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|  | | CAPSTONE PROJECT | | | | |  | |
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|  | | | | UNIVERSITY SUCCESS ANALYSIS |  | | | |
|  | | | | 01/06/2024—PARUL MALHOTRA |  | | | |
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|  | Overview | | | | | | |  |
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|  |  |  | **This report investigates various dimensions related to universities and their correlations with economic indicators, demographics, ranking criteria, and gender distribution. Key findings and insights are presented to provide a comprehensive understanding of the dynamics within the higher education landscape.** | | |  |  |  |
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| Venn diagram with solid fill | |  |  | | |  |  | |
|  | | THE PROCESS | | | | |  | |
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|  | **1: Data Acquisition from GitHub:**  Obtain the necessary dataset from a specified GitHub repository that contains essential information about university rankings across various countries and their performance in different ranking systems.  **2: Data Transformation and Enhancement:** If required, perform data transformation processes to enhance data quality and maintain consistency. Furthermore, explore the possibility of enhancing the dataset by incorporating new problem statements to bolster its analytical potential **3**. **Connecting with Tools:**  Establish connections between the dataset and a range of analytical tools. Enable the seamless integration and processing of data by interfacing the dataset with Power BI, Excel, and MySQL Workbench. This interconnected approach streamlines data management and analytical workflows.  **4.** **Problems Statement Solution in Power BI:**  Utilize the capabilities of Power BI to address the given problem statements. Make use of its robust tools for data visualization, exploration, and analysis, leading to the discovery of valuable insights and the facilitation of effective solutions.  **5. Exploratory Data Analysis (EDA):**  Perform a thorough exploration of the data, utilizing either Excel or SQL Workbench based on the data's complexity. Uncover valuable insights, discern patterns, relationships, and trends within the dataset, providing a foundation for informed decision-making.  **6. Creation of Visuals and Insightful PowerPoint:**  Develop a comprehensive PowerPoint presentation that effectively communicates the project's objectives, methodologies, problem statements, solutions, and key visualizations. Ensure that each problem statement is accompanied by a dedicated section that highlights meaningful conclusions and valuable insights.  **7. Detailed Documentation:**  Compile a comprehensive report that thoroughly captures the entire project lifecycle. The report should encompass key sections focusing on data collection, data transformation, problem statement formulation, integration of tools, development of Power BI solutions, insights gained from exploratory data analysis (EDA), and the creation of visualizations using PowerPoint.  **Objective**  University rankings serve as a valuable tool for assessing the relative merits of higher education institutions. However, these rankings are plagued by several challenges, including the lack of consistency between different ranking systems, the underlying factors that heavily influence the rankings, the historical trends that can skew the results, and the inherent limitations and potential biases that can impact the accuracy of these assessments.  The objective of this project is to conduct a thorough and professional analysis of university rankings datasets. The focus is on uncovering significant patterns, identifying ongoing trends, and pinpointing the key drivers influencing university rankings across diverse ranking systems. Ultimately, the goal is to provide valuable insights that can inform strategies for enhancing the quality and global competitiveness of higher education institutions.    The project will involve the following tasks:   * Performing a comprehensive analysis of university rankings, including variations across systems, key factors influencing rankings, historical trends, and the impact of limitations and biases on rankings * Deriving meaningful conclusions and recommendations for improving ranking methodologies.   + Compiling analysis results, conclusions, and recommendations for stakeholders   The success of the project will be measured by the following metrics   * The quality of the analysis * The relevance of the insights * The Impact of Recommendation   This project holds great importance as it has the potential to enhance the quality and global competitiveness of higher education institutions. By gaining insights into the factors that impact university rankings, institutions can improve their positioning on the global stage and thrive in the highly competitive educational landscape.  **Significant:**  Analyzing university rankings is of paramount importance in the realm of higher education, offering invaluable insights to prospective students, researchers, and academic institutions. By delving into the myriad factors that influence these rankings, individuals and institutions can make more informed decisions about where to pursue their studies or employment. In this discussion, we will explore the profound significance of university rankings analysis and its far-reaching implications  For students Perspective, University rankings analysis serves as a valuable resource for making informed decisions about their educational journey. By understanding the criteria used to rank universities, students can assess which institutions align with their academic goals, career aspirations, and personal preferences. They can consider factors such as reputation, faculty expertise, research opportunities, student satisfaction, and employment prospects. This information empowers students to choose universities that best suit their needs, increasing the likelihood of a fulfilling and successful educational experience.    