

Unleashing the potential of our youth : A Student Performance Analysis

- **INTRODUCTION**
- **1.1 Overview**

Nowadays the quality of the country's education system is widely increased as compared to the previous years. It has its own recognition and it has huge demand. Everyone knows the value of education and they are trying to become educated persons. However, like any other industry, it has numerous challenges, particularly in higher education. Main problems are decreasing the success rate of student results and another one is neglecting the studies at the middle of the academic year.

One most important thing in the education sector is teaching. Teacher has to analyze the student's work. To analyze the student knowledge, teachers constantly assign, collect and examine student work and improve their way of teaching techniques. This process will increase the progress of student knowledge. So that they will get quality education and they will also get interest to gain more knowledge and interaction of the student with teacher also important. It will improve the communication between student and teacher.

One of the major aspects of the student's performance is the educational background of the student's parent education. Research shows that parental education plays a significant role in shaping a child's academic goals. Students with parents who have higher education will gain more because they give support to their children, give knowledge about the importance of education and they have an idea about education. They will give suggestions on which is better for their career.

By analysing a dataset containing the marks secured by 1000 students from a school, this project aims to know student performance related to the education sector and their parental education. It gives an idea about valuable insights into the factors that give student success and address the problems in the education system.

1.2 Purpose of the project

Welcome to ‘Unleashing the potential of our Youth: A Student Performance Analysis’ the main aim of the project is about understanding and improving the outcomes of the youth. By doing this project we can analyze the insights and understand the drawbacks in the student performance.

To do a project we require a dataset . we have a dataset which is named as “student performance” .This dataset contains 1000 rows of valuable information,which is related to student performance such as Student ID, gender , race/ethnicity, parental level of education ,lunch status, test preparation course completion, math scores, reading scores and writing scores.

By exploring this dataset we aim to know about the student performance in their education sector. Here we need to understand their educational journey to give them good education standards. We examine how gender, race/ethnicity, parental education, and socio economic factors impact student life.

Our team has done a long analysing to do statistical visualizations to study the hidden information about the student performance. To represent statistical data we use different types of visualizations like bar chart, map chart, bubble chart, hierarchical chat, tree map etc.

2. Literature survey

2.1 Existing problem

At present the students are facing a lot of problems to study. some students have interest in it but due to the heavy schedule exams they would feel more stress. The teacher puts more pressure on students to get good grades.It will affect their happy life. And some teachers compare the students with another one due to this the student will get more stress.

Identifying struggling students at an early stage and implementing interventions to address their needs.In education sector most of the boys has high fail percentage when compared with girl's percentage.And some student parent's are illiterates due to this the student won't get suggestions or opinions from them.So the student will get confused.The guidance should be reliable to the student.Due to improper guidance the student can get stressed out.

The students may have low motivation during education due to this they will face so many problems.They lose their interest in life.Some

students have a lot of distractions in their life like spending more time in social media, surrounding peoples demotivation and some personal issues. The students will get easily distracted by others. Some students won't have enough memory power to write all the matter related to subject in written test. The students can't able to focus on study with these problems.

Revising is essential, but failing to put your new-found knowledge into practice is a big mistake. Academic success relies on having access to the right resources, whether that's the necessary books, equipment, a teacher to talk to, or anything else you need to learn effectively.

2.2 Proposed solution

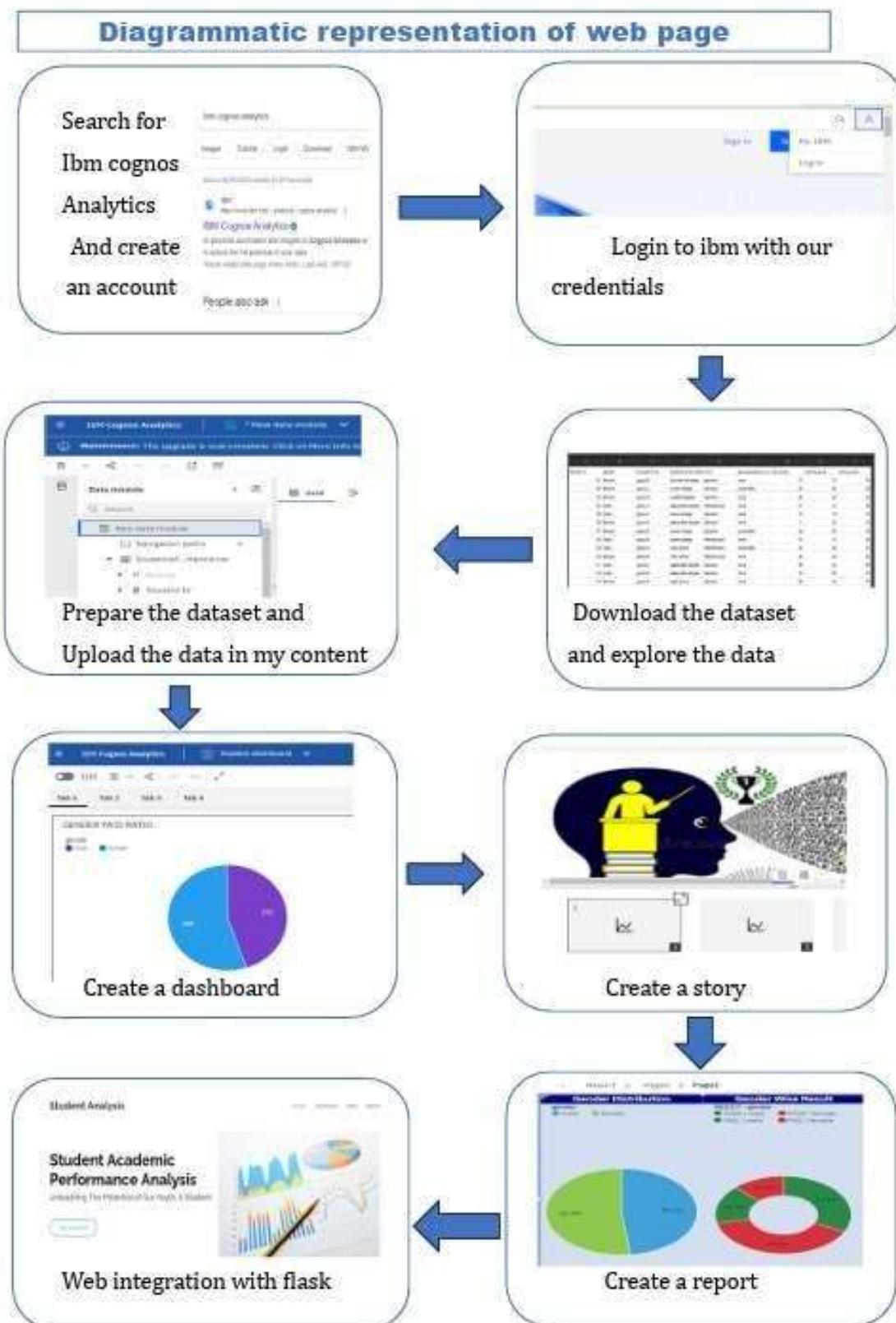
Data analytics techniques are very useful to find out student performance. It plays a key role to gain a deep understanding of the factors influencing it. To analyze the data we have used various types of charts like heatmap, bar charts, scatter plots, pie chart, donut chart, stacked area chart etc.

