CIS 568 DATA VISUALIZATION

FINAL PROJECT:

"HOSPITALS VISITS REVENUE"

AUTHORS:

Charish Yadavali (02151348)

Ramakrishna Gali (02149393)

Sree Likhitha Ninarapu (02147323)

Theopilus Gudapati (02147220)

LINK TO THE WEBSITE –
https://charishyadavali.github.io/final-dv-project/

WHAT?

Examining hospital revenue derived from patient treatments across various departments and categories, focusing on admission and discharge dates, specifically comparing revenue between the years 2018 and 2019. The dataset encompasses details regarding hospital branch revenue in the South, East, and Central regions, linked to the volume and types of treatments provided to patients within different departments and subcategories.

WHY?

The dataset provides a rich source for analyzing hospital revenue trends over the years 2018 and 2019. With this dataset, we can explore not only the financial performance of the hospital during these periods but also gain insights into the evolving demand for health services across specific departments. This analysis will help us identify fluctuations in patient numbers, which in turn reflects the changing needs and utilization patterns of different medical specialties.

HOW?

The forthcoming visualizations will offer a comprehensive analysis of key healthcare performance metrics across various dimensions of hospital operations. Firstly, Visualization 1 (stacked bar chart) and Visualization 2 (bar chart) will provide insights into revenue distribution across hospital branches and departments. They will highlight the East branch as the top revenue generator, particularly in Cardiology, with noticeable revenue growth expected from 2018 to 2019. Secondly, Visualization 3 (donut chart) will focus on patient visits categorized by risk profile, indicating a predicted predominance of low-risk patient visits at the East branch. Thirdly, Visualization 4 (histogram) will analyze service time distribution, revealing an anticipated bell-shaped pattern with a peak around 20-21 hours and a skew towards longer service times, which can inform future resource allocation and process optimization. Lastly, Visualization 5 (bubble chart) will showcase doctor performance based on patient visits and revenue, identifying future top-performing doctors like "Jonas Salk." Together, these forthcoming visualizations will offer valuable insights into future hospital revenue generation, patient distribution by risk profile, future service time patterns, and future doctor performance, serving as effective tools for strategic decision-making and operational improvement within healthcare organizations.

VISUALIZATION 1
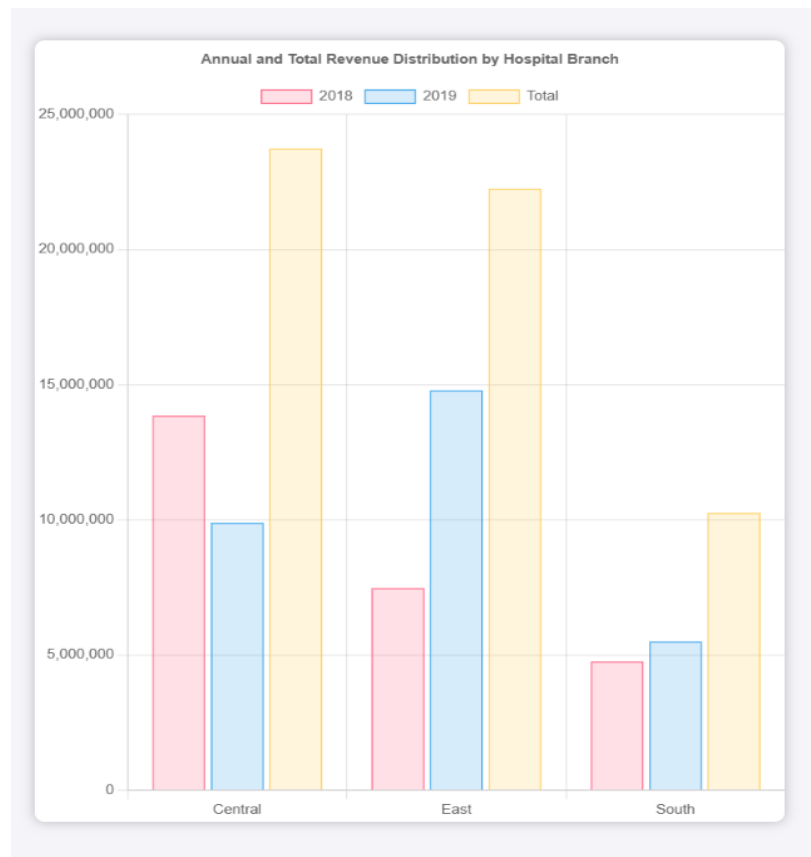
The image presents a stacked bar chart showing the annual and total revenue distribution across three hospital branches: Central, East, and South. The revenue data is provided for two years, 2018 and 2019, along with the total revenue.