Similarly, researchers can benefit from university rankings analysis when deciding where to pursue their academic careers. By examining the rankings, researchers can identify institutions that excel in their specific fields of interest. This knowledge allows them to align themselves with universities that have strong research program funding opportunities and collaborative networks. Such strategic decision-making enhances their research output, visibility, and career progression  Academic institutions themselves can leverage university rankings analysis to identify areas for improvement. By understanding the criteria that ranking organizations prioritize, institutions can focus their efforts on enhancing those specific aspects. For example, if a ranking heavily emphasizes research output, an institution can invest in research infrastructure, faculty recruitment, and collaboration initiatives to bolster its ranking position. This data-driven approach enables institutions to allocate resources effectively and strategically, ultimately enhancing their overall academic standing.  Universities can use analysis of university rankings to figure out where they can get better. By understanding what factors are important in these rankings, universities can concentrate on improving those specific areas. For instance, if a ranking gives a lot of weight to research, a university can invest in better research facilities, hire more experienced faculty, and encourage collaboration to improve its ranking. This data-driven approach helps universities use their resources wisely, which can boost their overall reputation  Additionally, analyzing university rankings is important for policymakers. They can use this information to see how well ranking systems work. By understanding how rankings are put together, policymakers can make sure they are fair, transparent, and actually reflect how good universities are. They can also spot any biases or problems in ranking systems and work on making them more accurate. Policymakers can also use past ranking data to see trends, compare performance, and make plans to improve higher education.  Furthermore, looking at university rankings allows for side-by-side comparisons of different colleges, which can help improve the overall quality and competitiveness of higher education. By studying these rankings, universities can learn from the top-performing institutions and apply their successful approaches to enhance their own performance. This promotes a culture of ongoing improvement and motivates universities to excel in areas like teaching, supporting students, going global, and engaging with the community.  In conclusion, university rankings analysis offers significant benefits for prospective students, researchers, academic institutions, and policymakers alike. It equips individuals with the information they need to make well-informed choices about their education and future careers. It provides universities with valuable insights on areas that need improvement, allowing them to enhance their offerings. Policymakers, on the other hand, can use this data to assess the effectiveness of ranking systems and make data-driven decisions to improve the quality and competitiveness of higher education. By embracing the lessons drawn from university rankings analysis, all stakeholders in the higher education sector can collaborate to create a more robust and impactful academic environment.  **Data Dictionary:**  **Table: Country:**   * Fields: * id: Unique identifier for each country. * country name: Name of the country. * Gdp: it is a key economic indicator of various countries. * Population: total number of people living in specific countries.   **Table: University:**   * Fields: * id: Unique identifier for each university. * university name: Name of the university. * Country\_id: Foreign key referencing the country id field in the Country table.   **Table: Ranking system**   * Fields: * id: Unique identifier for each ranking system. * ranking system name: Name of the ranking system.   **Table: Ranking criteria**   * Fields: * id: Unique identifier for each ranking criterion. ranking criteria * Criteria\_name: Name of the ranking criteria. * ranking\_system\_id: Foreign key referencing the ranking system id field in the Ranking system table.   **Table: University year**   * Fields: * university id: Foreign key referencing the university id field in the University table. * number of students: Number of students in the university for a specific year. * female population: Population of female students in the university for a specific year. . * international population: Population of international students in the university for a specific year. * Student to staff ratio: Ratio of students to staff members in the university for a specific year. * Score: Score of the university for a specific ranking criteria and year. * Year: Year of scoring for the university.   **Table: University ranking year**   * Fields: * ranking criteria\_id: Foreign key referencing the ranking criteria id field in the Ranking criteria table. * university\_id: Foreign key referencing the university id field in the University table. * Score: Score of the university for a specific ranking criteria and year. * Year: Year of scoring for the university. * ranking\_system\_id: Foreign key referencing the ranking system id field in the Ranking system table.   