well-rounded individuals capable of contributing positively to society.

Business Impact:

1.   Improved Institutional Reputation: Institutions that effectively analyse and address student performance issues gain a reputation for providing quality education and fostering student success. This can lead to increased enrollment rates and improved retention of students.

2.   Increased Student Retention: By understanding the factors affecting student performance and implementing appropriate interventions, educational institutions can reduce dropout rates and retain more students over the long term.

3.   Efficient Resource Allocation: Performance analysis allows institutions to allocate resources more efficiently by focusing on areas that need improvement the most, maximising the impact of investments.

4.   Better Decision-Making: Data-driven decision-making based on student performance analysis enables administrators and policymakers to make informed choices about curriculum design, teaching strategies, and support services.

5.   Enhanced Accreditation and Funding Opportunities: Institutions with a proven track record of using performance analysis to improve outcomes are more likely to receive accreditation and funding from governmental and private organisations.

6.   Alignment with Workforce Needs: A better understanding of student capabilities and potential allows educational institutions to align their offerings with the needs of the job market, producing graduates who are better equipped to succeed in their careers.

Data Collection & Extraction From Database

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.

Firstly the data need to be collected form student.csv and the process goes with as follows Student performance analysis so little understand about our project student from Indore csv so this is our data set this file contains 1000 rows each row correspond to an individual student with details and marks in the respective subjects print table standard test preparation none or completed numerical columns contains.

The data set normally require the following:

1.   Academic Records:Gather data on student academic performance, including grades, test scores, class rankings, and subject-specific achievements.

2.   Demographic Information:Collect demographic data, such as age, gender, ethnicity, and socio-economic background, as these factors may impact student performance.

3.   Attendance Data:Track student attendance records to assess their level of engagement and commitment to their studies.

4.   Educational Interventions: If any educational interventions or programs have been implemented in the past, gather data on their effectiveness and impact on student performance.

5.   Teacher Feedback and Evaluations: Obtain feedback and evaluations from teachers about students' strengths, weaknesses, and areas for improvement.

6.   Parental Involvement: Assess the level of parental involvement in students' education, as this can influence academic outcomes.

7.   Standardised Test Scores: If available, include data from standardised tests to compare student performance against national or regional benchmarks.

8.   Extracurricular Activities: Consider data on students' participation in extracurricular activities, as these can contribute to their overall development.

9.   Student Surveys:Conduct surveys to gather students' perspectives on their learning experiences, interests, and challenges.

10.   Teacher Surveys: Gather feedback from teachers on their teaching methods, classroom environment, and challenges they face in supporting student performance.

Storing the data DB2 and connect DB2 with cognos:

1. Install and Set Up Db2:

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  Download and install IBM Db2 n your server or local machi e. Follow the installation instructions provided by IBM.
   - Configure the Db2 instance and create the necessary databases to store your data.

2. Prepare Your Data:
   - Organise and format your data in a way that aligns with the database schema you plan to create in Db2. Ensure that your data is clean and free from errors.

3. Create a Database Schema:
   - Define the structure of your database by creating tables that correspond to the data you want to store. Decide on the appropriate data types and constraints for each column.

4. Import Data into Db2:
   - Load your data into the Db2 database by using tools like the Db2 Data Movement Tool (db2move) or the Data Import feature in IBM Data Studio.

5. Set Up Db2 Authentication:
   - Create users and assign appropriate privileges to access the Db2 database. Ensure that you have the necessary credentials to connect to Db2.

6. Connect Cognos to Db2:
   - Open IBM Cognos and access the Cognos Administration Console.
   - Configure the data source connection to Db2 in Cognos by providing the necessary connection details, such as the database name, hostname, port number, username, and password.

7. Define Data Source in Cognos:
   - Create a data source in Cognos that points to the Db2 database you want to use for reporting and analysis.

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8. Build Cognos Reports and Dashboards:
   Use Cognos Report Studio or C gnos Analytics to create rep rts, dashboards, and visualisations based on the data stored in Db2.

9. Schedule Data Refresh:
   - Set up a data refresh schedule to keep the data in Cognos reports up-to-date with the data in Db2. Depending on the frequency of data updates, you may need to schedule regular refreshes.

10. Test and Validate:The done data set is used to be tested and perform the data.

Data preparation:

Data preparation for student potential analysis is a crucial step in the project. It involves cleaning, transforming, and organising the data to ensure its quality and usability for analysis. Here are the key steps for data preparation in the context of student potential analysis:

1. Data Collection:
   - Gather relevant data from various sources, such as academic records, test scores, attendance data, extracurricular activities, demographic information, and any other data points that might impact student performance.

2. Data Cleaning:
   - Identify and handle missing or incomplete data. Depending on the extent of missing data, you might choose to impute missing values or exclude incomplete records from the analysis.
   - Check for data inconsistencies and errors, and rectify them to ensure the accuracy and reliability of the data.

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3. Data Integration:
   - Combine data from different sources into a unified dataset. Ensure that data from various sources can be linked to specific students accurately.

4. Data Transformation:
    Convert data into appropriate f rmats for analysis. For exam le, if the data is in raw text format, convert it into numerical or categorical variables as needed.

5. Feature Engineering:
   - Create new features or variables that might be useful for the analysis. For example, you could calculate a student's average test score or determine their level of participation in extracurricular activities.

6. Standardisation and Normalisation:
   - Scale numerical variables to have a similar range to avoid bias during analysis. For instance, you can normalise grades or test scores to a common scale.

7. Identify Key Performance Metrics:
   - Define the primary performance metrics that will be used to assess student potential. This could include GPA, standardised test scores, or any other relevant indicators.

8. Data Aggregation:
   - Aggregate data at different levels (e.g., student, class, school) to facilitate analysis and make comparisons across different groups.

9. Data Splitting:
   - Divide the dataset into training, validation, and testing sets if you plan to build predictive models to predict student potential.

10. Data Visualization:

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- Visualise the data using charts and graphs to gain insights and identify patterns or trends that can help guide the analysis.

11. Addressing Ethical Considerations:
- Ensure that the data handling process complies with data privacy and security regulations. Anonymize or pseudonymous personal information to protect student privacy.

12. Documentation:
- Keep detailed documentation of the data preparation steps, including any decisions made during the process, to ensure transparency and reproducibility.

Data visualisation:

Data visualisation plays a vital role in student potential analysis as it helps to convey insights and patterns in the data effectively. Below are some common types of data visualisations that can be used in the context of student potential analysis:

1. Bar Charts and Histograms:
- Use bar charts to visualise categorical data, such as the distribution of students based on gender, grade levels, or socio-economic backgrounds.
- Histograms can be used to show the distribution of continuous data, such as test scores or GPA.

2. Line Charts:
- Use line charts to track the academic progress of individual students over time, showing their performance trends across different subjects or semesters.

3. Scatter Plots:
- Scatter plots can reveal relationships between two continuous variables, such as test scores and study hours, to identify any correlations or patterns.

4. Bubble Charts:
- Bubble charts can be used to show the relationship between three variables, where the size of the bubbles represents a third data dimension. For example, it could be used to visualise the relationship between study hours, test scores, and student age.

5. Heatmaps: - Heatmaps are useful for comparing multiple variables simultaneously. You could use a heatmap to display the correlation between different subjects' grades or to explore the performance of students across various tests.

6. Box Plots:

- Box plots can help identify the distribution and spread of data, making it easy to compare performance across different student groups or schools.

7. Stacked Bar Charts:
   - Stacked bar charts are ideal for visualising proportions and comparing the contribution of different factors to overall performance. For example, you could use it to show the breakdown of test scores by subject.

8. Radar Charts:
   - Radar charts can be used to compare the performance of multiple students on different criteria, such as academic performance, extracurricular involvement, and attendance.

9. Gauge Charts:
   - Gauge charts can provide a quick visual assessment of student progress towards specific targets or goals, such as achieving a certain GPA.

10. Tree Maps:
    -    Tree maps can help visualise hierarchical data, such as the allocation of time spent on different subjects or activities.

11. Word Clouds:
    -    Word clouds can be used to highlight keywords or frequently mentioned themes in student feedback surveys or qualitative data.

No.of unique visualisation:

Male Female pass ratio:

We will be seeing the performance page on the gender so for that we need to feels that is Gender and the average of three subjects so let's get started with this so first a er that we can take average of three subjects so since performance is measured on the average so we have to correct this problem has ach field of which so that's all for this video.

Student By Grade:

This video i am going to pay it and visitation to demo set up a comma so student paste on the printer level of education three subjects and we will write we will write a conditions then reading scope then writing scope we free how to create a dream app first education and go to measure land about emo encounter screen we can see a tree I put average of three now we can a behaviour and then average change the colour of this girl colours from this I am selecting oil good night di Megan apply change the name of the city and put the name I put the performance in relation 11 education select all we can send changes now to change the change we will go to format we will go to setting now we can Pintu now we can see the head performance then inter level education we can see the name of the sheet is also change not this seat the average of the average of the student by the level and we can see that the students master degree this is called visualisation.