The creation of visualizations using bar charts, pie charts, treemap, donut chart, hierarchical chart, column chart etc shows us a visual representation of math, reading, and writing scores across different ethnicity categories and comparing the course completion rates and relationship between reading and writing scores.

These data analysis techniques and visualizations 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 and addresses the challenges surrounding student performance.

From this analyzation all the people can understand how the students are performing in their daily life. These visualizations helps us to find out the student interest in their subjects. It will shows us a deep performance of the student. 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.

3.Theoretical Analysis



3 2 Hardware / Software designing

Hardware Requirements -

- **Server**
- **Computer or Laptop**

Software Requirements-

- **Python**
- **Flask**
- **Ibm cognos analytics**
- **Web browser**

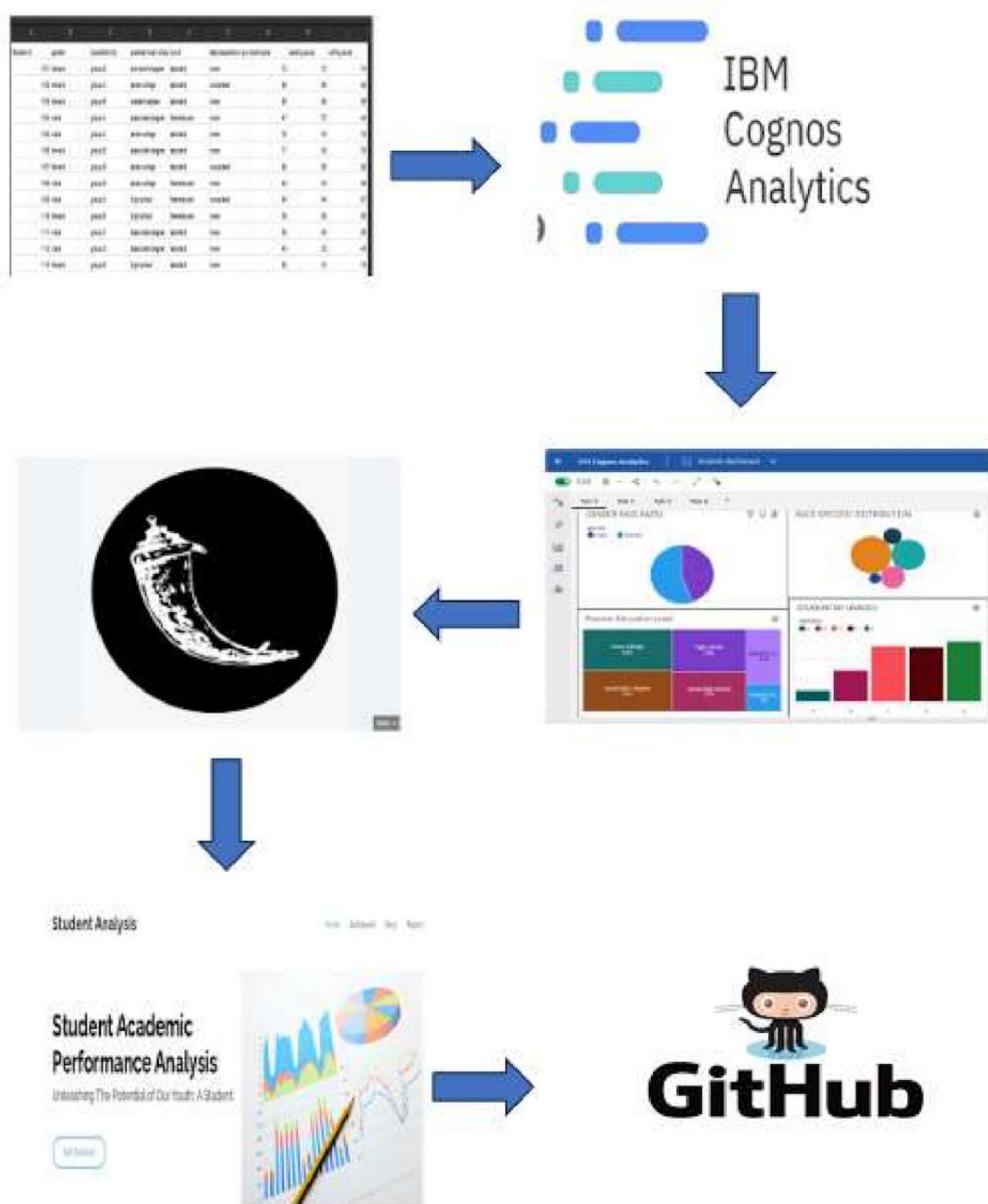
4. Experimental Investigations

When working on the project with the “student performance” dataset, there are so many analyses and investigation that were conducted.some common analyse are listed below:

- 1. Descriptive Statistics:** It gives an overview of statistics such as mean, median, standard deviation, quartiles for the math, reading, and writing scores.This give an idea about student performance.
- 2. Parental Education:** In this we know the impact of parental education on student performance.Analyze how much it impacts on the academic studies of students.
- 3. Gender-based Analysis:** Compare the performance of male and female students in math,reading,and writing scores.In this we know about academic performances based on gender.
- 4. Ethnicity-based Analysis:**Explore the relationship between race/ethnicity and student performance. Compare the scores across different ethnic groups to identify any disparities or patterns.
- 5. Lunch Status Analysis:** Examine the relationship between lunch status and student performance. Determine if there is a correlation between the type of lunch a student receives and their academic scores.
- 6. Test preparation Analysis:** In this we know the impact of the test preparation course on students.compare the scores of students of all students.

7. Data visualization: In this we create visual representation using the dataset such as bar charts, map chart, tree chart, pie chart, bubble chart, donut chart, etc are used to visually explore the relationship and patterns within the dataset.

5. Flowchart



6 RESULT

We have analyzed the dataset of a student's performance containing 1000 of fields including rows and columns like student id, gender, race/ethnicity, parental level of education, lunch, test preparation course,math score, reading score & writing score. created Visualization, Dashboard, Story, Report based on the requirements. The process of them are explained below :

1.VISUALIZATION:

First visualization is the students by grades bar chart graph. we have plotted this based on grades ranging from A-F and count of student performance.134 students scored A.414 scored B.343 students scored C.87 scored D and 22 scored F.

Next one is the grades based on preparation material for this we have used bar chart.It shows the students completion material and none. we have plotted this based on grades ranging from A-E and count of student .

Next visualization is Race wise pass/fail ratio for this we used stacked bar.It shows the pass and fail ratio of the groups from A to E of the students.

Moving forward is the test preparation effectiveness for this we have used stacked column.It shows the test preparation course between male and female students.

Next one is the Gender pass ratio for this we have used pie chart.It shows the pass and fail ratio between male and female.The female pass ratio is 394 and male pass ratio is 321.

Next visualization is the Average result of male and female for this we used column chart.It shows the average result of male and female scores in math score,reading score,and writing score.

Next visualization is the Impact of parents education for this we have used packed bubble chart.It shows the level education of parents in associate's degree,bachelor's degree,high school,master's degree,some high school of the students.In masters and bachelor degree the parents level education is very low.

Final one is student result based on lunch choice for this we used column chart.It shows the reduced and standard lunch of the student id.The fail ratio is low.Like this we have completed our visualizations based on the student performance.

PDF FOR VISUALIZATION

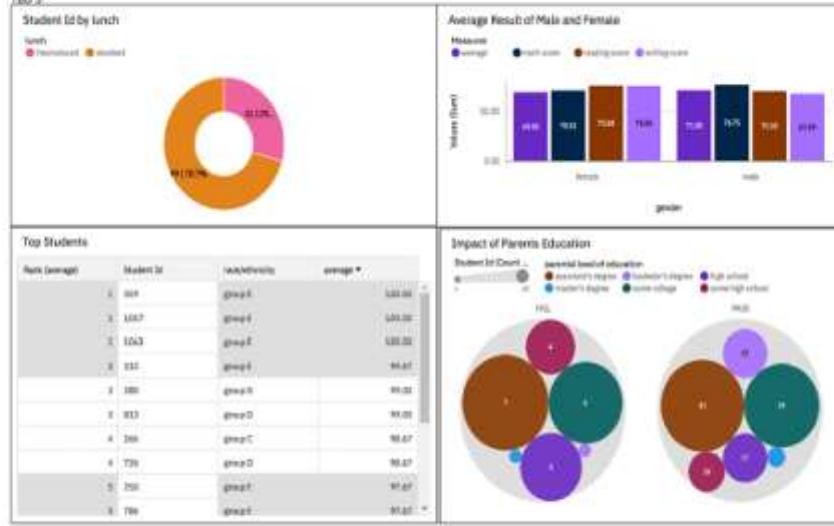
https://drive.google.com/file/d/1LKTTeNtq_JWwRkPbaLdBiBZxbYEjVZZjC/view?usp=drive_link

By using this visualizations we have created Dashboards,Story, Reports.

