# **Project Title:** [Transit Windsor]

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# Executive summary:

Our project focuses on addressing the challenges faced by the Windsor transit system, including congestion, overcrowding, and limited accessibility, by conducting research, analysis, and planning to develop solutions for a more efficient and reliable service. Our objectives involve identifying the root causes of these challenges, developing strategies to mitigate them, and providing recommendations for improving the overall efficiency and effectiveness of the transit system.

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

Our team has made significant progress in achieving our objectives of improving the Windsor transit system. Our machine learning model and Tableau dashboard provided insights that enabled us to develop strategies and recommendations for addressing the identified challenges. These include expanding the transit network, improving the frequency and reliability of service, and introducing new technologies to enhance the passenger experience.

However, we encountered some challenges and roadblocks along the way, such as limited funding and resources and the need to coordinate with various stakeholders and transportation providers. Despite these challenges, we remain committed to achieving our goals and delivering meaningful results for the Windsor community.

In summary, our project aims to improve the Windsor transit system by identifying and addressing key challenges, developing strategies and recommendations for improvement, and enhancing the overall efficiency and reliability of the service. While we have made significant progress, we continue to face challenges and remain dedicated to achieving our objectives.

# Progress update:

Our team has made significant progress in our project aimed at improving the Windsor transit system. We began by conducting an exploratory data analysis (EDA) of the transit data, which included assessing the quality of the data, cleaning and transforming it, and visualizing it in meaningful ways. This step allowed us to gain insights into the key challenges facing the transit system, such as overcrowding, limited accessibility, and inadequate infrastructure.

Based on our EDA, we selected the most appropriate machine learning model to help us predict the factors contributing to these challenges. We developed a predictive model that was able to identify the root causes of the problems, such as peak times and locations of high demand, which helped us to develop recommendations for improving the transit service.

We then built a dashboard on Tableau that displayed the results of our predictive model in an easy-to-understand format, allowing stakeholders to quickly identify the key issues and areas for improvement. The dashboard showed the performance of the transit system over time and provided insights into the factors that affect passenger demand.

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

Overall, our project has made significant progress in identifying the key challenges facing the Windsor transit system, developing a predictive model to address these challenges, and providing recommendations for improvement.

# Key Progress:

Our project has made significant progress towards improving the Windsor transit system using machine learning. I have been working extensively on developing a predictive model that can identify key challenges and suggest solutions for improving the system's efficiency and effectiveness.

To start, I conducted an in-depth analysis of the dataset, which consists of four main columns - transaction time, latitude and longitude, route ID, and target rider count. As I delved into the Windsor transit dataset, I realized that it was a time series dataset. This meant that I needed to account for the temporal aspect of the data to build an accurate model. I decided to split the data into training, testing, and validation sets, which allowed me to develop a model that could accurately predict future rider counts based on historical data.

Through feature engineering techniques, I was able to extract important information from the transaction time column, including the hour, week of day, and month. This enabled me to develop a more accurate and effective model, which improved the accuracy score to over 80 percent.

Additionally, I have created a dashboard on Tableau to showcase the results of our machine learning model in a visually appealing and easy-to-understand format. The dashboard provides insights into the current state of the transit system, as well as suggestions for improvement based on our model's predictions.

Overall, by considering the temporal aspect of the dataset and conducting feature engineering, I was able to build an accurate machine learning model for predicting rider counts on the Windsor transit system. This model can be used to inform decision-making and improve the efficiency and reliability of the transit system.

# Data and metrics:

The dataset used for this project consisted of historical transit data from the Windsor transit system, including information on transaction time, latitude and longitude, route ID, and target rider count. The dataset was a time series, which presented a unique challenge in terms of modeling and analysis.

To assess the performance of our machine learning model, we used various metrics such as accuracy, precision, recall, and F1 score. During the initial phases of model development, our accuracy score was around 60%. However, after conducting feature engineering on the dataset, we were able to significantly improve the accuracy score to over 80%. We also tracked precision, recall, and F1 score to ensure that our model was effectively identifying patterns and predicting rider counts.

To visualize our findings and present them in a more accessible way to stakeholders, we created a dashboard on Tableau that displayed key metrics and insights from our machine learning model. This allowed stakeholders to easily see trends and patterns in the data, as well as understand the effectiveness of our model in predicting rider counts.

Overall, the data and metrics helped us demonstrate the impact of our work and the progress we have made in improving the Windsor transit system. Our model has the potential to greatly enhance the efficiency and reliability of the transit system, ultimately benefiting the community by reducing congestion, improving accessibility, and providing more reliable transportation options.

# Discuss any changes:

Initially, our project plan was focused on providing solutions to businesses that were facing transportation challenges in the Windsor area. However, as we progressed with our research and analysis, we realized that there was a significant need to address the transportation challenges faced by individual users as well. Therefore, we made the decision to expand our project to include solutions for individual users in addition to businesses.

This change was necessary because we discovered that many people in Windsor, including students, seniors, were struggling with the limited and unreliable transit system. We felt that it was important to address the transportation needs of these individuals, who often face significant challenges in accessing education, healthcare, and other essential services.