Race Specific Distribution:

On the race and electricity so that required feels could be the recent atmost student id so let it started with this first will have to take the average rain put it for the colour marks so we need to collect this formula a er student id I am we need the account for this so when we have to correct the formula recent electricity vacancy we canHow to make a visualisation for the performance based

Parents education:

Visualisation where we will see the performances students based on to show you and then you will go to create calculated field please set the formula for it score now let's make for making analysis the making the diagram average now Sumit ki Utkal colour off D Rose different colours are good in a fighting and you can change your from your also let's change the background can we change into something breed title also fight change to White change the name of the seed one performance students based on a now we will see the value lunch with students have taken their standard one have got up more average of three subjects ok which is 70.837 where is

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for the free if the reduced one ecord 62.199 students work getting a standard lunch or getting more marks of more marks subjects

DashBoard:

In the context of a "Student Performance Analysis Project," a dashboard is a visual representation of key performance indicators (KPIs) and data insights related to student performance. It provides a user-friendly interface that allows stakeholders, such as educators, administrators, and policymakers, to monitor, analyse, and interpret data in real-time. Dashboards consolidate various data sources into a single, interactive platform, making it easier to understand complex information and make data-driven decisions.

A dashboard is a graphical user interface (GUI) that displays information and data in an organised, easy-to-read format. Dashboards are o en 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 charts ,graphs.

Components of a Dashboard:

Data Visualization: Dashboards use charts, graphs, tables, and other visual elements to present data in a clear and intuitive manner. Common types of visualisations include bar charts, line charts, pie charts, scatter plots, and heatmaps.

Key Performance Indicators (KPIs): KPIs are specific metrics that represent essential aspects of student performance. Examples of KPIs in a student performance analysis dashboard

could include average grades, attendance rates, standardised test scores, dropout rates, and progress over time.

Filters and Interactivity: Dashboa ds o en include filt ring options t t allow users to focus on specific data subsets or time periods. Interactivity enables users to click on elements in the dashboard to drill down into more detailed information or explore related data.

Real-time Updates: Dashboards can be connected to live data sources, ensuring that the information presented is up-to-date and relevant.

Working of a Dashboard:

Data Collection and Integration: The first step is to collect data from various sources, such as student information systems, test scores, attendance A dashboard is a visual representation of data and information, presented in a consolidated and easily digestible format. In the context of the "Unleashing the Potential of Our Youth: A Student Performance Analysis Project," a dashboard can be a powerful tool for presenting.

key insights and findings from the analysis in a user-friendly manner. It allows stakeholders, such as educators, policymakers, and parents, to quickly grasp important information and make data-driven decisions to support students effectively.

Here are some key components and features of a student performance analysis dashboard:

Provide a high-level summary of the project's objectives, methodology, and key findings. Display key performance metrics, such as average grades, exam scores, and overall academic progress. Student Performance Metrics:

Present individual and aggregate performance metrics of students, such as test scores, grades, attendance, and participation in extracurricular activities.

Use visualisations like line cha ts, bar graphs, and scatter plots to tr ck student progress over time and identify trends. Comparative Analysis:

Compare the performance of different groups of students (e.g., grade levels, schools, or districts) to identify disparities and best practices.

Use interactive charts to enable users to filter and explore data based on specific criteria.

Correlation and Predictive Analysis:

Highlight correlations between student performance and various factors like socio-economic status, parental involvement, and school resources.

Display key performance metrics, such as average grades, exam scores, and overall academic progress.

Student Performance Metrics:

Present individual and aggregate performance metrics of students, such as test scores, grades, attendance, and participation in extracurricular activities. Use visualisations like line charts, bar graphs, and scatter plots to track student progress over time and identify trends.

Comparative Analysis:

Compare the performance of different groups of students (e.g., grade levels, schools, or districts) to identify disparities and best practices.

Use interactive charts to enable users to filter and explore data based on specific criteria.

Correlation and Predictive Analysis:

Highlight correlations between student performance and various factors like socio-economic status, parental involvement, and school resources.

Display predictive models and forecasts that can help identify students at risk of underperforming or dropping out.

Attendance and Behavior Tracking:

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Include data on student attendance and behaviour, as these factors can significantly impact academic performance.

Use data visualisations to represent patterns in att ndance and be vioural trends.
Intervention Effectiveness:

Evaluate the effectiveness of educational programs and interventions aim student
performance.

Showcase before-and-a er comparisons and success rates of specific interventions.
Recommendations:

Provide evidence-based recommendations based on the analysis for improving the
education system and supporting students.

Include interactive elements that allow users to explore recommended strategies and
their potential impact. User Interaction:

Design the dashboard with interactive features, such as drop-down menus, filters, and drill-
down capabilities, to allow users to explore data based on their specific interests.

Ensure the dashboard is user-friendly and accessible to various stakeholders, regardless of
their technical expertise.

Data Privacy and Security:

Implement data privacy measures to ensure that sensitive information is protected.
Anonymize data or provide role-based access to maintain confidentiality.
Overall, a well-designed dashboard for the "Unleashing the Potential of Our Youth: A
Student Performance Analysis Project" can serve as a valuable tool for empowering
stakeholders with actionable insights, fostering data-driven decision-making, and ultimately
supporting the educational journey of our youth.

Comparison of Student Attributes

Gender

Female 51.80%

Male 48.20%

Race/Ethnicity

Group C 31.90%

Group D 26.20%

Group A 8.90%

Group E 14.00%

Group B 19.00%

Lunch

Standard 64.50%

Free 35.50%

Test Course

None 64.20%

Completed 35.80%

Parental Education

Associate's Degree 22.20%

Some College 22.60%

Master's Degree 5.90%

Bachelor's Degree 11.80%

High School 19.60%

Some High School 17.90%
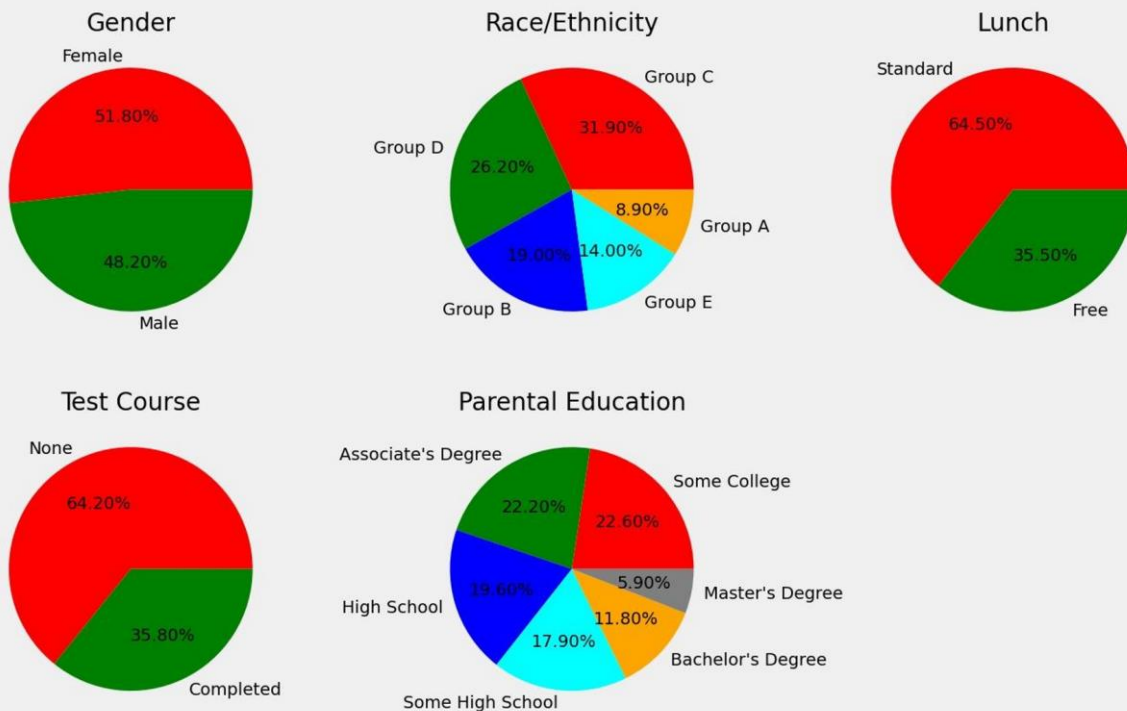
Creating a dashboard for the "Unleashing the Potential of Our Youth: A Student Performance Analysis" project can be an effective way to visualise and communicate the findings of the analysis to various stakeholders, including educators, policymakers, and parents. Here's a brief overview of the best references and their working for creating an informative and interactive dashboard:

Data Visualization Library: Plotly (https://plotly.com/)
Plotly is a powerful open-source graphing library that allows you to create interactive, visually appealing plots and charts. It supports a wide range of chart types, including bar charts, line plots, scatter plots, heatmaps, and more. It is compatible with various programming languages, such as Python, R, and JavaScript, making it a versatile choice for building interactive dashboards.