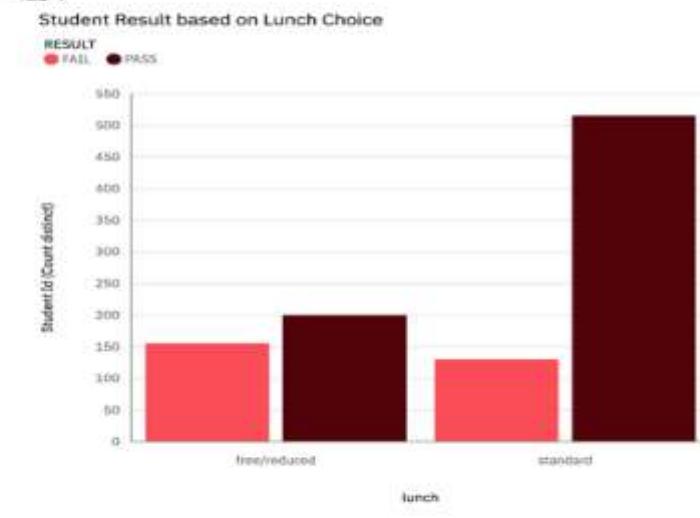
DASHBOARD



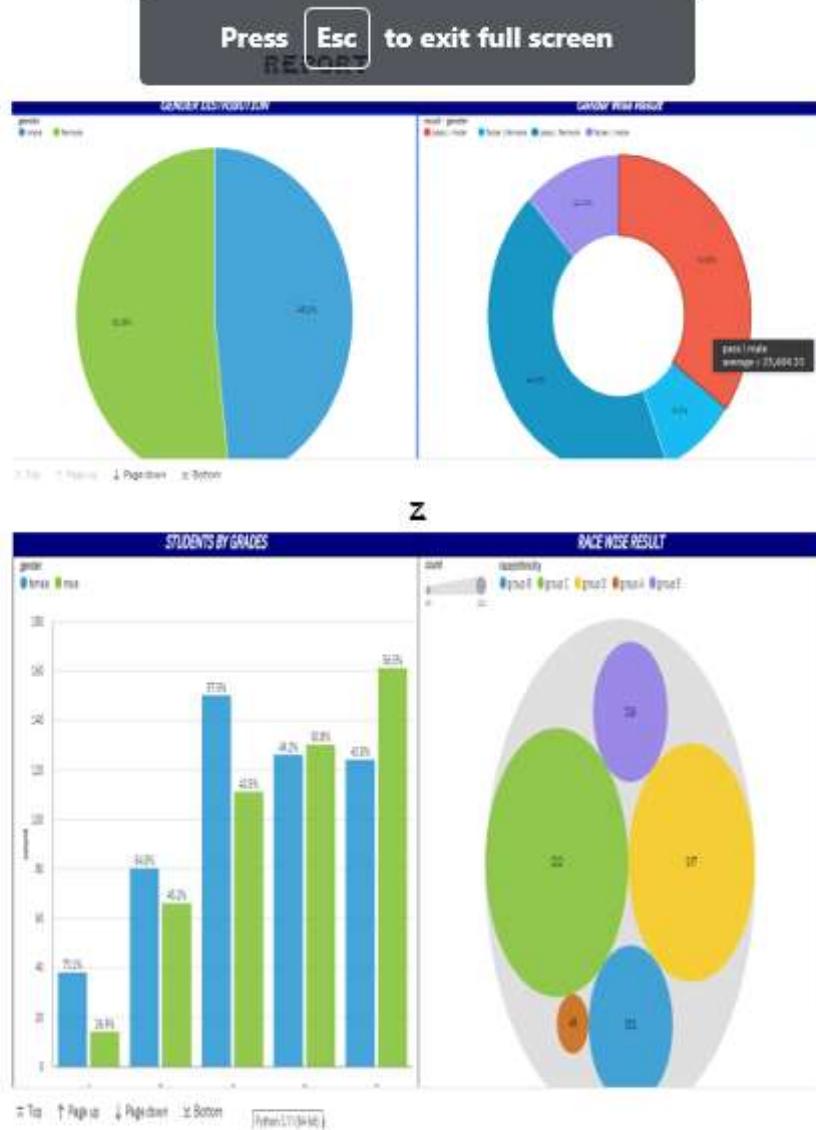
Tab 3:



Tab 4:



REPORT

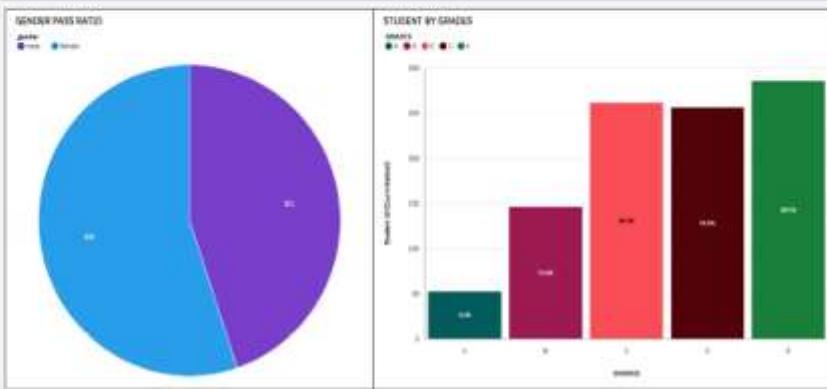




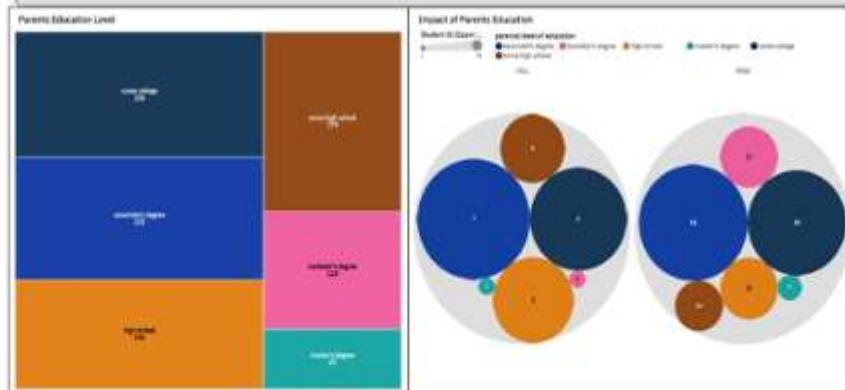
STORY



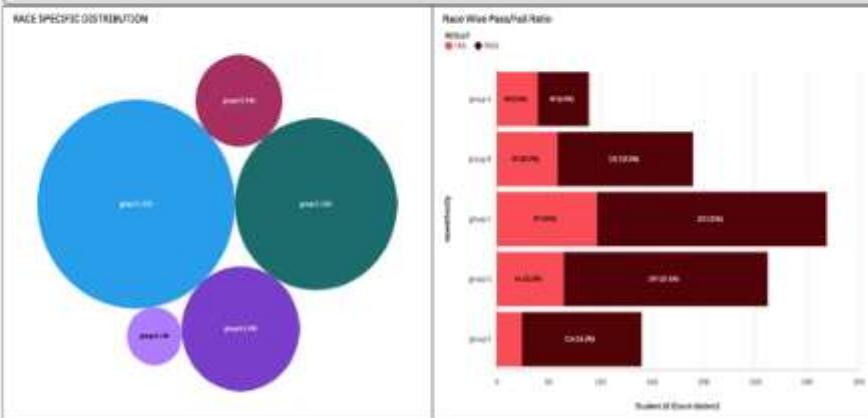
Gender Diversity and Grades



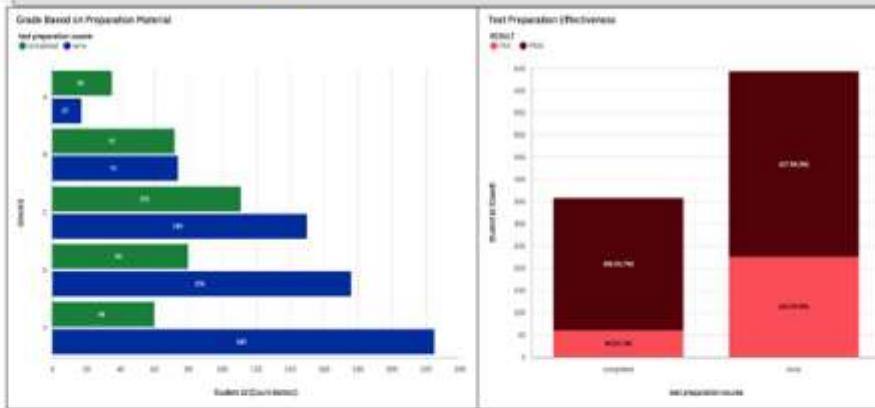
Parents Education and Its Impact



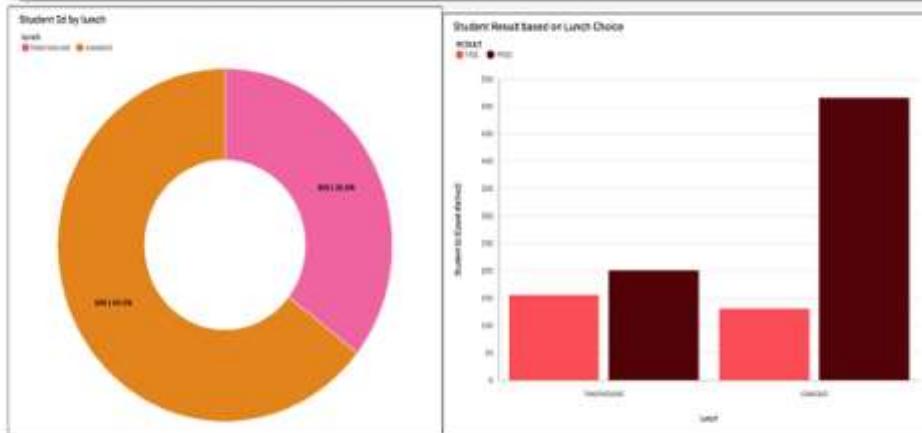
Race Diversity



Test Preparation and Grades



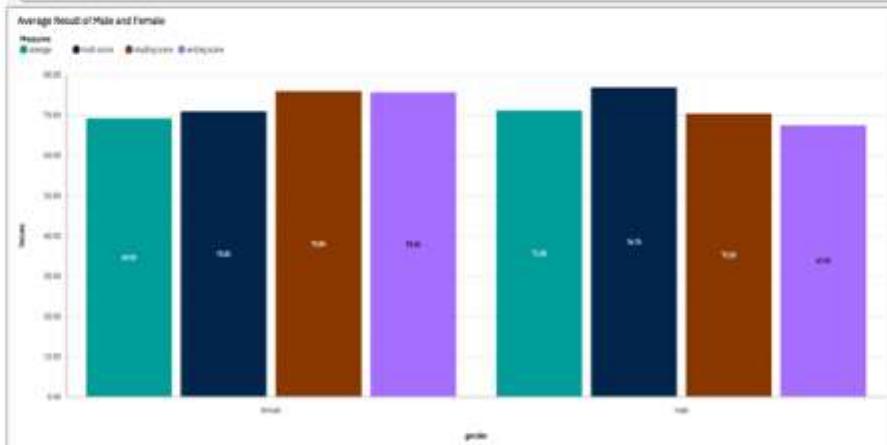
Male Choice



Top student and Ranks

Rank (Highest)	Student ID	Result/Activity	Score %
1	100	group1	100.00
1	1001	group1	100.00
1	1002	group1	100.00
2	200	group1	99.97
2	2001	group1	99.98
2	2002	group1	99.99
3	300	group1	99.97
3	3001	group1	99.98
3	3002	group1	99.99
4	400	group1	99.97
4	4001	group1	99.98
4	4002	group1	99.99
5	500	group1	99.97
5	5001	group1	99.98
5	5002	group1	99.99
6	600	group1	99.97
6	6001	group1	99.98
6	6002	group1	99.99
7	700	group1	99.97
7	7001	group1	99.98
7	7002	group1	99.99
8	800	group1	99.97
8	8001	group1	99.98
8	8002	group1	99.99

Gender Average Result in Subjects



Gender Pass Fail Counts



7 Advantages and Disadvantages :

The advantages of the proposed solution

Data-driven decision making: The utilization of data analysis techniques allows for evidence-based decision making in education. By analyzing student performance data, policymakers and educators can make informed choices about curriculum design, instructional strategies, and resource allocation.

2. Identification of key factors: Through data analysis, important factors influencing student performance can be identified. This knowledge enables targeted interventions to address specific challenges or leverage strengths, leading to improved academic outcomes.