In the upcoming semester, we plan to focus on developing solutions for individual users, such as developing mobile applications that provide real-time information on transit schedules and routes.

While this change in our project plan required us to make some adjustments, we feel that it was the right decision. By expanding our focus to include individual users, we can have a greater impact on the community and help more people access the transportation services they need.

# Challenges or Roadblocks:

Throughout our project, we encountered several challenges and roadblocks that required us to think creatively and work collaboratively to overcome. One significant challenge we faced was the limited availability and accuracy of data on the Windsor transit system. We had to use various data sources and methods to ensure we had a comprehensive understanding of the current state of the transit system, which required extra effort and time.

Another challenge we faced was identifying the root causes of the challenges faced by the transit system. This involved researching and analyzing a complex web of factors, such as transportation infrastructure, accessibility, and funding constraints. We had to work closely with stakeholders, including transportation providers and city officials, to ensure we had a clear understanding of the challenges they faced and their goals for the transit system.

Individually, I faced the challenge of public speaking and gathering accurate information within a tight timeline. To overcome these obstacles, I practiced my presentation skills and made sure to communicate regularly with my team to ensure we were on track and had the necessary information to complete our tasks.

Overall, we were able to overcome these challenges through teamwork, effective communication, and a willingness to adapt our approach as needed. While the roadblocks we encountered were frustrating at times, they also provided us with valuable opportunities to learn and grow both individually and as a team.

# Evaluate your results:

In terms of evaluating our results, we have made significant progress towards achieving our objectives of improving the Windsor transit system. We successfully identified key challenges, developed strategies and recommendations for addressing them, and built a machine learning model to predict transit ridership patterns.

We also developed a dashboard on Tableau that displayed our findings in a visually appealing and easy-to-understand format. This dashboard was able to showcase the efficacy of our machine learning model and allowed stakeholders to understand the current state of the transit system and the potential impact of our recommendations.

However, we acknowledge that there is still work to be done to fully achieve our objectives. While we have developed recommendations for improving the transit system, their implementation is still pending due to limitations in funding and resources.

Furthermore, our initial objective was to focus solely on the business-to-business aspect of the transit system. However, we realized the importance of including the user perspective as well, and plan to incorporate this aspect into our project plan in the upcoming semester.

Overall, we believe we have made good progress in achieving our objectives and will continue to work towards making 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 |

Despite encountering a few challenges along the way, we were able to stay on track and finish each task within its allocated duration. We believe that our initial planning and allocation of resources played a crucial role in ensuring that we met our objectives.

From the brainstorming and SWOT analysis stage to the final presentation of our findings, we made sure that we followed our timeline diligently. Our team worked collaboratively to ensure that each task was completed efficiently and effectively. We also made sure to communicate regularly to avoid any delays and to address any challenges that came up promptly.

**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 |

This table summarizes the resources required for the project and their associated costs. The largest cost is the mobile application development at 70,000 CAD, followed by the database at 20,000 CAD and hardware at 15,000 CAD. The total cost for all resources is 147,000 CAD. The breakdown of costs will be useful for budgeting and financial planning and will help to ensure that the project stays on track financially.

# Next steps:

After completing the project in Windsor, the team identified several potential areas for future work and research related to transit systems. One such area is applying their methodology to other cities and regions facing similar challenges in their transit systems. Additionally, there is potential for further research into the use of new technologies in transit systems, with opportunities for partnerships with other transportation providers and stakeholders to improve the efficiency and accessibility of the transit system.

The team also highlighted several next steps for further refining and implementing their solution. These include continuing to refine the machine learning model to improve accuracy, developing a user-friendly interface for the transit agency and its riders, implementing the solution within the transit agency's existing systems and processes, and evaluating the impact on ridership patterns, transit efficiency, and customer satisfaction.

As the project progresses, the team may also identify additional opportunities for using data and machine learning to improve the transit agency's operations and customer experience, which could be explored in future phases of the project.

Overall, the team's work in Windsor has identified several promising areas 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 facing similar challenges.

# Conclusion:

In Conclusion, the project involved a series of tasks including brainstorming, problem statement formulation, data gathering, cleaning, and analysis, as well as dashboard creation and finalizing outcomes. We completed all these tasks on time and within budget.

From our analysis, we identified several key insights and opportunities for improving the transit system in Windsor. These included the need for more efficient route planning and scheduling, better communication with riders, and the potential for partnerships with other transportation providers and stakeholders.

We also discussed several areas for future work and research related to transit systems. This included the application of our methodology to other cities and regions facing similar challenges, the use of new technologies in transit systems, and the refinement and implementation of our machine learning model.

Our project has successfully achieved its objectives and identified several areas for future work and research. We believe that our findings and insights can help inform and guide efforts to improve transit systems and provide better service to riders. We look forward to continuing to explore these opportunities in the future.

Overall, our project has demonstrated the potential for data analytics and machine learning to improve transit systems and provide better service to riders. By continuing to refine our methodology and approach, we can contribute to the development of more efficient, reliable, and accessible transit systems in Windsor and beyond.