Working: With Plotly, you can use its Python or R libraries to create different visualisations based on your analysis results. For example, you can create a bar chart to compare the

average performance of students in different subjects, a heatmap to show correlations between variables, or a scatter plot to examine t e relationship between student attendance and their test scores.

Data Visualization Library:
D3.js is a JavaScript library widely used for data visualisation. It provides powerful tools for creating custom visualisations and enables a high level of interactivity in web-based dashboards. D3.js is particularly useful when you need to create unique and specialised visualisations for your project.

Working: Using D3.js, you can create custom data visualisations to present the analysis results in a unique and engaging way. For instance, you can create a force-directed graph to visualise the social network of students, showing how friendships or study groups impact academic performance.

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Dashboard Framework: Dash (https://dash.plotly.com/)
Dash is a Python web application framework built on top of Plotly and other libraries. It allows you to create interactive, web-based dashboards quickly and efficiently without requiring extensive web development knowledge.

Working: Dash enables you to create interactive dashboards with Python code. You can use its components to define charts, filters, and other user-interface elements that update dynamically based on the user's interactions. For example, you can create dropdown filters to allow users to select specific schools or grade levels and update the dashboard visualisations accordingly.

Business Intelligence (BI) Tools: Tableau (https://www.tableau.com
BI tools like Tableau and Power BI offer powerful dashboard-building capabilities with intuitive interfaces. They provide drag-and-drop functionalities, making it easier for non-technical users to create interactive dashboards quickly.

Working: These tools allow you to connect directly to your data source and create interactive dashboards using a visual interface. You can drag and drop charts, filters, and other elements onto the dashboard canvas and then configure them to represent your analysis results. These tools usually offer various customization options, such as colour schemes and formatting, to make the dashboard visually appealing.

Performance of Students

Performance based on the Gender

male 65.837
female 69.569

Performance based on the Race/Ethnicity

group E
group A
group B
group D
group C

Performance in relation with the Parental Level of Education

some college
high school
bachelor's degree
associate's degree
some high school
master's degree

Performance based on their Lunch

Lunch
free/reduced
standard
0   10   20   30   40   50   60   70
Average of three Subjects

Performance based on their Test Preparation

Test Pre..	
completed	
none	

Next Dashboard

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 summarises the key findings and highlights their implications. Data stories can be told using a variety of mediums, such as reports, presentations, interactive visualisations, and videos.

The story provides the variation in student's performance based on different parameters. The story has a total of 9 visualisations and each visualisation has an interconnected meaning and all the visualisations are pointing toward the performance of students. From the whole story, it can be inferred that the females from group E with standard lunch whose parental level of education is Master's degree and completed the test preparation have shown the most promising results.

Working of the Project:

Research Design: The project starts with designing a comprehensive research plan that outlines the objectives, data sources, methodologies, and expected outcomes of the analysis.

Data Collection: Relevant data is collected from educational institutions, including schools, colleges, and universities. The data may include student demographics, academic performance, attendance records, socio-economic factors, and other variables that could potentially impact student achievement.

Data Preprocessing: The collected data undergoes preprocessing, which involves cleaning, transforming, and normalising the data to ensure consistency and accuracy.

Exploratory Data Analysis (EDA): EDA is conducted to gain an initial understanding of the data's distribution, patterns, and relationships between variables. This step helps identify any data inconsistencies or outliers that may need further investigation.

Correlation Analysis: The data is analysed to identify correlations between different factors and student performance. This analysis helps to pinpoint potential influencing variables that may impact academic achievements positively or negatively.

Predictive Modelling: Machine learning algorithms or statistical models are applied to develop predictive models that can forecast student performance based on relevant factors. These models can be used to identify students who may need additional support or interventions.

Comparative Studies: The project may involve comparing the performance of different schools, districts, or regions to identify best practices and areas for improvement in the education system.

Qualitative Research: To complement the quantitative analysis, the project may include qualitative research through interviews, surveys, or focus groups with students, teachers, and parents. Qualitative data can provide insights into non-quantifiable factors that influence student performance, such as motivation, engagement, and social support.

Findings and Recommendations: Based on the data analysis and research findings, the project generates evidence-based recommendations for policymakers, educators, and stakeholders. These recommendations aim to optimise the education system, enhance student outcomes, and support students in reaching their full potential.

Reporting and Communication: The final step involves presenting the project's findings and recommendations in a clear and concise manner, ensuring that the insights are accessible and actionable for the target audience.
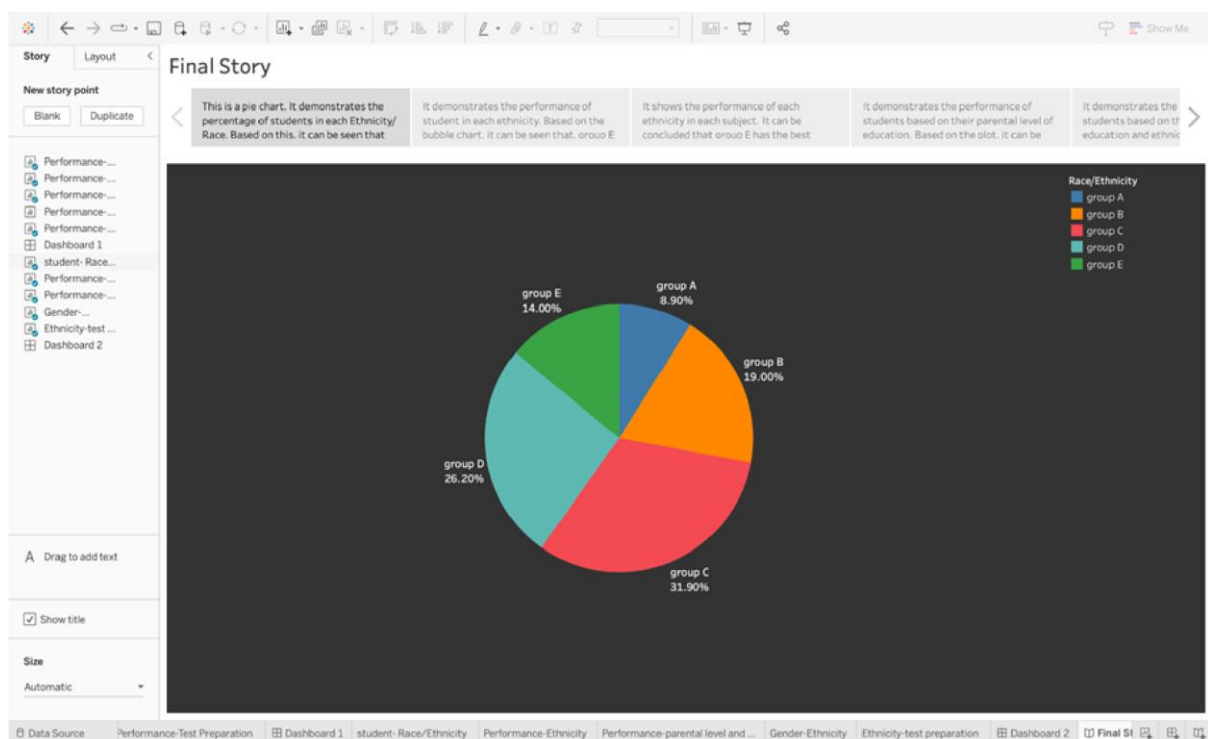
It demonstrates the performance of students in each ethnicity. Colour denotes the performance of the student and size denotes the number of students in each