8  A data dictionary is a valuable resource that offers a complete view of the dataset, including information about the tables and their associated fields. It helps to clarify how these tables are interconnected, which in turn aids in comprehending the dataset's structure. This understanding is pivotal for the effective development and deployment of the Power BI Dashboard.    **ER Diagram :**    An Entity-Relationship Diagram (ERD) is a visual representation used in database design to model the structure of a database. It's a popular tool for database designers and developers to illustrate the entities within a system, their attributes, and the relationships between them. ERDs provide a clear and concise way to depict the database schema, making it easier to understand and communicate the database design.  **Power BI Problem Statements:**    **How many universities are there in each country?**  Analyzing the quantity of universities in different countries provides valuable insights into the global higher education landscape. Examining data from the Country Report enables us to identify nations with both high and low numbers of universities. Countries like the United States, United Kingdom stand out with a significant presence of universities, which reflects their substantial investment in education and research.  This analysis furnishes policymakers, researchers, and educators with a deeper comprehension of the worldwide distribution of educational institutions. It can inform decisions related to educational planning, resource allocation, and opportunities for international collaborations in the field of higher education.    **What is the distribution of international students across different countries?**  Exploring the distribution of international students across countries provides valuable insights into global educational mobility trends. Countries such as the United States, the United Kingdom, Australia are prominent choices for international students due to their extensive academic offerings and inclusive atmospheres. In contrast, Finland, Russia, and Italy tend to draw fewer international students, possibly due to language barriers or limited program options.    **Which country has the highest number of female students enrolled in universities?**  Exploring the enrollment of female students in different countries sheds light on the state of gender diversity and educational accessibility. This data highlights the United States as leaders in promoting gender equality and providing inclusive educational opportunities. Improving the accuracy and availability of this data is essential for a more comprehensive understanding of the obstacles female students face in their educational journeys.    **How many universities are ranked by each ranking system?**  This kpi chart illustrates total number of universities are distributed across various ranking systems. The presence of universities in different ranking systems underscores the diversity of viewpoints and assessment criteria within the academic world. While each ranking system may employ distinct evaluation methods, this visualization underscores the necessity of comprehending and interacting with a range of ranking approaches.    **How does the ranking system affect a university's student-staff ratio?**  A column chart has been created to visually represent the number of students and staff under the ranking system .This chart offers valuable insights into university performance based on different evaluation system. The chart highlights the significant variation in average scores among universities as assessed by different ranking systems, with some systems being more generous in their scoring and others more conservative. We can see “Center for World University Rankings” has highest average score as compare to other ranking system.Furthermore, the chart reveals the specific priorities of each ranking system, depending on whether they emphasize research, teaching quality, or other factors. Universities    **What are the most important criteria considered by ranking systems**?  The creation of above chart shows, it is evident that the CWUR ranking places the highest importance while the Shanghai Ranking places the lowest importance.    **Is there a correlation between a university's score and the number of international students?**  The number of international students at a university can be correlated with its ranking, although this relationship is influenced by various factors. Typically, higher-ranked universities tend to attract more international students due to their strong reputation for quality education, research opportunities, and renowned faculty. These institutions often offer greater diversity and a global appeal, making them more attractive to students from abroad seeking a culturally enriching experience.    **How does the percentage of female students impact a university's ranking?**  Exploring the impact between a university's ranking and its  percentage of female students unveils insights into institutional performance metrics. We can see when score is below 10k the more numbers of female students are university get like 50 to 60 percent. Universities with a higher proportion of female students are often seen as more diverse and inclusive, positively affecting their ranking, particularly in rankings that value social factors and inclusivity.    **Which university has the highest number of students?**  With a bar chart, we can clearly observe that Arizona State University boasts the highest student enrollment among all universities. This data underscores the institution's remarkable capacity to cater to a diverse array of educational needs while nurturing a thriving academic community. Arizona State University's impressive ability to accommodate a substantial number of students is a testament to its comprehensive program offerings, state-of-the-art facilities, and effective administrative strategies.    **How does the percentage of international students vary across different universities?**  The creation of a chart displaying the percentage of international students for each university like United States and United Kingdom having higher %. This analysis is pivotal for identifying and understanding patterns and trends in international student enrollment. Universities with higher percentages of international students often exhibit qualities such as global appeal, a strong academic reputation, and a commitment to fostering an inclusive learning environment. Conversely, universities with lower international student percentages may have different strategic priorities or encounter barriers affecting their international student recruitment efforts.    **Is there a correlation between a university's ranking and its student-staff ratio?**  Exploring the connection between a university's ranking and its student-staff ratio can provide valuable insights into institutional performance metrics. While the initial data may not show a straightforward correlation, a more in-depth analysis can shed light on the factors influencing this relationship. Universities with lower student-staff ratios may place a strong emphasis on personalized education and individualized attention. This focus can positively impact student satisfaction and potentially lead to improved rankings over time. On the other hand, institutions that prioritize research output or offer specialized programs may have higher student-staff ratios without necessarily negatively affecting their rankings. A comprehensive examination of this correlation can help institutions optimize resource allocation, enhance teaching quality, and improve the overall student experience. These improvements collectively contribute to enhancing institutional rankings over time.    **How does the number of students in** **universities change over time**?  The creation of a bar chart reveals a compelling trend: between 2011 and 2016, there was a consistent and substantial increase in university enrollments worldwide. This growth exhibited a remarkable surge, particularly between 2011 to 2015.Suddenly shows fall during 2016. Several interconnected factors contributed to this phenomenon, including improved accessibility to higher education, a surging demand for a skilled workforce, and evolving societal perspectives on the value of a college degree. It is essential to emphasize that the speed and specific patterns of this surge exhibited regional and national variations, often driven by economic conditions, government policies, and demographic changes. Nevertheless, on a global scale, this period bore witness to a noteworthy and widespread upswing in university enrollments.    **Is there a correlation between a university's ranking score and the student-staff ratio over the years?**  The data analysis reveals distinct patterns within the time frame of 2015 to 2016. During the initial period there was relatively minimal fluctuation in the scores. However, a remarkable and sudden increase is observed in subsequent years, leading to a peak in performance. This spike is then followed by a noticeable decline between the year 2015 to 2016.In parallel, the student-to-staff ratio exhibited a consistent and stable pattern from 2011 to 2015, with minimal fluctuations. However, a significant and sudden surge in the ratio is observed thereafter, marking a departure from the earlier trend.    **How does the percentage of international students vary across different years?**  The analysis of the percentage of international students reveals a notable trend across the years. In 2011, international students accounted for 16.69% of the total student population, initiating the observed pattern. Subsequently, there was a consistent increase in the proportion of international students in the following years, with percentages of 18.02% in 2012, 18.16% in 2013, and 18.43% in 2014. This upward trajectory signified a growing international presence within the institution, reflecting perhaps enhanced recruitment efforts or changes in international enrollment policies. However, it is important to note that this trend experienced a significant decline in 2016, with the percentage dropping to 10.63%. The fluctuation in the percentage of international students over time provides valuable insights for a comprehensive understanding of the dynamics at play in the realm of international student enrollment.    **What is the impact of a university's ranking on the number of international students it attracts?**  **While there are many factors that influence a university's attractiveness to international students, its ranking can play a significant role. Many international students seeking a high-quality education and promising career prospects may be drawn to a highly ranked institution. However, they also base their decisions on more practical considerations such as affordability and program fit.**    **Is there a relationship between a university's ranking score and the percentage of female students enrolled?**  The analysis has unveiled a noteworthy connection between a university's ranking score and the percentage of female students in its enrollment. This association implies that universities boasting a higher proportion of female students tend to attain elevated ranking scores.    **How does the percentage of international students affect a university's student-staff ratio?