Here are the key observations:

1. The East branch generated the highest revenue among the three branches, both in 2018 and 2019, as well as in total.
2. The Central branch had the second-highest revenue, followed by the South branch, which had the lowest revenue.
3. For the Central branch, the revenue increased slightly from 2018 to 2019.
4. For the East branch, the revenue increased significantly from 2018 to 2019.
5. The South branch experienced a small decrease in revenue from 2018 to 2019.
6. The total revenue across all three branches is dominated by the East branch, followed by the Central branch, and then the South branch.

This visualization allows for a clear comparison of revenue performance across the different hospital branches and over the two-year period. It highlights the East branch as the top revenue generator and shows the relative contributions of the other branches to the overall revenue.

VISUALIZATION 2
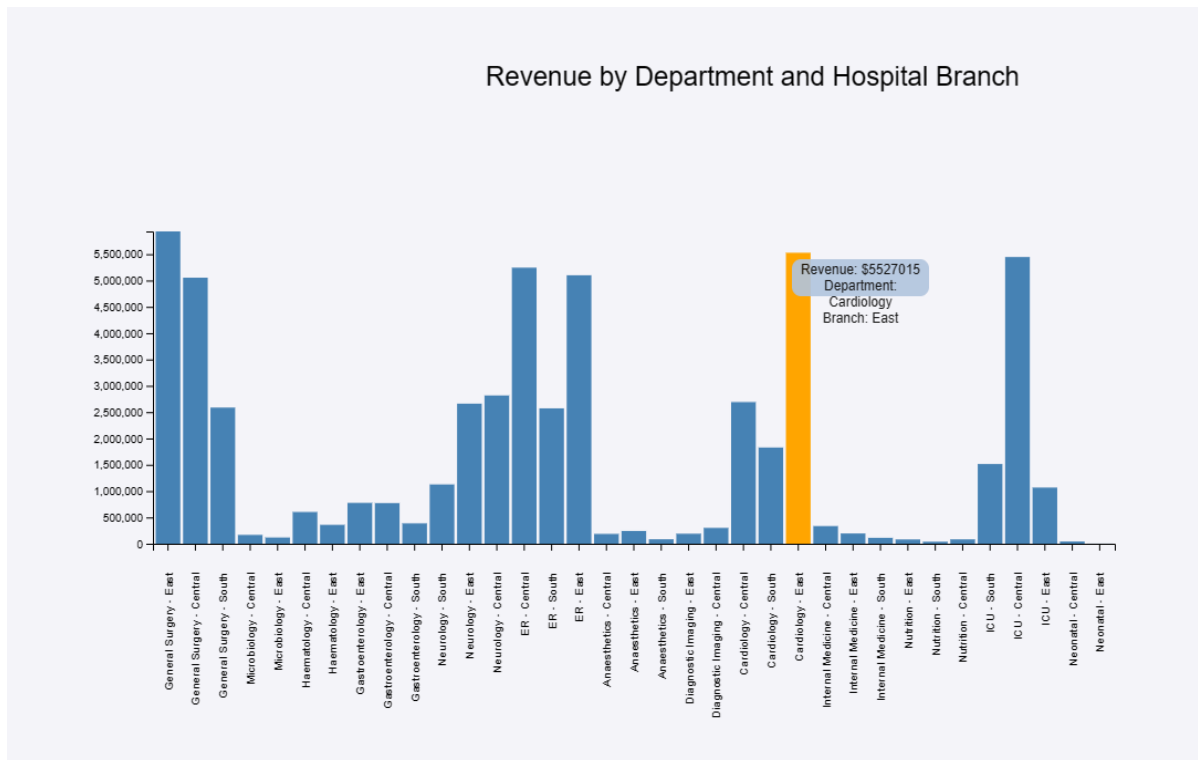
The image displays a bar chart showing the revenue generated by different departments across multiple hospital branches. The x-axis lists the various departments, and the y-axis represents the revenue amount.

The key observations are:

1. The department generating the highest revenue is Cardiology, with a revenue of $5,527,015 from the East branch.
2. Most of the departments have revenue bars for the Central and East branches, indicating these two branches contribute significantly to the overall revenue.
3. There are fewer revenue bars for departments like OB/GYN, ICU, and Wound Healing, suggesting these departments may only operate in certain branches or have lower revenue contributions.
4. The Central branch appears to have a more consistent revenue distribution across various departments, while the East branch has a few high-revenue departments like Cardiology.
5. There is a noticeable lack of revenue data for some departments in certain branches, potentially indicating the absence of those departments or incomplete data.

This visualization allows for a comprehensive comparison of revenue generation across different departments and hospital branches. It highlights the top-performing departments and branches while also providing insights into the revenue distribution and potential areas for growth or optimization.