e hnicitie . Ba ed on the bubble chart, it can be een that group E has the highest performance.
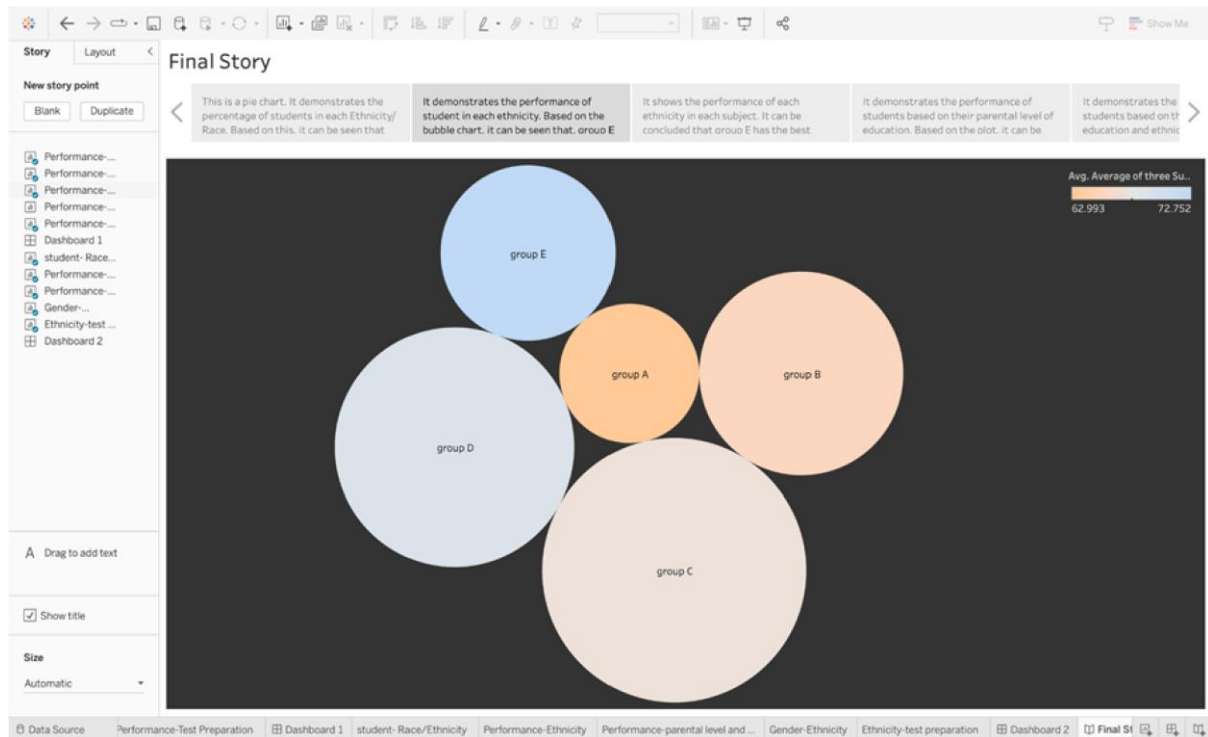
This is a treemap. It demonstrates the performance of students based on their parental level of education. Colour denotes the performance of the student and size denotes the number of students based on the parental level of education. Based on the plot, it can be seen that students whose parental level of education is master's degree have the highest performance in spite of having the lowest count of students.
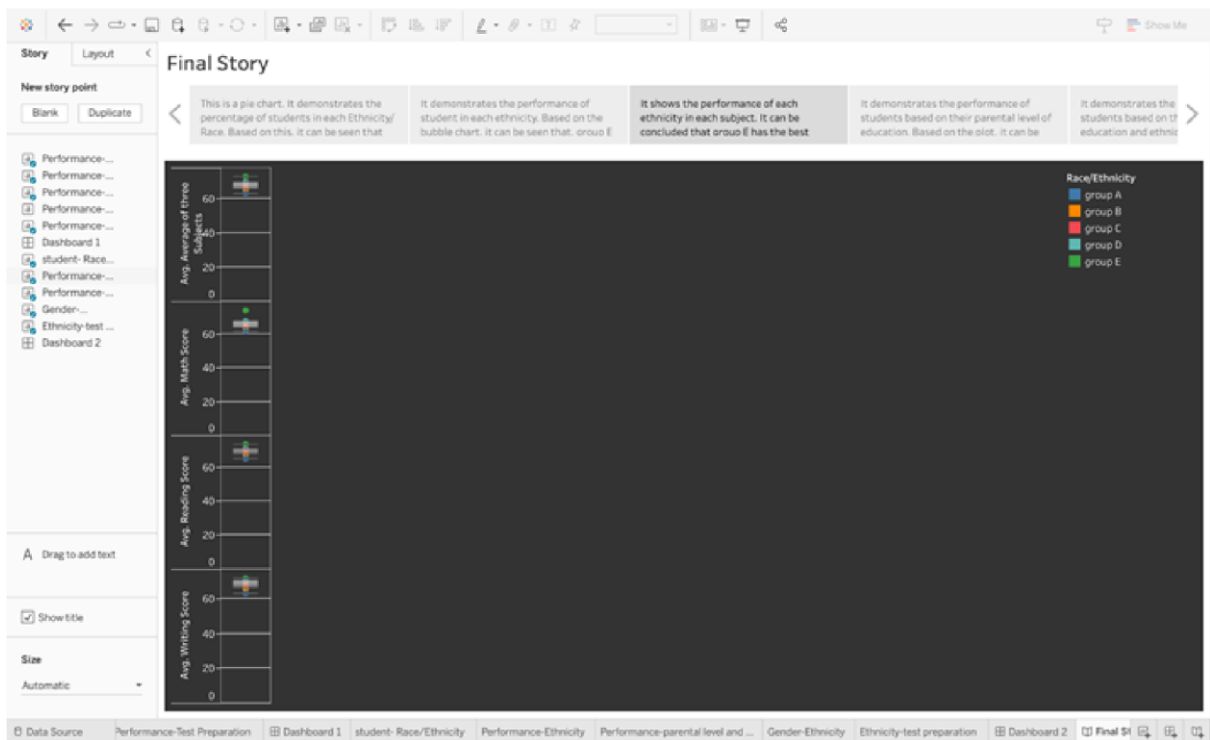
It demonstrates the performance of students based on their parental level of education and ethnicity. Based on the heat map, it can be seen that students under group E and whose parental education level is master's degree have the highest performance.
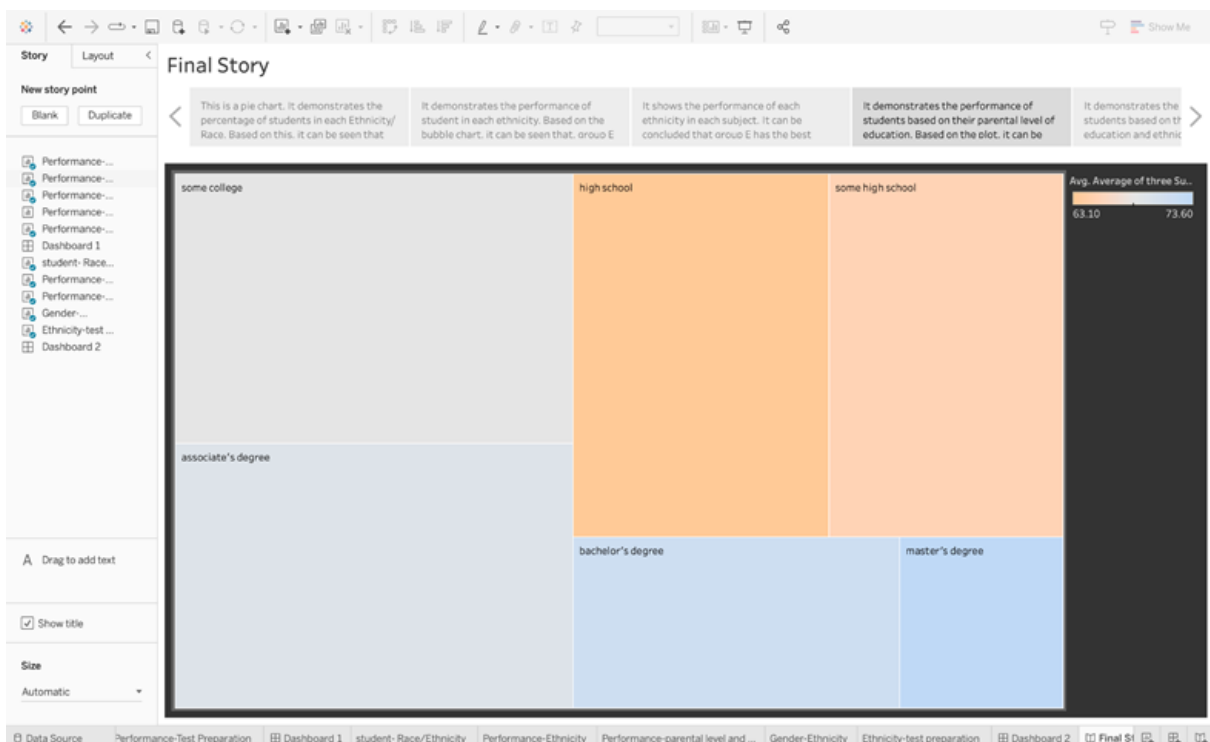
I demon t ate the performanc of students ba ed on their gender. Colour denotes gender. According to this, females are performing better than males.
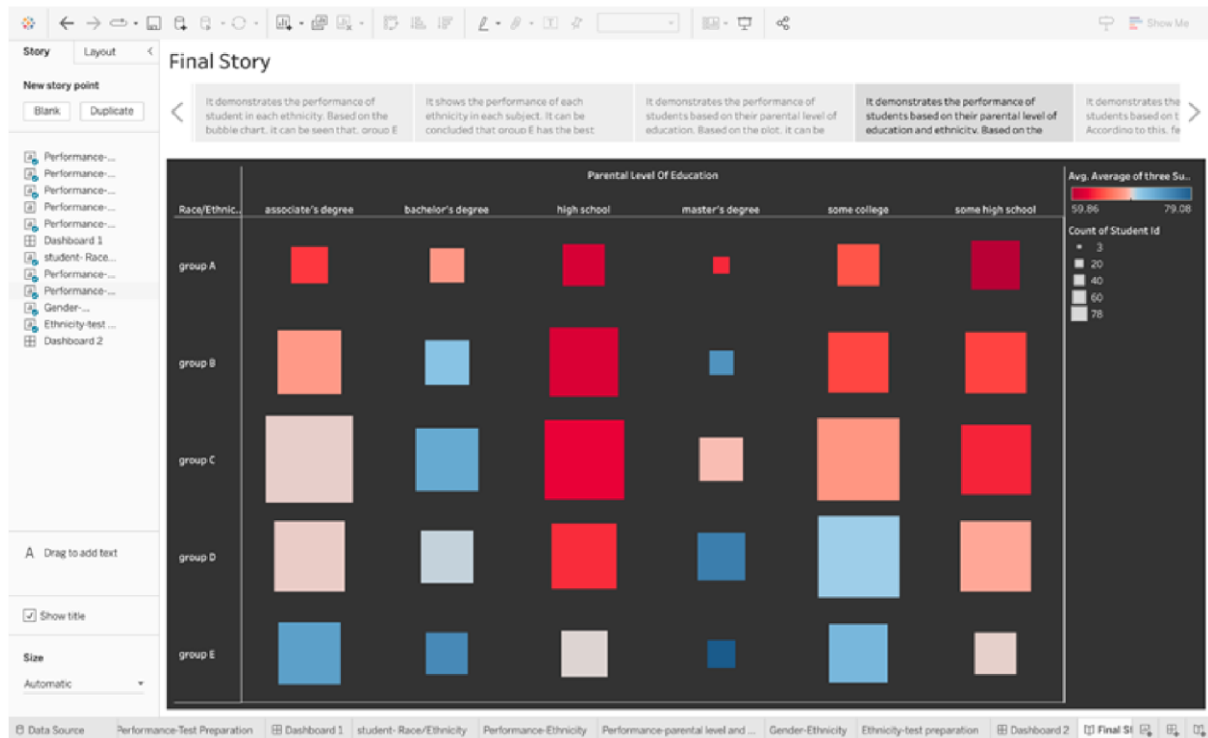
It shows the performance and count of students based on gender and ethnicity. Different shapes denote gender and colour denotes the ethnicities. We can conclude that females are performing better in each ethnicity.
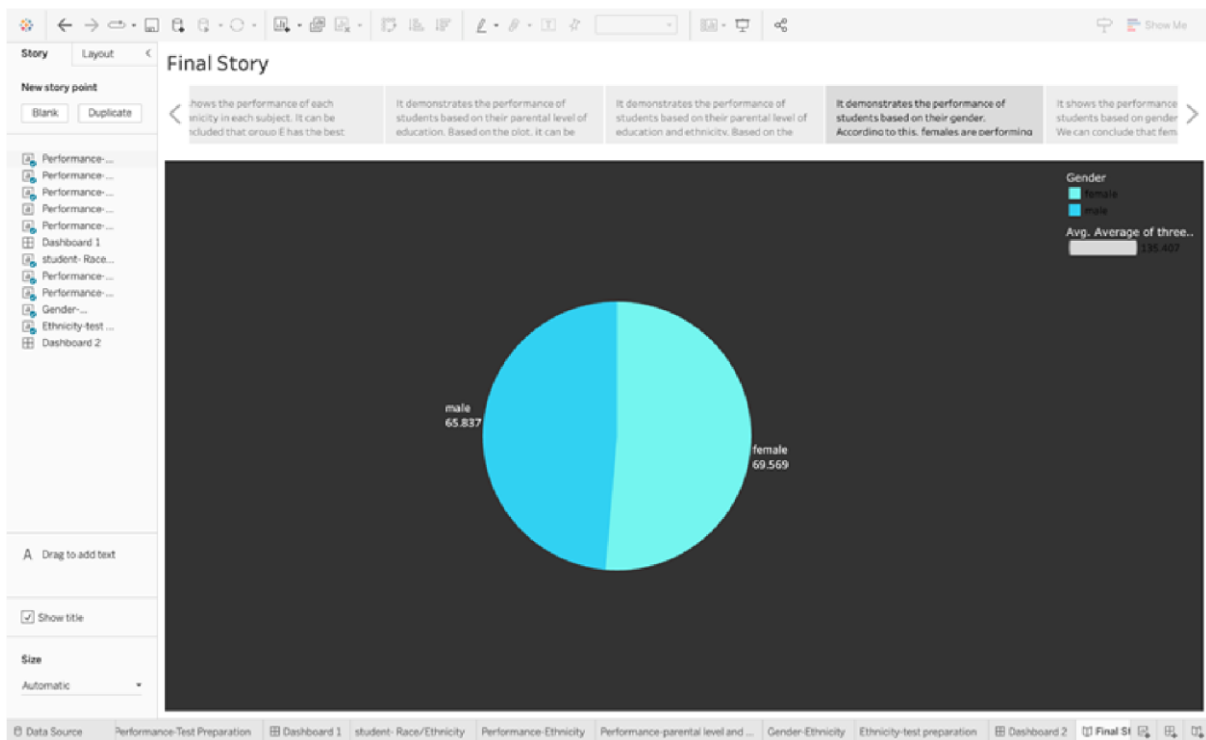
