ECOCOMMUTE

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Problem Statement

Currently, Victoria is facing a challenge in managing their urban mobility, mainly due to the increase in private vehicles over the years. This leads to increased traffic congestion, carbon emissions, bad air quality and an overall reduction of public transport.

Certain gaps in data related to demographics limit the ability to implement targeted solutions. The Victoria Government pledges to reduce their transport sector emissions. To achieve this goal a sustainable solution that reduces dependency on private vehicles is needed.

Project Description

Our project, Eco Commute aims to revolutionise the urban mobility in Australia by taking Victoria as a starting point and creating an integrated, data-driven system that prioritises sustainable transport over the use of private vehicles.

It leverages the use of analysis, behavioural insights, 'cutting-edge technology' and innovative policies to build a connected urban environment where public transport, cycling, walking and electric mobility are the default modes for the citizens. It paves the way to create a more sustainable and liveable city in line with Victoria's zero emissions goal by 2045.

Data Story

During our analysis, the team noticed significant gaps in the amount of data available to detect trends and patterns relating to public transport usage. There was no data relating to public transport travel before 2018 and it was not consistent after 2018. The data lacked accuracy to be sufficient to detect trends and patterns. Additionally, there was no data relating to age demographics and locations most likely travelled to when using public transport.

Our team analysed patterns and trends using the provided dataset however the gaps in data were quite significant and prevented more accurate analysis. Using the dataset relating to car registration, we uncovered increasing trends over the last twenty years. There was a slight decline during the COVID 19 pandemic as shown in the graph above however this picked up the years following the pandemic.

Trend of Vehicle Registrations (2004-2024) for CD_CLASS_VEH 1 and 2
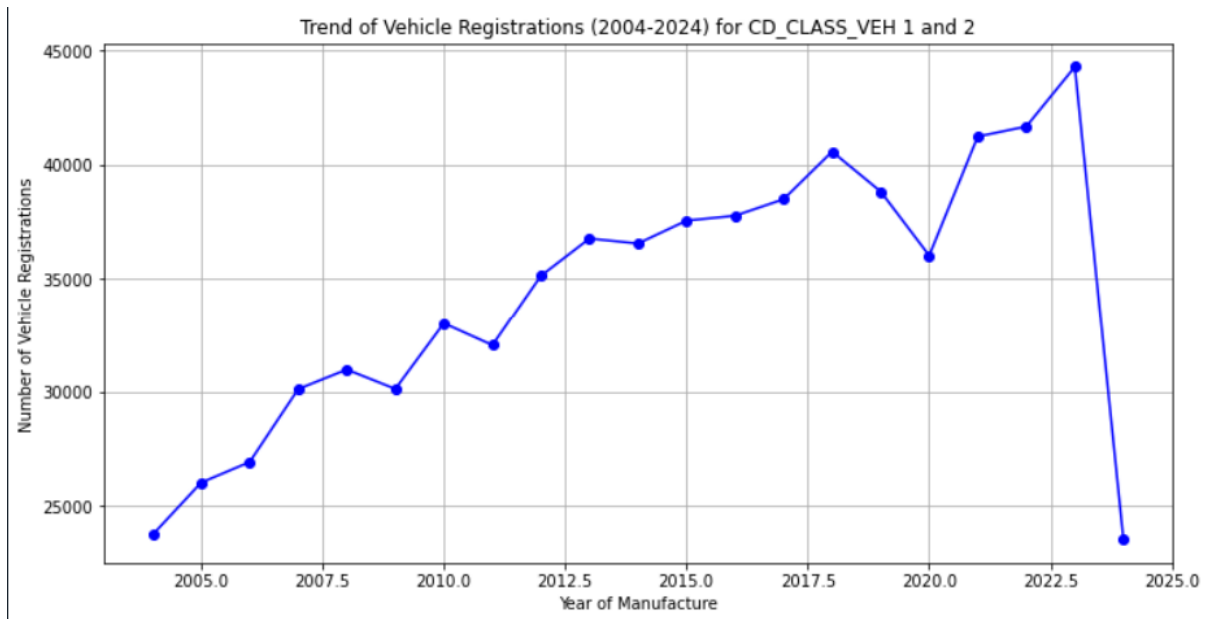
To compare this data in relation to the public transport data, our team constricted the car registration data to the years 2018 – 2024 and conducted the analysis. This data still shows the increase in car registrations, apart from the 2024 data which is not yet completed.