3. Equity and fairness: The analysis of student performance data can help identify and address disparities in achievement among different groups, such as race/ethnicity or gender. This promotes equity and fairness in education by ensuring equal opportunities and support for all students.

4. Continuous improvement: Ongoing data analysis allows for continuous quality improvement in education. By monitoring student performance trends over time, educators can identify areas that require improvement and adjust teaching methods or interventions accordingly.

5. Resource optimization: Data analysis helps in optimizing the allocation of resources, both human and material, in the education system. By identifying areas of need or areas with successful outcomes, resources can be directed where they are most effective, maximizing their impact.

While the proposed solution has several advantages, it is important to consider the potential disadvantages:

1. Data limitations: The effectiveness of data analysis is dependent on the availability, accuracy, and completeness of the data. Inaccurate or incomplete data can lead to biased or misleading conclusions, potentially impacting the effectiveness of interventions based on the analysis. We have focused on just 1000 data entries, this might cause biased decision making for a larger pool of students.

2. Data Bias: The dataset may contain inherent biases or limitations in terms of its representativeness. If the dataset is not adequately

diverse or does not cover a wide range of socioeconomic backgrounds, the analysis may not fully capture the factors that influence student performance across all demographics.

3. Causation vs. Correlation: The analysis may identify correlations between variables, but it may not always establish causation. It is essential to interpret the findings carefully and avoid making causal claims based solely on correlation

4. Ethical Considerations: Any analysis involving student data needs to adhere to ethical guidelines and privacy regulations. Proper anonymization and data protection measures must be in place to ensure the privacy and confidentiality of the students' information.

8.APPLICATIONS

1. Social Impact: The proposed solution of analyzing student performance has a positive social impact by improving student outcomes. By gaining insights into factors that contribute to success or failure, educators and policymakers can implement targeted interventions and strategies to enhance student learning. This can lead to improved academic performance, higher graduation rates, and better overall educational outcomes for students. Additionally, the solution promotes equity in education by identifying and addressing disparities in achievement among different groups. It ensures that all students have equal opportunities and access to resources, helping to reduce educational inequalities. Furthermore, the analysis of student performance data enhances transparency and accountability in the education system. It allows for the identification of areas of improvement, holding educational institutions, teachers, and policymakers accountable for their performance and enabling evidence-based decision-making to drive educational reforms.

2. Business Impact: The proposed solution has a significant impact on businesses and educational institutions. By analyzing student performance data, businesses in the education sector can gain valuable insights into student learning patterns, needs, and preferences. This information can be used to develop tailored educational products, services, and resources that effectively meet the demands of students. Educational institutions can leverage the analysis to improve teaching methods, curriculum design, and resource

allocation, resulting in enhanced efficiency and effectiveness in delivering education. Additionally, the solution promote competitiveness among educational institutions by allowing them to benchmark their performance against others and identify areas where they can excel or differentiate themselves. This competitive edge can attract more students and stakeholders, ultimately contributing to the growth and success of educational businesses.

3. Researchers and Academics: The analysis provides a rich dataset for researchers and academics to explore various aspects of student performance. Researchers can delve into factors such as gender, race/ethnicity, parental education, and their impact on student outcomes. This offers opportunities to conduct further studies, contribute to the field of education, and inform educational practices and policies. By analyzing the dataset, researchers will uncover correlations, trends, and patterns in student performance. These insights will contribute to a better understanding of the educational landscape and help identify effective strategies to improve student outcomes.

4. Nonprofit Organizations and Community Groups: Nonprofit organizations and community groups can utilize the analysis to design and implement targeted interventions that address specific needs and challenges faced by students from disadvantaged backgrounds or underrepresented groups. The insights will be able to guide the development of programs and initiatives to support academic success and promote equity in education.

CONCLUSION

From this analysis of student performance we have gained valuable insights into the factors that influence student performance and achievement. Our exploration of various demographic aspects, including gender, race/ethnicity, parental education, and socioeconomic factors like lunch status, has shed light on the complex dynamics within educational journeys.

The analysis has revealed several noteworthy findings:

1. Gender Impact: We observed variations in academic performance between male and female students. While further research is

needed to understand the underlying causes, these difference highlight the importance of targeted interventions to address gender-based disparities in educational outcomes.

2. Ethnicity Influence: Race/ethnicity has shown some correlations with student performance. We found variations in academic achievements among different ethnic groups, emphasizing the need for culturally responsive educational approaches to ensure equitable opportunities for all students.

3. Parental Education: The level of parental education has been found to have an impact on student performance. Students with parents who have higher education backgrounds tend to demonstrate higher academic scores. This underscores the importance of parental involvement and support in fostering educational success.

4. Socioeconomic Factors: The analysis revealed a significant correlation between socioeconomic factors, such as lunch status, and student performance. Students from disadvantaged backgrounds, indicated by free/reduced lunch status, often face additional challenges that can impact their academic achievements.

By uncovering these patterns and correlations, our analysis provides a foundation for evidence-based decision-making in education. These findings call for targeted actions to maximize the potential of our youth and promote inclusive educational environments that address the diverse needs of students.

It is important to note that while this analysis provides valuable insights, further research and exploration are required to gain a more comprehensive understanding of student performance and the underlying factors influencing it. Nonetheless, the findings presented here contribute to the ongoing dialogue on enhancing educational outcomes and empowering our youth to reach their full potential. By documenting the project's conclusions, you can effectively summarize the key findings and insights obtained from the analysis, ensuring that stakeholders and readers understand the implications and potential actions that can be taken based on the analysis results.