It shows the performance and count of students based on gender and ethnicity. Different shapes denote gender and colour denotes the ethnicities. We can conclude that females are performing better in each ethnicity.
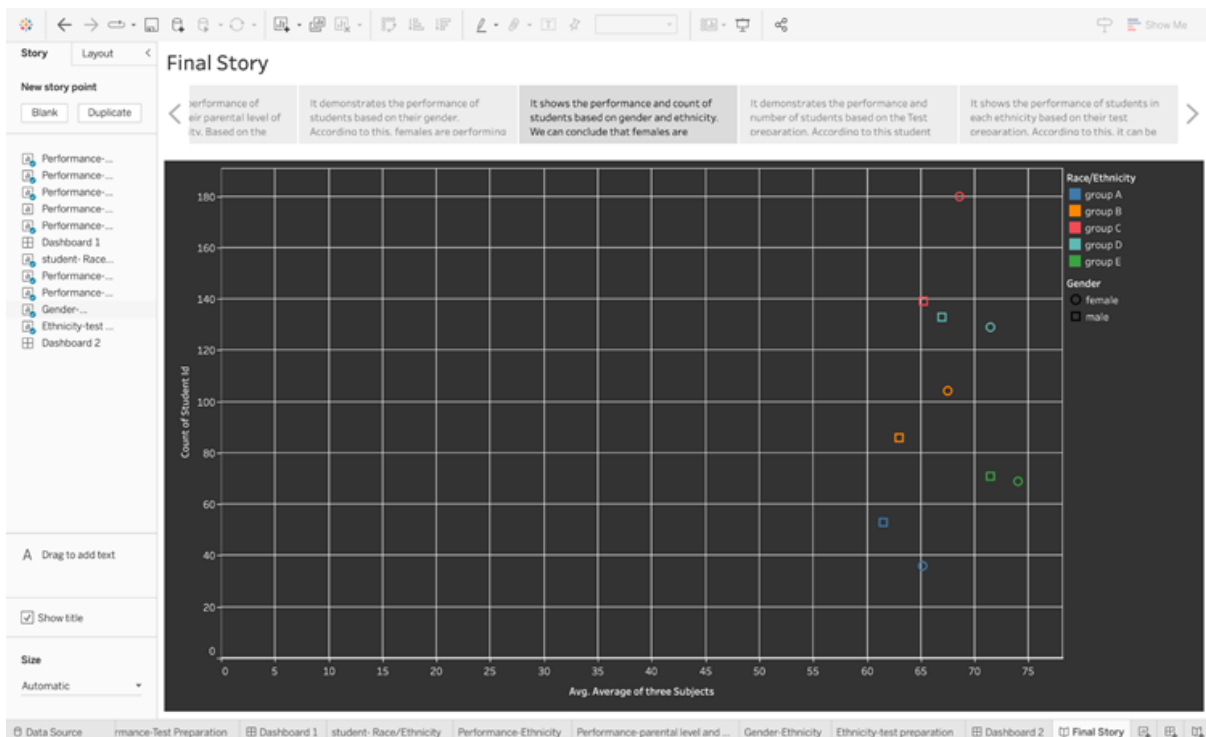
I demon t ate the performanc and number of tudents based on the Test preparation. Colour denotes the average score and size shows the count of the student ids. According to this student who had been prepared for the test performed better in spite of less count of students.
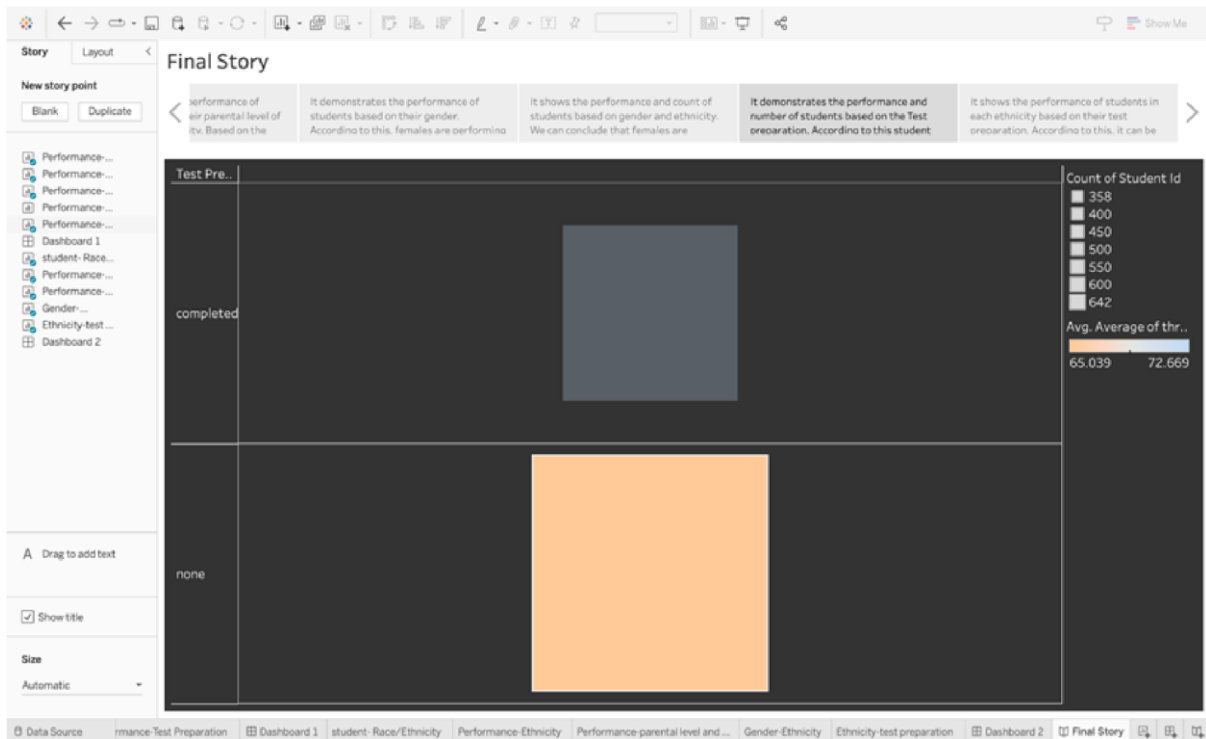
It shows the performance of students in each ethnicity based on their test preparation. Colour denotes the average score and size shows the count of the student ids in each ethnicities. According to this, it can be seen that group E with the completed test preparation has the highest performance.
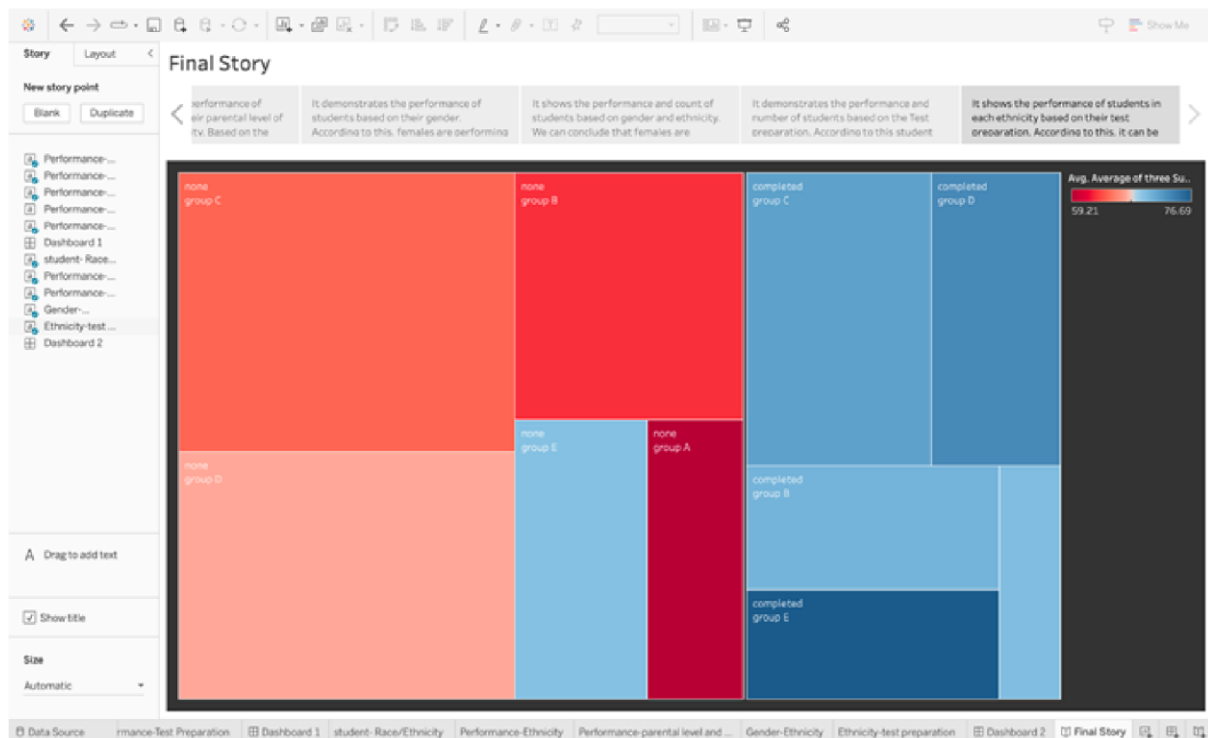
we will go and open the story and will go to this year option and copy the whole embedded code a er copying the choose we have to story this is suppose we have to publish our story suppose we have to coverage Public Service story we will press control we to paste all the lines so this is the line where we have to publish that code so we will go again go to table been embedded our this is the this is our story and we can see that it is working.