**  The percentage of international students in a university's student body can significantly impact the student-staff ratio. A higher proportion of international students often necessitates additional support services and staff to cater to their unique needs, potentially increasing the student-staff ratio. Furthermore, diverse cultural backgrounds and learning styles may necessitate adjustments in teaching methods and academic programs, influencing faculty-student ratios within the university. Financial considerations, such as increased recruitment efforts and cultural exchange programs, can also affect budget allocation and, subsequently, the student-staff ratio. Overall, the percentage of international students can lead to various staffing and resource allocation adjustments, with implications for the student-staff ratio. Universities need to carefully consider these factors when planning their staffing needs and resource allocation to ensure they can effectively support a diverse student body.    **Are there any significant trends or patterns in the rankings of universities from different countries?**  University rankings vary widely from one country to another, making it clear that there's no consistent pattern worldwide. The USA leads with the most ranked universities, but the rankings are subject to change due to diverse factors like research quality and funding. This shows that the criteria for assessing universities differ regionally. The number of ranked universities and their positions shift over time, reflecting the dynamic nature of higher education. Each country's institutions strive for international recognition based on their unique strengths. This diversity underscores the complex nature of global higher education systems, where universities compete for prominence on their own merits.  **Is there a correlation between a country's GDP and the number of universities?**  The solution has been achieved with the help of SQL workbench for calculation, data extraction and Excel for data visualization using pivot table and chart.      **This section explores statistical analyses to determine if a correlation exists between a country's GDP and the number of universities.**  **How has the number of universities changed over the years in each country?**    **Examining historical data, this section analyzes how the number of universities has changed over the years in different countries. Trends and fluctuations are discussed to understand potential influencing factors.**    **Is there a relationship between a country's population and the number of universities?**    **Investigating whether there is a relationship between a country's population and the number of universities. Population density and regional variations are considered to provide a nuanced perspective.**    **Are there any common criteria used by different ranking systems?**    By Analyzing we can see from the above output we can conclude that there are no such common criteria used by ranking system. Each system tends to have its unique focus and priorities, which can encompass academic excellence, research output, faculty qualifications, student-faculty ratios, and more. This lack of common criteria highlights the versatility of ranking systems, enabling institutions to tailor their assessment approaches to their specific objectives and values. While this diversity can be advantageous, it also underscores the importance of carefully selecting a ranking system that aligns with an institution's goals and missions.  **What is the trend in university rankings over the years according to each system?**    The trends in university rankings over the years according to various ranking systems, such as the Times Higher Education World University Ranking, Shanghai Ranking, and Center for World University Rankings, vary based on the available insight. For the Times Higher Education system, the information provided lacks specific trends, leaving it unclear whether rankings have been stable or changing. In the case of the Shanghai Ranking, the insight notes less fluctuation, but it doesn't specify whether the rankings have remained consistently high or have experienced gradual changes. On the other hand, the Center for World University Rankings saw a significant event in 2014, with a sudden increase in rankings, indicating a notable positive shift. To comprehensively understand the trends in university rankings, it would require a detailed analysis of historical data, including trend analysis, statistical assessment, and data visualization to reveal how rankings have evolved over time within each system.    **How does the choice of ranking system affect a university's international student enrollment?**    The choice of a university's ranking system can significantly shape its international student enrollment trends. The Shanghai Ranking system, characterized by consistent growth in international student numbers over the years, tends to attract more students due to its perceived academic excellence. In contrast, the Times Higher Education World University Ranking shows minimal fluctuations, suggesting that this ranking has less impact on international student recruitment. On the other hand, the Center for World University Rankings typically reports lower international student enrollments, indicating that universities excelling in this ranking may face challenges in attracting a diverse international student body. These insights emphasize the multifaceted factors influencing international student enrollments, including the choice of ranking system, location, reputation, and program offerings.    **Are there any criteria that have different weights in different ranking systems?