10. FUTURE SCOPE

The future scope for the project, "Unleashing the Potential of Our Youth: A Student Performance Analysis," can include several potential areas of expansion and further investigation. Here are some future scopes that can be considered:

- 1. Advanced analytics:** As technology and data analytics tool advance, there is potential for more sophisticated analysis techniques to be applied. This could include machine learning algorithms, predictive analytics, and natural language processing to extract deeper insights from student performance data.
- 2. Personalized learning:** The proposed solution can be further leveraged to support personalized learning approaches. By analyzing individual student data, including learning styles, preferences, and strengths, educators can tailor instruction and interventions to meet the unique needs of each student, fostering personalized learning experiences.
- 3. Early intervention and student support:** The solution can be utilized to identify early warning signs and indicators of student underperformance or potential dropout. By analyzing data on attendance, assignment completion, and assessment scores, educators can intervene early and provide targeted support to struggling students, improving retention rates and overall student success.
- 4. Longitudinal Analysis:** Extend the analysis to include data from multiple years or semesters to observe trends and patterns in student performance over time. This can provide insights into the effectiveness of educational policies and interventions implemented and identify long-term impacts on student outcomes.
- 5. Qualitative Research:** Supplement the quantitative analysis with qualitative research methods such as interviews, focus groups or surveys to gather deeper insights into the experiences and perspectives of students, parents, and educators. This can provide a more holistic understanding of the underlying factors influencing student performance.
- 6. Exploration of Additional Variables:** Consider incorporating additional variables or datasets that can potentially contribute to a more comprehensive analysis. For example, factors such as class size, teacher experience, extracurricular activities, or student engagement can be explored to assess their impact on student performance.
- 7. Comparison with External Data Sources:** Compare the findings from the "StudentsPerformance" dataset with external data sources such as national or international assessments to gain broader insights into educational outcomes and performance benchmarks. This can provide a broader context for understanding the strengths and weaknesses of the education system under examination.

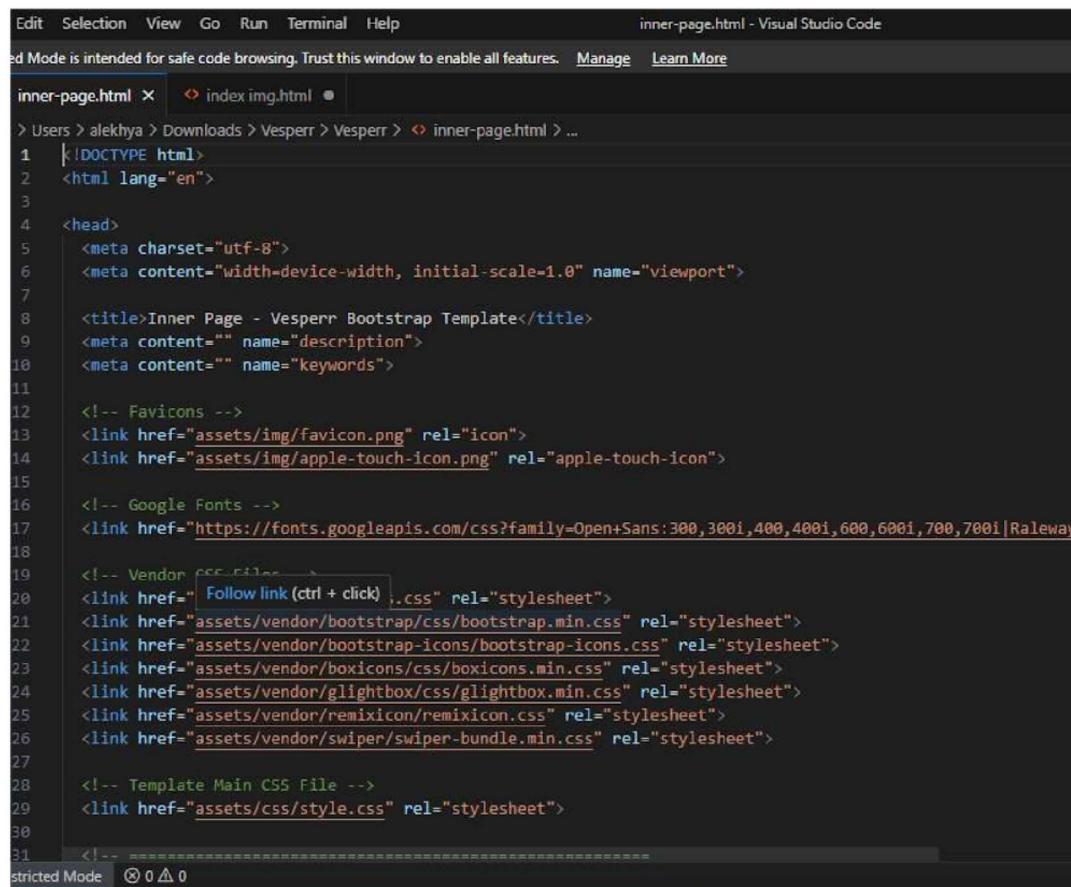
8. Implementation of Recommendations: Collaborate with educational institutions, policymakers, and stakeholders to implement evidence-based recommendations derived from the analysis. Monitor the outcomes of the implemented interventions and measure their effectiveness in improving student performance.

9. Ethical considerations and data privacy: Given the sensitivity of student data, future developments should also focus on ensuring strong ethical standards and data privacy protections. Striking a balance between data analysis for improvement and safeguarding student privacy is crucial for the future implementation of such solutions.