Report:

A er all the work public a er copy the whole we will come here and we will published all the we will public all the tab to code here so here we have to hear we are go to the website and a er reloading the website we will go again there so in the call to action we have published a we have we haWe have analysed the dataset StudentsPerformance containing 1000 of fields including columns like Student ID, gender, race/ethnicity, parental level of education, lunch, test preparation course,maths score, reading score & writing score. 1. First is the Male Female Pass

Ratio. This is a bar chart graph plotted on Gender and Count of

StudentsPerformance as our columns. We can see that the female count is 503 and that of male is 475 i.e 28 more females passed. 2. Next is the Students By Grade Bar chart graph. We have plotted this based on grades ranging from A F and Count of

S udentsPe formance. 134 stud nts scored A. 414 scored B. 343 students scored a C. 87 scored D and 22 scored F. 3. Moving forward is the Race Specific Distribution HeatMap based on Group A to E. Here we have a maximum of Group C races i.e.

319 then comes Group D having 262 students, group B having 190, group E 140 then A being 85. 4. Then there is Parents Education packed bubbles graph showing various degrees of parent's education. 5. Test preparation Effectiveness is also shown between male and female students. 6. Race wise Pass Fail Ratio is also made across various race groups from A to E and Count of StudentPerformance. 7. Finally we have also shown Grades Based on Preparation Material and how much is completed and not completed.

The results are promising and astonishing as, it can be seen that

- On the basis of gender, females are performing better than males;

- On the basis of parental level of education, student's whose parents having master's degree are showing the best performance;

- On the basis of ethnicity and race, group E had the most promising results;

- On the basis of test preparation, student who had been prepared for the test are showing the better results;

- On the basis of lunch, students who are having standard lunch are showing better results;

- On the basis of the scores in three subjects, the average reading score is best, then comes the average writing score and in the last comes is the average maths score.

Dashboard 1 provides the information about the students' performance with respect to each domain, and it shows the same results as inferred above.

Dashboard 2 provides information about how ethnicity is related with each other dimensions. It shows the largest number of students are from Group C. Students from Group A are performing the worst in all scenarios and students from Group E are performing

the best. Females are performing best in each group. Students who have completed the test preparation are performing the best from each group. Students from group E whose parental level degree is Master's degree are the best performers.