Trend of Vehicle Registrations (2004-2024) for CD_CLASS_VEH 1 and 2
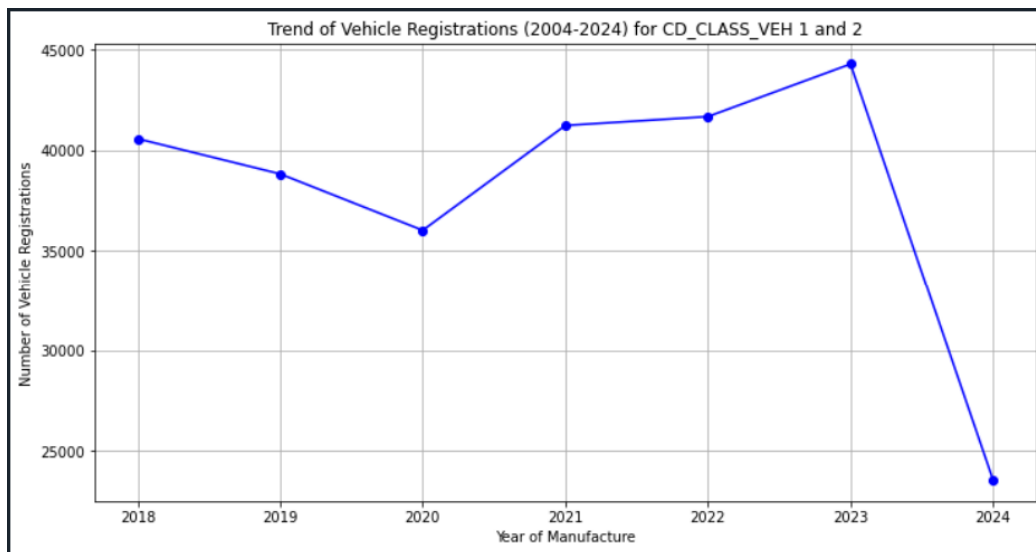
The below diagram shows the trends of passengers using public transport over the same years but in months. This diagram shows that the has been an overall fluctuating decline in the use of public transport over the years. During the COVID 19 pandemic, there was a steady decline, and this decline has not increased to its original level. This could be a result of individuals working from home or preferring to use private cars over public transport.[2]
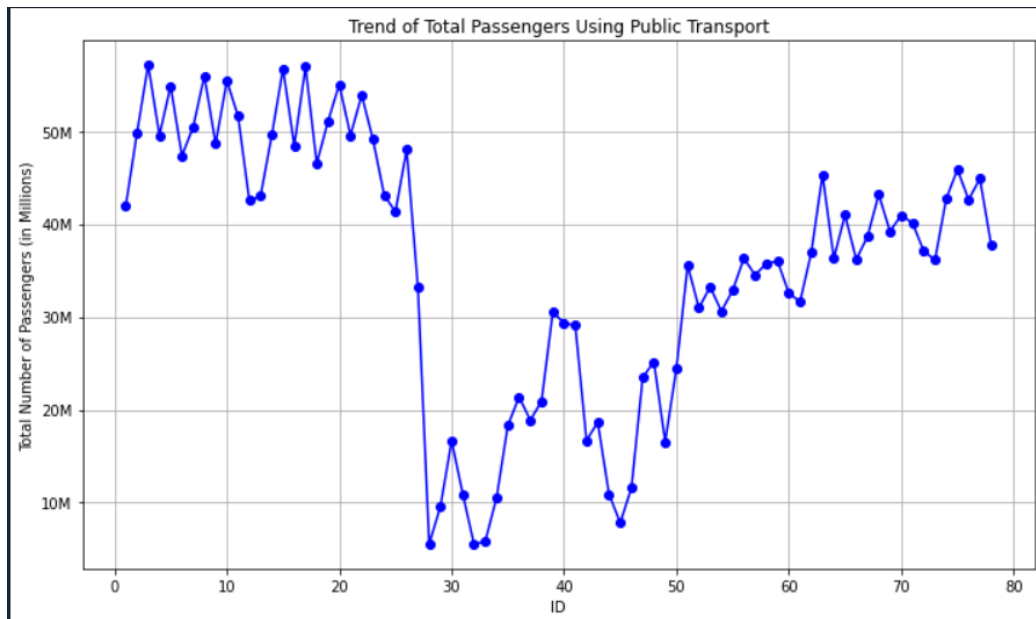
Our solutions, considering the trends relating to greater car registration in relation to decline in public transport usage, will attempt to encourage individuals to use their cars less and switch to public transport modes of travel.