APPENDIX:

Source code :

To download the source code we require vesper. For that browse the website bootstrapmade and download the vesperr file and Extract the file. To access code we require visual studio code. For that install the visual studio code and open vesperr file with it . Then we can see the code as shown below :



The screenshot shows the Visual Studio Code interface with the file 'inner-page.html' open. The code is a standard HTML document with meta tags, title, and various CSS links. The code is color-coded for syntax highlighting.

```
1 <!DOCTYPE html>
2 <html lang="en">
3
4 <head>
5   <meta charset="utf-8">
6   <meta content="width=device-width, initial-scale=1.0" name="viewport">
7
8   <title>Inner Page - Vesperr Bootstrap Template</title>
9   <meta content="" name="description">
10  <meta content="" name="keywords">
11
12  <!-- Favicons -->
13  <link href="assets/img/favicon.png" rel="icon">
14  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">
15
16  <!-- Google Fonts -->
17  <link href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i,700,700i|Raleway:300,300i,400,400i,500,500i,600,600i,700,700i&display=swap" rel="stylesheet">
18
19  <!-- Vendor CSS Files -->
20  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
21  <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css" rel="stylesheet">
22  <link href="assets/vendor/boxicons/css/boxicons.min.css" rel="stylesheet">
23  <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
24  <link href="assets/vendor/remixicon/remixicon.css" rel="stylesheet">
25  <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">
26
27
28  <!-- Template Main CSS File -->
29  <link href="assets/css/style.css" rel="stylesheet">
30
31  <!-- Global JS Files -->
```

After opening the code at first we have to change the title of the web page for that at first we can see the title at that place replace it with “ welcome”.

```

<!DOCTYPE html>
<html lang="en">

<head>
    <meta charset="utf-8">
    <meta content="width=device-width, initial-scale=1.0" name="viewport">

    <title>WELCOME</title>
    <meta content="" name="description">
    <meta content="" name="keywords">

    <!-- Favicons -->
    <link href="assets/img/favicon.png" rel="icon">
    <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

    <!-- Google Fonts -->
    <link href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,700,800&display=swap" rel="stylesheet">

    <!-- Vendor CSS Files -->
    <link href="assets/vendor/aos/aos.css" rel="stylesheet">
    <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
    <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css" rel="stylesheet">
    <link href="assets/vendor/boxicons/css/boxicons.min.css" rel="stylesheet">
    <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
    <link href="assets/vendor/remixicon/remixicon.css" rel="stylesheet">
    <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">

    <!-- Template Main CSS File -->
    <link href="assets/css/style.css" rel="stylesheet">

```

After that go to header section and at “index.html” replace it with “Student Analysis”. Then at “services” replace the name with “Dashboard”,at “portfolio” replace the name with “Story”,at “Team” replace the name with “Report”.

```

<!-- Header Section -->
<header id="header" class="fixed-top d-flex align-items-center">
    <div class="container d-flex align-items-center justify-content-between">

        <div class="logo">
            <h1><a href="index.html">Student Analysis</a></h1>
            <!-- Uncomment below if you prefer to use an image logo -->
            <!-- <a href="index.html"></a>-->
        </div>

        <nav id="navbar" class="navbar">
            <ul>
                <li><a class="nav-link scrollto active" href="#hero">Home</a></li>
                <li><a class="nav-link scrollto" href="#services">Dashboard</a></li>
                <li><a class="nav-link scrollto" href="#portfolio">Story</a></li>
                <li><a class="nav-link scrollto" href="#team">Report</a></li>
            </ul>
            <i class="bi bi-list mobile-nav-toggle"></i>
        </nav><!-- .navbar -->

    </div>
</header><!-- End Header -->

<!-- ----- Hero Section ----- -->

```

After that move to the “Hero Section” now at “Grow your business with Vesperr” replace it with “Student Academic Performance Analysis”. And below change it with “Unleashing The Potential of Our Youth: A Student”. After that at img src replace with any image.

```

<!-- ===== Hero Section ===== -->
<section id="hero" class="d-flex align-items-center">

  <div class="container">
    <div class="row">
      <div class="col-lg-6 pt-5 pt-lg-0 order-2 order-lg-1 d-flex flex-column justify-content-center">
        <h1 data-aos="fade-up">Student Academic Performance Analysis</h1>
        <h2 data-aos="fade-up" data-aos-delay="400">Unleashing The Potential of Our Youth: A Student</h2>
        <div data-aos="fade-up" data-aos-delay="800">
          <a href="#about" class="btn-get-started scrollto">Get Started</a>
        </div>
      </div>
      <div class="col-lg-6 order-1 order-lg-2 hero-img" data-aos="fade-left" data-aos-delay="200">
        
      </div>
    </div>
  </div>

</section><!-- End Hero -->

```

After that move to the “services section” at h2 replace the name with “Dashboard”. Now open ibm account and copy the dashboard link to place it in code. place the link at div and remove the remaining code.

```

<!-- ===== Services Section ===== -->
<section id="services" class="services">
  <div class="container">

    <div class="section-title" data-aos="fade-up">
      <h2>Dashboard</h2>
    </div>

    <div>
      <iframe src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FStudent%2Bdashboard&closeWindowOnExit=true" data-aos="fade-up" data-aos-delay="400">
      </div>
    </div>
  </section><!-- End Services Section -->

<!-- ===== Portfolio Section ===== -->

```

Now move to the “portofolio section” repeat the same process with “story”. Remove the remaining code.

```
<!-- ===== Portfolio Section ===== -->
<section id="portfolio" class="portfolio">
  <div class="container">

    <div class="section-title" data-aos="fade-up">
      <h2>Story</h2>
    </div>

    <div>
      <iframe src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&pathRef=.my_folders%2Fstudent%2Bstory&closeWindowOnLastView=true" data-aos="fade-up">
    </div>

  </div>
</section><!-- End Portfolio Section -->
```

**Now move to the “Team Section” and repeat the same process with
“Report”. Remove the remaining code.**

```
<!-- ===== Team Section ===== -->
<section id="team" class="team section-bg">
  <div class="container">

    <div class="section-title" data-aos="fade-up">
      <h2>Report</h2>
    </div>

    <div>
      <iframe src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&pathRef=.my_folders%2FStudent%2Bdashboard&closeWindowOnLastView=true" data-aos="fade-up">
    </div>

  </div>
</section><!-- End Team Section -->
</main><!-- End #main -->
```