Story provides information about the student's performance. From the whole story, it can be inferred that the females from group E with standard lunch whose parental level of education is Master's degree and completed the test preparation have shown the most promising results.

Performance Testing:

Performance testing is a type of so ware testing that evaluates how a system or application performs under different workloads and conditions. The goal of performance testing is to identify any performance issues or bottlenecks that may exist and to determine whether the system can handle its expected workload.

Performance testing is a method used to evaluate and measure a student's academic performance in specific subjects or overall educational achievements. It involves the systematic collection, analysis, and interpretation of data related to students' test scores, grades, and other relevant academic indicators. The primary objective of performance testing is to gain insights into individual and group performance levels and identify areas where improvements may be needed.

Types of Performance Testing in Education:

Formative Assessment: This type of performance testing occurs during the learning process and helps educators gauge students' understanding and progress in real-time. Formative assessments can take various forms, such as quizzes, class discussions, and homework assignments, providing ongoing feedback to guide instruction.

Summative Assessment: Summative assessments are conducted at the end of a learning period to evaluate students' overall understanding and mastery of a subject or course. Examples include final exams, standardised tests, and end-of-year assessments.

Benchmark Testing: Benchmark testing compares students' performance against predetermined standards or benchmarks, helping to gauge their progress compared to grade-level expectations. Benchmark tests are o en administered periodically throughout the academic year.

High-Stakes Testing: High-stakes testing is used for important decisions, such as graduation requirements, college admissions, or school accountability. These tests have significant consequences for students, educators, and institutions, making their accuracy and fairness crucial.

Relevance to the Project:
In the context of "Unleashing the Potential of Our Youth: A Student Performance Analysis," performance testing will play a critical role in achieving the project's objectives:

Evaluation of Educational Programs: Performance testing can help assess the impact and effectiveness of various educational programs and interventions. By comparing the performance of students who have participated in specific programs with those who haven't, researchers can identify whether these programs lead to improved academic outcomes.

Identifying Areas for Improvement: Through performance testing, educators and policymakers can identify subject areas or topics where students are struggling. This information can be used to develop targeted interventions and support systems to address these challenges effectively.

Monitoring Progress: Regular performance testing enables the tracking of student progress over time. This data can help identify trends and patterns, allowing educators to implement timely interventions to support struggling students and challenge high achievers.
Equitable Education: Performance testing can shed light on achievement gaps between different demographic groups, helping to ensure that educational opportunities are equitable and inclusive for all students.

Working of Performance Testing:

1. Test Design: The first step in performance testing involves designing the assessments. The tests can vary in format and content, depending on the educational level and subject being evaluated. Common types of performance tests include standardized exams, quizzes, practical assessments, projects, and performance-based evaluations.

2. Test Administration: Once the tests are designed, they are administered to the students. This process may involve conducting exams in schools, colleges, or universities under controlled conditions to ensure fairness and consistency.

3. Data Collection: During the test administration, data is collected on students' responses, scores, and performance metrics. This data includes individual student scores and can also be aggregated at various levels, such as school, district, or region, for broader analysis.

4. Data Preprocessing: Before analyzing the performance data, it is crucial to preprocess and clean the data. This step involves removing any anomalies or errors and ensuring data integrity.

5. Descriptive Analysis: The performance data is subjected to exploratory data analysis to understand the distribution of scores, identify trends, and gain insights into the overall performance of the student population.

6. Comparative Analysis: Performance testing enables comparisons between different groups, such as male and female students, students from different socioeconomic backgrounds, or students from various schools. This comparison helps identify disparities and areas for improvement.

7. Correlation Analysis: Performance testing data can be correlated with other variables, such as attendance, parental involvement, or access to educational resources, to determine potential relationships between these factors and academic achievement.

8.   Predictive Modelling: Performance testing data can also be used to develop predictive models to forecast future student performance based on historical data and relevant factors.

9.   Identification of Interventions: Performance testing helps educators and policymakers identify areas where students may be struggling and design targeted interventions to address specific challenges.

10.   Assessment of Educational Programs: By analysing performance testing data over time, the effectiveness of educational programs and interventions can be assessed, leading to evidence-based decision-making.

11.   Recommendations: The insights gained from performance testing can lead to data-driven recommendations for improving the education system, enhancing teaching methods, and providing better support to students.

Amount of Data rendered to DB2:

DB2, developed by IBM, is a widely used relational database management system (RDBMS) that can handle large volumes of data efficiently. It is commonly used in enterprise environments to store and manage structured data.

To determine the amount of data rendered to DB2 for your specific "Unleashing the Potential of Our Youth: A Student Performance Analysis" project, you will need to consider the following steps:

Data Collection: Determine the sources from which you will collect student performance data, such as educational institutions, online platforms, or surveys.
Data Scope: Identify the specific data fields and attributes you need to collect for your analysis, such as student demographics, test scores, attendance, and extracurricular activities.

Data Volume: Estimate the size of the dataset based on the number of students, schools, and academic records you plan to include in the analysis.

Data Updates: Decide on the frequency at which you will update the data in the DB2 database, considering whether it will be a one-time analysis or an ongoing project.

Database Design: Design an appropriate database schema in DB2 to efficiently store and manage the student performance data.

Data Loading: Import the collected data into the DB2 database, ensuring data integrity and consistency during the loading process.

Data Maintenance: Implement a data maintenance plan to ensure the database remains up-to-date and accurate over time.

1. Data Collection:
   -   Student Performance Data: This includes academic records, exam scores, attendance, class participation, extracurricular activities, and other relevant information about students' performance.
   -   Socio-economic Data: Information about students' backgrounds, such as household income, parental education level, and access to resources.
   -   School Data: Details about schools, including infrastructure, student-teacher ratios, available facilities, and educational programs.

2. Data Preparation:
   Before rendering data to the DB2 database, it must be cleaned, transformed, and preprocessed to ensure consistency and accuracy. This step involves data cleansing, data integration, and data normalisation to eliminate duplicates and handle missing or erroneous data.

3. Database Schema Design:

A database schema is a blueprint that defines the structure of the database, including tables, columns, and relationships between them. In the case of student performance analysis, the schema will include tables for students, schools, exam scores, socio-economic data, and other relevant entities.

4. Data Rendering to DB2:

The process of rendering data to DB2 involves inserting, updating, or deleting records in the appropriate tables. The data can be loaded into DB2 using various methods:

- SQL INSERT statements: Individual records can be inserted using SQL queries.
- Data Load Utility: DB2 provides utilities like "LOAD" to efficiently load large volumes of data from external sources.

- ETL (Extract, Transform, Load) Tools: ETL tools like IBM InfoSphere DataStage can automate the process of extracting data from various sources, transforming it, and loading it into DB2.

How DB2 Works:

1. Data Storage:

DB2 stores data in tables, which are organised into tablespaces. Tablespaces consist of data pages, and each page holds a specific amount of data. When data is inserted or updated, DB2 manages the storage and ensures data integrity.

2. Query Processing:

When a query is executed against the DB2 database, the query optimizer determines the most efficient way to retrieve the requested data. It selects the best access paths, indexes, and execution plans to optimise query performance.

3. Indexing:

DB2 allows the creation of indexes on specific columns of a table to speed up data retrieval. Indexes enable faster searching and sorting of data, especially for frequently accessed columns.

4. Transaction Management:

DB2 follows the principles of ACID (Atomicity, Consistency, Isolation, Durability) to ensure data integrity and consistency during transactions. It supports concurrent transactions, providing isolation to prevent data conflicts.

5. Security and Access Control:
DB2 provides robust security features to control data access. Administrators can define user roles, permissions, and access privileges to protect sensitive information and maintain data privacy.

No.of Calculation felids: 1.
Academic Performance Metrics:

- Calculation of GPA (Grade Point Average) or CGPA (Cumulative Grade Point Average) for individual students based on their course grades.

- Determining class averages, median scores, and standard deviations to understand overall class performance.

2. Attendance and Engagement:
- Calculation of attendance rates for students and classes.
- Analysing patterns of absenteeism and tardiness to identify potential correlations with academic performance.

3. Socio-Economic Factors:
- Statistical analysis of demographic data to determine the influence of socio-economic backgrounds on student performance.
- Correlation between parental education levels, income, and academic success.

4. Standardised Test Scores:
- Analysing scores from standardised tests to assess the effectiveness of educational programs.
- Comparing students' test scores to national or regional averages.

5. Teacher Performance:

- Evaluating teacher effectiveness using metrics like student-teacher ratios, class performance, and student feedback.
- Assessing the correlation between teacher qualifications and student outcomes.

6. Extracurricular Activities and Leadership:
   - Calculating the number of extracurricular activities participated in by students.
   Analysing factors contributing to dropout rates and identifying potential interventions.