Solutions

MykiEarn

MykiEarn as a mode of Data Collection:

MykiEarn is one of the solutions that our team proposes to target identified gaps in data. This app, if used in conjuction with the existing PTV app, can be used to store data relating to users which in turn can help create more accurate datasets. By collecting information relating to the age of PTV users and storing this data within the PTV app, datasets can be developed. This dataset will fill in any gaps relating to the current demographics that use PTV for travel and assist with any prediction for the future.

This is possible, if MykiEarn were to store data within its database relating to distance and location to inform datasets in the future. Additionally, if every new user was prompted to enter their age when registering a new myki within the PTV app, datasets relating to demographic age of individuals using public transport can be determined. This targets the gap in data that we uncovered, especially in data relating to frequented locations, distances travelled using myki transport and the age demographics of myki users.

It is also essential to consider the privacy implications of the data storeed as it may contain sensitive information relating to people travelling on public transport. There may be need for encryption to ensure data integrity.

MykiEarn as an Incentive:

MykiEarn was created to encourage a greater amount of individuals to use public transport and to keep using public transport. This application would work through a connection to the myki card. By connecting real-time data relating to myki "touch on's" the app will prompt the user to begin a game to be played for the duration of the travel. By playing this game, the user can earn points which in turn can be redeemed for discounts for myki travel. Points can be earned, for instance, by solving a word puzzle in two-three attempts.
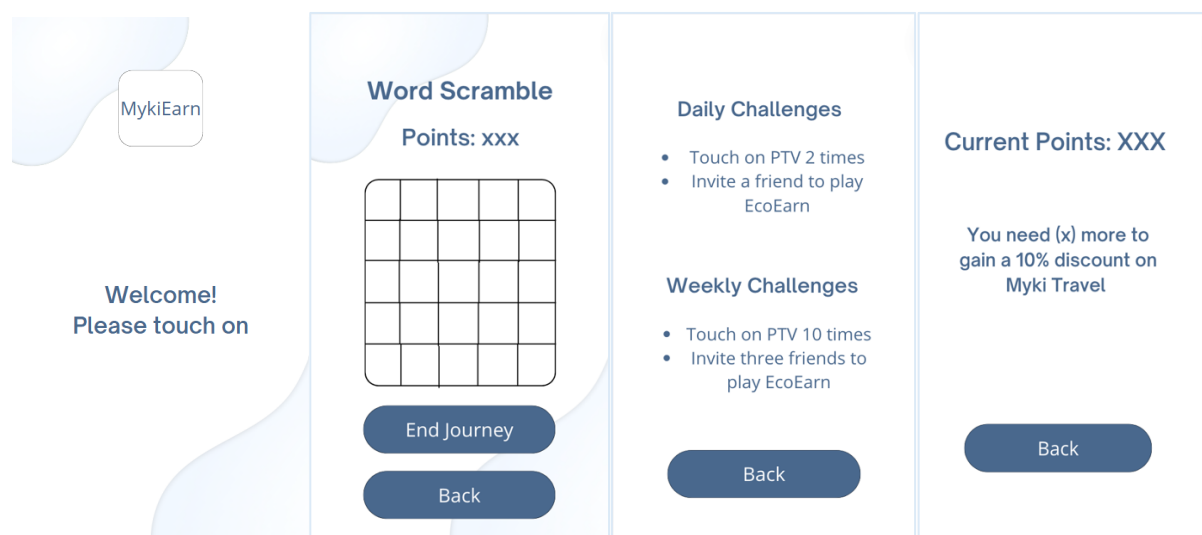

Other functionality of the app include a leaderboard and a challenges page. Being at the top of the leaderboard could also be be an incentive if there was an additional discount on top of the discount offered when the game was completed. The challenges page, on the other hand, would include the daily and weekly challenges to be completed to receive more points. Challenges could include inviting friends to participate or even use PTV transport multiple times in a week.

MykiEarn is beneficial for the government as it will boost the amount of "touch on's" and will act as an incentive owing to the discounts given to the general public. By simply touching on and playing a game, discounted travel may be possible. Although this is a feasible solution, our team considered how this would encourage people who currently use cars to move to public transport. The question of whether it would cater for everyone arised as this would only encourage individuals who currently use public transport to keep using

public transport. This may be solution to prevent current public transport users from shifting to private car usage.

MykiEarn as an Awareness Raising Tool

Additionally, MykiEarn can be used to raise awareness of health benefits to the general public through their access to our app.[1] These can also be push notifications that remind the individual to take public transport over their private car. Having engaging medical facts will encourage individuals to pick public transport over private transport in atleast some scenarios.