VISUALIZATION 3
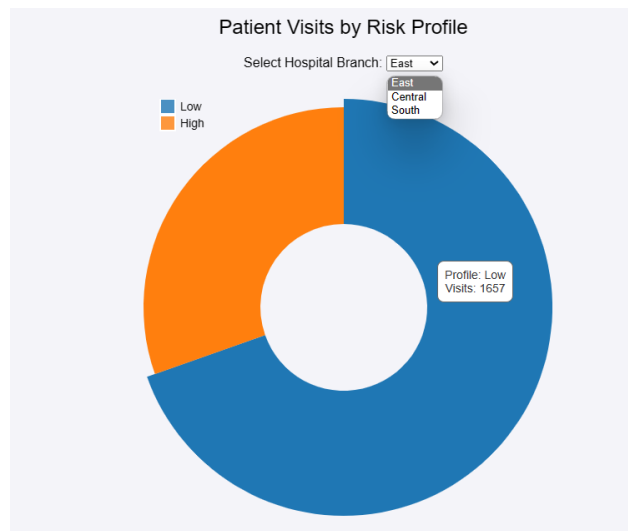
The image presents a donut chart that displays the distribution of patient visits by risk profile for the East hospital branch. The risk profiles are categorized as "Low" and "High".

Here are the key observations:

1. The chart has a dropdown menu that allows the user to select the hospital branch, and the current selection is "East".
2. The larger blue segment represents the low-risk patients, indicating that the majority of patient visits at the East branch are from patients with a low risk profile.
3. The smaller orange segment represents the high-risk patients, indicating a smaller portion of patient visits from patients with a high risk profile.
4. A callout box displays the specific details for the low-risk profile segment, showing that there were 1,657 visits from low-risk patients at the East branch.
5. No callout box is provided for the high-risk segment, so the exact number of visits from high-risk patients is not shown.

This visualization effectively communicates the distribution of patient visits based on risk profiles at the East hospital branch. It provides a clear visual representation of the predominance of low-risk patient visits and allows for easy comparison between the two risk categories. The dropdown menu also suggests the ability to analyze data for other hospital branches.

VISUALIZATION 4
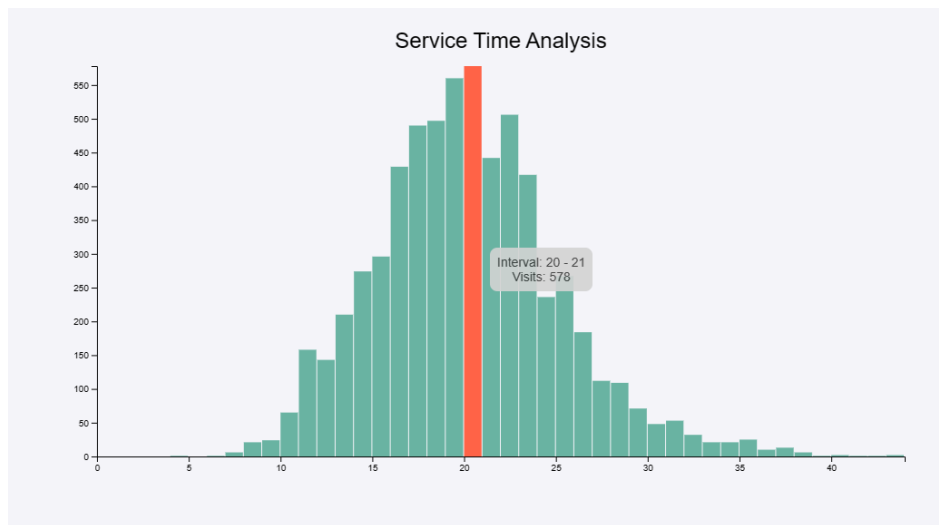
The image presents a histogram analyzing the service time distribution for a healthcare facility or service provider. The x-axis represents the service time intervals in hours, while the y-axis shows the frequency or number of visits/cases corresponding to each time interval.

The key observations from the histogram are:

1. The histogram exhibits a roughly bell-shaped distribution, which is typical of many natural phenomena and processes.
2. The peak of the distribution is at the interval of 20-21 hours, with 578 visits/cases falling within this range.
3. The distribution is slightly skewed to the right, indicating that there are more instances of longer service times compared to shorter service times.
4. The service times range from around 0 hours to over 35 hours, with the majority of visits/cases clustered between 15 and 25 hours.
5. The intervals between 0-15 hours and 25-40 hours have relatively lower frequencies, suggesting that extremely short or extremely long service times are less common.

This type of analysis can provide valuable insights into the service time patterns and help identify potential bottlenecks or areas for improvement. For instance, if a significant number of visits/cases fall into the longer service time intervals, it may indicate the need for additional resources or process optimization to reduce waiting times and improve efficiency.