7 Time Management and Study Habits:
- Analysing study habits, time spent on homework, and time management skills of students.
- Assessing the correlation between study habits and academic success.

8. Predictive Modelling:
- Developing predictive models to forecast student performance based on various factors.
- Evaluating the accuracy and reliability of the predictive models.

No.of Visualization:

1.   Bar Charts: Bar charts can be used to compare student performance across different academic levels, subjects, or schools. They are effective in showing the distribution of data and identifying trends.

2.   Line Charts: Line charts are suitable for displaying the trend in student performance over time. They can be used to analyse academic progress and identify any improvements or declines.

3.   Scatter Plots: Scatter plots can be used to explore the relationship between two variables, such as student performance and parental involvement. They help in identifying correlations and potential patterns.

4.   Pie Charts: Pie charts can represent the proportion of students falling into different performance categories, such as excellent, good, average, and below average.

5.   Heatmaps: Heatmaps can be used to visualise student performance across different subjects and time periods. They provide an intuitive way to identify areas of strength and weakness.

6.   Histograms: Histograms can show the distribution of student scores in a particular subject or assessment. They provide insights into the frequency of different performance levels.

7.   Box Plots: Box plots can be used to compare the distribution of student performance between different groups or schools. They show the median, quartiles, and outliers.

8.   Bubble Charts: Bubble charts can be employed to represent three variables simultaneously, such as school performance, student enrollment, and available resources.

9.   Geographic Maps: Geographic maps can be used to display student performance data across different regions or districts. They help in identifying regional variations and disparities.

10.   Network Diagrams: Network diagrams can be useful to illustrate relationships between various factors affecting student performance, such as the connections between teacher quality and student outcomes.

11.   Radar Charts: Radar charts can be used to compare the performance of individual students in multiple subjects or skills, highlighting strengths and weaknesses.

-tree map
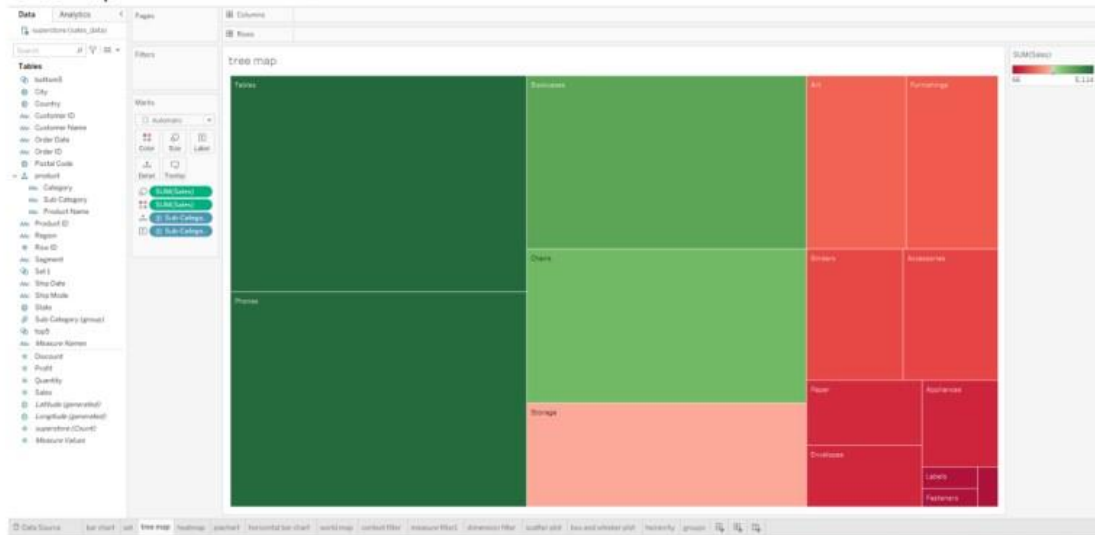
-piechart
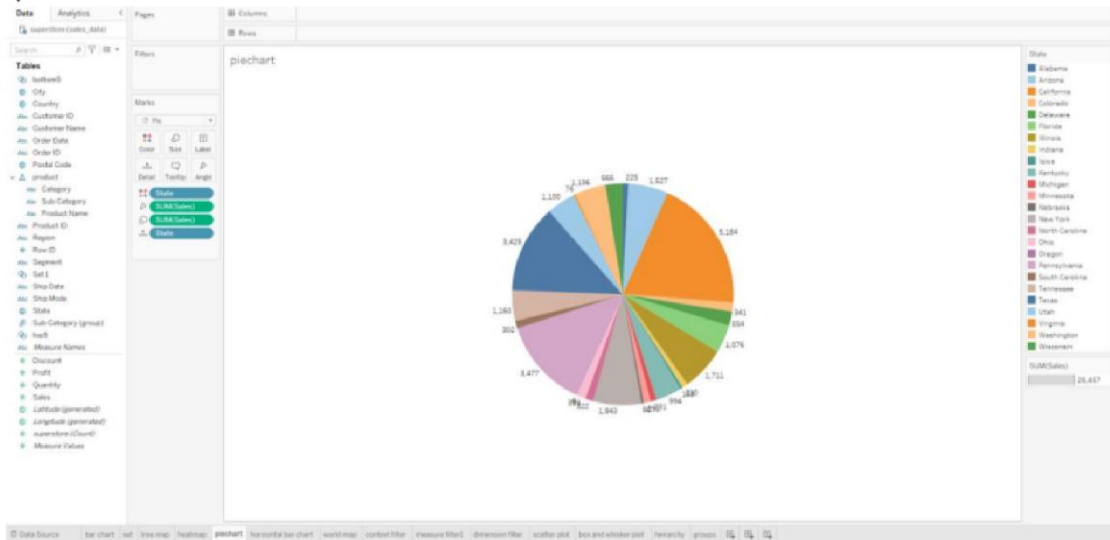
-horizontal bar chart
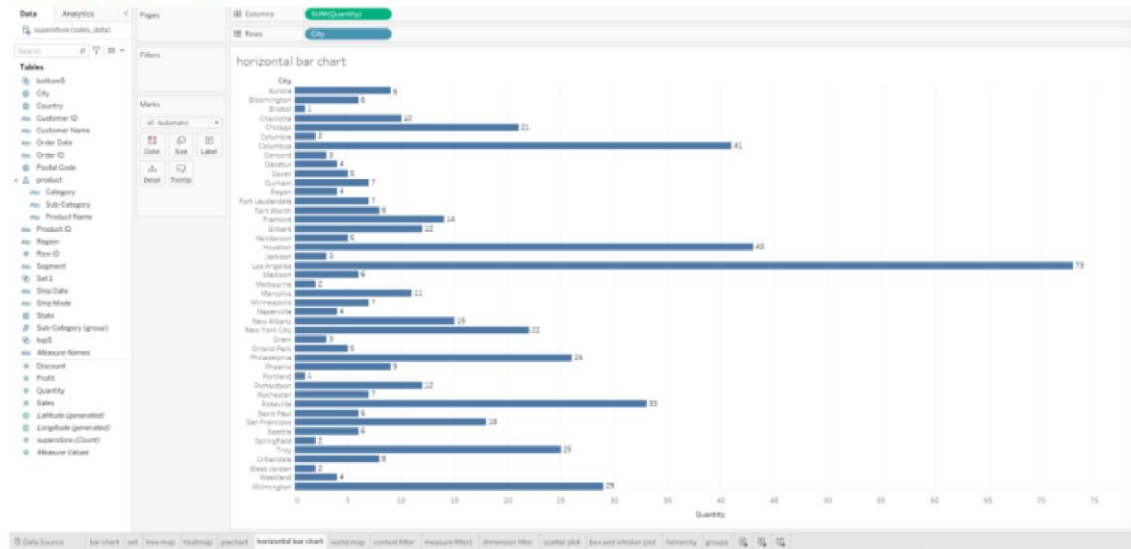
-scatter plot

-box and whiskr plot

context filter

-measure filter

-dimension filter

-hierarchy

-group

-set

Web Integration:

Its going to so how to integrate and stories to web so why we need to integrate that one and story to them so that publishing help us to drag and monitor key performance Matrix to communicate results and progress it also helps a published to stay form make better decisions and communication like like this but before it going to this it will show a pop up in which we have to we have to put our credentials a er that it will show this pop up in which we have to give the title that will be shown for this dashboard I have already saved in that public so I am not going to save it again but you have to put the title and then click to the save button now I will show you this is my travel direct YouTube to your account like this

this is how we will publish a dashboard publisher dashboard on integrated dashboard to aware also be given from here and we will share we can also share our dashboard like clicking on this and copy the link or the imped code now I will show how to how to integrate a story to with our public so we will again story I will show my story to you so this is the story that you have seen in the I Tablet W public account it is also editable on we can see the whole story from we can see the whole story from here like this this is the second third fourth and 5th visualisation those this is our story.