**Project Title:** Transit Windsor

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Group 3

Executive summary:

In this report, we present the findings of our project, which focuses on improving the Windsor transit system. Our project aims to address the challenges faced by the transit system, such as congestion, overcrowding, and limited accessibility. To achieve this, we conducted research, analysis, and planning to develop solutions for a more efficient and reliable service.

Through our research, we identified key challenges such as inadequate infrastructure, limited frequency and reliability of service, and accessibility issues for passengers with disabilities. We then leveraged our expertise in machine learning to build a predictive model that helped us identify the root causes of these challenges. Our findings were presented in a visually appealing and easy-to-understand format using a Tableau dashboard.

Our team has made significant progress towards achieving our objectives, which include developing strategies and recommendations for addressing the identified challenges. These strategies include expanding the transit network, improving the frequency and reliability of service, and introducing new technologies to enhance the passenger experience.

Despite encountering challenges such as limited funding and resources and the need to coordinate with various stakeholders and transportation providers, we remain committed to achieving our goals and delivering meaningful results for the Windsor community.

In conclusion, our project aims to improve the Windsor transit system by addressing key challenges, developing strategies and recommendations, and enhancing the overall efficiency and reliability of the service. While we have faced challenges, we remain dedicated to achieving our objectives and delivering positive results for the community.

Progress update:

Our project to improve the Windsor transit system has achieved significant progress. We began by conducting an EDA of the transit data, which included assessing its quality, cleaning, transforming it, and creating meaningful visualizations. This enabled us to gain insights into the key challenges, including overcrowding, limited accessibility, and inadequate infrastructure.

Based on our EDA, we selected the most suitable machine learning model to predict the factors contributing to these challenges. Our predictive model successfully identified the root causes of the problems, such as peak times and locations of high demand, and provided us with recommendations for improving the transit service.

To make our findings more accessible to stakeholders, we created a dashboard on Tableau that presents the results of our predictive model in a user-friendly format. The dashboard tracks the transit system's performance over time and offers insights into the factors influencing passenger demand.

We are also exploring the possibility of implementing our recommendations in other cities facing similar challenges to Windsor, such as limited accessibility and overcrowding.

Overall, our project has made significant progress in identifying the challenges facing the Windsor transit system, creating a predictive model to tackle these issues, and recommending ways to improve the service.

Key Progress:

Our project aims to improve the Windsor transit system through the use of machine learning, and I have been working on developing a predictive model to identify key challenges and suggest solutions for improvement. I started by analyzing the dataset, which is a time series dataset consisting of four main columns, and split it into training, testing, and validation sets to develop an accurate model that predicts future rider counts based on historical data.

To improve the model's accuracy, I conducted feature engineering techniques to extract important information from the transaction time column, such as the hour, week of day, and month. This improved the accuracy score to over 80 percent.

Moreover, I created a dashboard on Tableau that displays the model's predictions in an easy-to-understand format, providing insights into the current state of the transit system and suggestions for improvement based on the model's predictions.

Overall, my work has resulted in an accurate machine learning model that can be used to improve the efficiency and reliability of the Windsor transit system by predicting future rider counts and informing decision-making.

Data and metrics:

I had the opportunity to work on an exciting project that aimed to improve the Windsor transit system using machine learning. The dataset we worked with contained historical transit data, including information on transaction time, latitude and longitude, route ID, and target rider count. As the dataset was a time series, we faced a unique challenge in terms of modeling and analysis.

To evaluate the performance of our machine learning model, we used various metrics such as accuracy, precision, recall, and F1 score. In the initial stages of development, our accuracy score was not satisfactory, standing at only 60%. However, after implementing feature engineering techniques, we were able to significantly improve our accuracy score to over 80%. We also monitored precision, recall, and F1 score to ensure our model was accurately identifying patterns and predicting rider counts.

To make our findings more accessible to stakeholders, we created a dashboard on Tableau. The dashboard displayed key metrics and insights from our machine learning model, making it easier for stakeholders to visualize trends and patterns in the data, as well as understand the effectiveness of our model in predicting rider counts.

Overall, our analysis of the data and evaluation of the metrics helped us demonstrate the impact of our work and the progress we made towards improving the Windsor transit system. We believe that our model has the potential to significantly enhance the efficiency and reliability of the transit system, benefiting the community by reducing congestion, improving accessibility, and providing more reliable transportation options.

Discuss any changes:

Initially, our project plan was geared towards providing solutions to businesses facing transportation challenges in the Windsor area. However, as we delved deeper into our research, we recognized that individual users were also struggling with the limited and unreliable transit system. Thus, we decided to expand our project's scope to include solutions for individual users, in addition to businesses.

Our team felt it was important to address the transportation needs of individuals, including students, seniors, and others who encounter significant difficulties in accessing education, healthcare, and other essential services due to inadequate public transportation. With this realization, we expanded our project's focus to develop solutions to help these individuals.

In the upcoming semester, we intend to concentrate on building solutions for individual users, such as mobile applications that offer real-time information on transit schedules and routes.

Although this shift in our project's plan required us to make certain adjustments, we believe it was the right decision. By expanding our focus to include individual users, we can make a more significant impact on the community and assist more people in accessing the transportation services they require.

Challenges or Roadblocks:

During the project, we faced various challenges and obstacles that required creative thinking and teamwork to overcome. One of the significant hurdles we encountered was the lack of data availability and accuracy on the Windsor transit system. We had to use multiple data sources and techniques to gain a comprehensive understanding of the transit system, which took extra time and effort.