VISUALIZATION 5
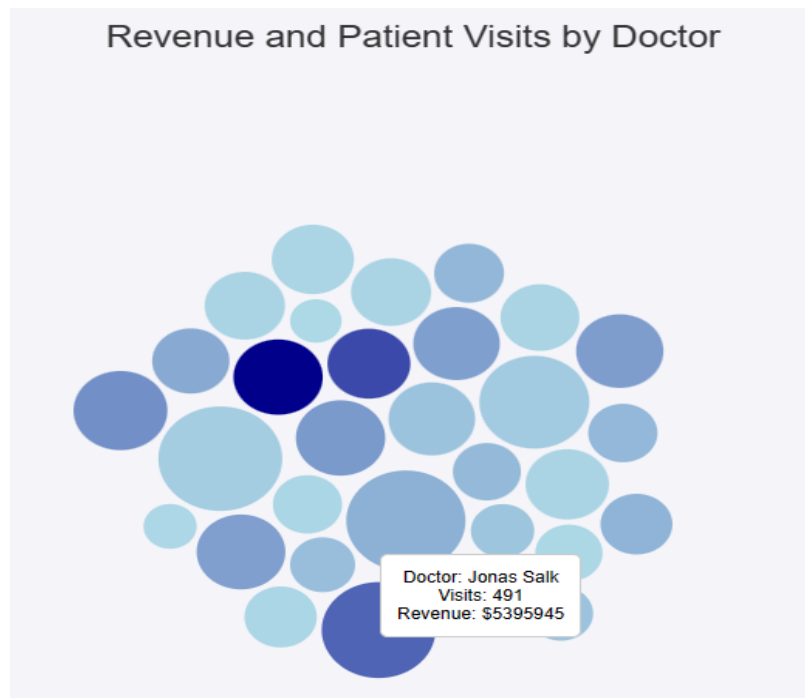
The image presents a bubble chart visualizing revenue and patient visits for different doctors. Each bubble represents a doctor, with the size of the bubble corresponding to the number of patient visits, and the color indicating the revenue generated.

The largest dark blue bubble in the center represents the doctor with the highest number of patient visits (491 visits) and revenue ($539,545). This doctor is labeled as "Jonas Salk".

The other bubbles of varying shades of blue and cyan represent other doctors in the practice, with lighter colors indicating lower revenue and smaller bubble sizes indicating fewer patient visits.

This type of visualization allows for a quick comparison of the productivity and revenue generation among the different doctors within the practice. It highlights the top-performing doctor (Jonas Salk) while also displaying the relative performance of the other doctors in terms of patient volume and associated revenue.

CONCLUSION

REVENUE BY DEPARTMENT AND HOSPITAL BRANCH:

- Understanding which departments contribute most to the hospital's revenue.
- Identifying revenue patterns across different hospital branches, indicating the financial performance of each location.

PATIENT VISITS BY RISK PROFILE:

- Analyzing the distribution of patients based on their risk profiles (e.g., low, medium, high).
- Identifying trends in patient visits and risk profiles across departments or branches.

SERVICE TIME ANALYSIS:

- Examining the average service time per patient visit.
- Identifying departments or services where longer service times may affect patient flow or resource allocation.

REVENUE AND PATIENT VISITS BY DOCTOR:

- Evaluating the revenue generated and patient visits attributed to individual doctors.
- Understanding which doctors are driving significant patient traffic and revenue.

ANNUAL AND TOTAL REVENUE BY HOSPITAL BRANCH:

- Comparing the annual revenue of different hospital branches.
- Identifying growth or decline trends across branches over time.

FUTURE WORK

Future works based on these insights could include:

- **PREDICTIVE MODELING:** Developing predictive models to forecast future revenue trends based on historical data and other relevant variables.
- **OPTIMIZATION STRATEGIES:** Implementing strategies to optimize revenue generation by focusing on high-revenue departments, doctors, or services.
- **RESOURCE ALLOCATION:** Using insights to optimize resource allocation, staffing, and service offerings across hospital branches and departments.
- **PATIENT CARE IMPROVEMENT:** Leveraging data to enhance patient care and experience based on service time analysis and patient visit patterns.
- **DOCTOR PERFORMANCE ANALYSIS:** Conducting deeper analysis on doctor performance to improve efficiency and patient outcomes.
- **BRANCH EXPANSION OR CONSOLIDATION:** Using revenue and patient visit data to guide decisions on branch expansion, consolidation, or strategic focus areas.
- **RISK MANAGEMENT:** Enhancing risk management strategies by understanding patient risk profiles and their impact on revenue and resource utilization.

Implementing these future works can lead to more informed decision-making, improved operational efficiency, and ultimately enhanced financial performance and patient care within the hospital setting.