**      Examining various ranking systems uncovers a notable absence of universally accepted criteria. Each system tends to prioritize distinct aspects, such as academic excellence, research productivity, faculty qualifications, student-to-faculty ratios, and other relevant metrics. This diversity of criteria underscores the flexibility of ranking systems, allowing institutions to tailor evaluation approaches to their specific objectives and values. While this adaptability can be beneficial, it also emphasizes the importance of carefully selecting a ranking system that aligns with an institution's goals and mission  **How have the weights of ranking criteria changed over time?**    **An examination of how the weights assigned to different criteria in ranking systems have changed over the years. This helps in understanding evolving trends in evaluating university performance.**    **Is there a relationship between a university's score and the student-staff ratio?**    **Investigating if there is a correlation between a university's overall score and its student-staff ratio. This section explores potential implications for resource allocation and educational quality.**    **How does the number of female students different among universities?**    By Analyzing we can see, The number of female students varies among universities. Some universities have a more balanced gender ratio, with a relatively equal number of male and female students, while others may have a skewed ratio, either with more female or male students. The gender distribution can be influenced by factors such as the university's location, cultural norms, and the field of study. It is important to note that gender diversity in universities is a complex issue, and efforts to promote gender equality and inclusivity in higher education institutions continue to be essential.    **What is the distribution of universities across different countries?**      The distribution of universities across different countries is highly uneven. The United States of America has the highest number of universities, with 203 institutions, indicating a strong presence in higher education. In contrast, many other countries have fewer than 30 universities, highlighting the concentration of higher education institutions in a select few nations.    **How has the ranking of universities changed over the years?**    By analyzing we can see ,The ranking of universities has exhibited notable trends over the years. From 2011 to 2016, there was relatively little fluctuation, suggesting a period of stability in university rankings. However, in 2015, there was a sudden rise in the rankings, possibly indicating improvements or changes in university performance, followed by a significant drop in 2016, which may suggest a decline in rankings or increased competition. These fluctuations highlight the dynamic nature of university rankings, reflecting shifts in academic quality, reputation, and various other factors that influence a university's standing.    **What is the trend in the percentage of female students over time?**    The trend in the percentage of female students over time exhibits relative stability from 2011 to 2015, with only slight fluctuations. However, in 2016, there is a sudden drop in the percentage of female students, This suggests that the gender distribution among students experienced a significant shift during this period, potentially due to changes in admission policies, educational initiatives, or social factors. The trend indicates a noteworthy transition in the gender composition of students during these years.    **How has the ranking score of universities evolved over the years?**    The ranking scores of universities have shown a relatively stable period with minimal fluctuations from 2011 to 2014. During this time, there was gradual, steady improvement in scores. However This was followed by a sharp drop in 2015, suggesting a sudden decline in the perceived quality of these universities. These fluctuations in ranking scores between 2014 and 2016 may be attributed to various factors, such as changes in university policies, research output, or external influences. Overall, the evolution of university ranking scores has been characterized by stability, followed by abrupt changes in recent years.    **Is there a relationship between a university's ranking score and the number of students over time?**    **By analyzing we can see there is a positive correlation exists between the average ranking score and the average number of students.** **this section** **provides a comprehensive overview of the relationships explored in the report. Implications for policymakers, universities, and researchers are discussed.**    **CONCLUSION**  In this project, we explored global based dataset on university ranking. The research ability has a clear impact on university ranking. High rank universities produce consist high impact publications. For low ranking universities, they may have a few labs that will produce high quality research findings. As a result, there is a large variation in publication scores of low ranking universities. Student staff ration does not show a clear relation with university ranking. Most high ranking universities are from developed countries, with U.S. dominate the ranking. Population of a country does not seem to have a linear relation with number of high ranking universities. China and India are not among the top 10 countries with most high-ranking universities. The producer of the ranking does impact the result. U.K. based ranking favor more U.K. based universities. This can be viewed as a bias. Asian countries do not score well in universities ranking. It is likely that the ranking standards may not in line with the strength of Asian countries. | | | | | | |  |
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