Another challenge was identifying the root causes of the problems faced by the transit system. This involved complex research and analysis of several factors, such as transportation infrastructure, accessibility, and funding limitations. Working closely with stakeholders, including transportation providers and city officials, helped us gain a clear understanding of the challenges they faced and their transit system goals.

Individually, I had to overcome the challenge of public speaking and gathering accurate information within a tight deadline. To resolve these issues, I practiced my presentation skills and maintained frequent communication with my team to stay on track and have the required information.

Overall, we overcame these obstacles by collaborating as a team, communicating effectively, and being adaptable. Although we faced frustrating roadblocks, they also provided valuable opportunities for individual and team growth and learning.

Evaluate your results:

Our team has made significant progress in evaluating our project's results towards improving the Windsor transit system. Our accomplishments include identifying major challenges, developing strategies to address them, and building a machine learning model that predicts transit ridership patterns. We also created a Tableau dashboard that presents our findings in an easy-to-understand format, showcasing the effectiveness of our machine learning model, and providing stakeholders with a clear understanding of the transit system's current state and the potential impact of our recommendations.

However, we recognize that more work needs to be done to fully achieve our objectives. Although we developed recommendations for improving the transit system, they have yet to be implemented due to financial and resource limitations. Additionally, we initially planned to focus solely on the business-to-business aspect of the transit system but later realized the importance of including the user perspective. Thus, we plan to incorporate this aspect into our project plan in the upcoming semester.

Overall, we are pleased with the progress we have made towards our objectives and are committed to continuing our efforts to make meaningful improvements to the Windsor transit system.

Timeline and Budget update:

**Timeline:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Start Date** | **End Date** | **Duration** | **Task Description** |
| **2023-01-17** | 2023-01-31 | 15 | Brainstorming and SWOT Analysis |
| **2023-02-01** | 2023-02-10 | 10 | Problem Statement Formulation |
| **2023-02-11** | 2023-02-15 | 5 | Data Gathering |
| **2023-02-16** | 2023-03-02 | 15 | Data Cleaning and EDA |
| **2023-03-03** | 2023-04-01 | 30 | Descriptive Data Analysis and finding trends |
| **2023-04-02** | 2023-04-08 | 6 | Creating Dashboard and finalizing outcome |
| **2023-04-09** | 2023-04-11 | 2 | Presenting our findings |
| **2023-04-12** | 2023-04-18 | 6 | Interim Report writing |

Throughout the course of our project, we faced some obstacles, but we were able to complete each task within the time frame we set. We attribute our success to our thorough planning and allocation of resources, which helped us stay on track and meet our objectives.

Starting from the early stages of brainstorming and conducting a SWOT analysis, we followed our timeline closely. Our team worked together to ensure that we finished each task efficiently and effectively. Regular communication was also key to preventing any delays or issues from getting in the way of our progress.

Despite the challenges we faced, we were able to stay focused and accomplish what we set out to do. We are proud of the work we accomplished and grateful for the opportunity to learn and grow as a team.

**Budget:**

|  |  |
| --- | --- |
| **Resource** | **Cost** |
| Mobile Application | 70,000 CAD |
| Hardware (GPS, etc.) | 15,000 CAD |
| Database | 20,000 CAD |
| Training | 15,000 CAD |
| Technical Support | 9,000 CAD |
| Testing | 18,000 CAD |
| Total | 147,000 CAD |

The following table provides a comprehensive overview of the resources needed for the project and their corresponding costs. The most substantial expense is the development of the mobile application, which amounts to 70,000 CAD. The database is the second-highest expense, costing 20,000 CAD, followed by hardware at 15,000 CAD. The total cost of all resources needed for the project is 147,000 CAD. This cost breakdown is essential for budgeting and financial planning purposes, as it allows us to track our expenses and ensures that the project remains financially viable.

Next steps:

Upon completion of the project in Windsor, the team recognized various potential opportunities for future research and work related to transit systems. One such area is extending their methodology to other cities and regions that experience comparable challenges in their transit systems. Additionally, there is scope for further research into the use of new technologies in transit systems, with opportunities for partnerships with other transportation providers and stakeholders to enhance the efficiency and accessibility of transit systems.

Furthermore, the team identified specific next steps to further refine and implement their solution. These include further improving the machine learning model's accuracy, developing a user-friendly interface for the transit agency and its passengers, incorporating the solution into the transit agency's current systems and processes, and evaluating the impact on ridership patterns, transit efficiency, and customer satisfaction.

As the project advances, the team may also identify more possibilities for using data and machine learning to enhance the transit agency's operations and customer experience, which can be pursued in future phases of the project.

Overall, the team's work in Windsor has identified various promising opportunities for future research and implementation in transit systems. By continuing to refine and apply their methodology and approach, the team can contribute to the development of more efficient, reliable, and accessible transit systems in cities and regions encountering comparable challenges.

Conclusion:

In summary, our project consisted of various tasks, including brainstorming, problem formulation, data gathering, analysis, dashboard creation, and finalizing outcomes. We managed to complete all tasks within budget and on time.

Our analysis yielded significant insights into the Windsor transit system, highlighting the need for more efficient route planning and scheduling, better communication with riders, and opportunities for partnerships with other transportation providers and stakeholders.

We also identified potential areas for future work and research, including applying our methodology to other cities and regions facing similar transit system challenges, using new technologies, and refining and implementing our machine learning model.

Overall, we believe that our project has accomplished its objectives and provided valuable insights and findings that can inform and guide efforts to improve transit systems and provide better service to riders. We will continue to explore these opportunities in the future and contribute to the development of more efficient, reliable, and accessible transit systems in Windsor and beyond through data analytics and machine learning.