MykiEarn can be used to raise awareness on the different mental and physical health outcomes as a benefit of using public transport.
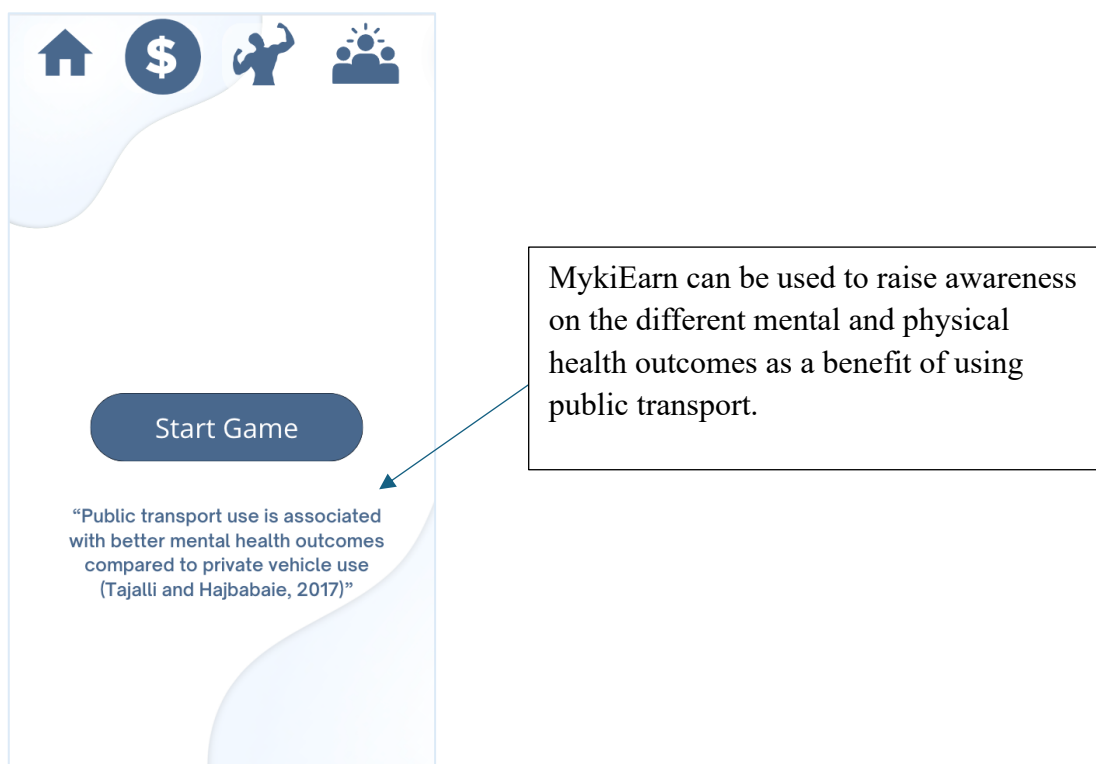
High Occupancy Vehicle (HOV) Lanes

To tackle the problem of private car usage, our team proposes two solutions. One is to introduce High Occupancy Vehicle (HOV) lanes to encourage more people to drive to places in the same vehicle. Having looked at the car registration data, there is solid information stating that more people now own cars. By introducing a greater number of HOV lanes, it may be possible to urge families, for instance, to travel together and thus help in reducing congestion.

Community Challenge

The second solution was to introduce a community challenge, such as a "No Car Friday", where individuals were asked to not drive their car on any given weekday as an effort to

move to more sustainable modes of transport. During these challenge days, it may be necessary to have frequent public transport times to further boost usage and prevent congestion. It may be necessary to run a trial period of such challenges and subject them to certain suburbs depending on the day to prevent any traffic congestion with public transport.

Additionally, considering the datasets given relating to public transport usage, introducing a challenge may seem like the most feasible option to get individuals to experience public transport travel.

This can then be used in conjunction with the MykiEarn system, which will incentivise travel and encourage them to keep travelling to receive greater discounts. If the population using public transport increased, the data would also be more accurate and consistent as it would reflect the actual amount of population using public transport, their demographic and location data.

Prediction

To assess the impact of MykiEarn, our team developed a linear regression model to predict the number of passengers likely to switch to public transport. This prediction assumes a 1% annual increase in public transport usage, backed by a case study on the positive impact of Semco Company [3]. The case study clearly demonstrates the company's improved performance after implementing employee incentive programs, reinforcing the relevance of incentives like MykiEarn. As shown in the visualization below, there is a clear upward trend, with a significant rise in passengers using public transport projected by the year 2029. This growth is also reflected in the predicted graph, highlighting the model's strong indication of increased public transport adoption over time.
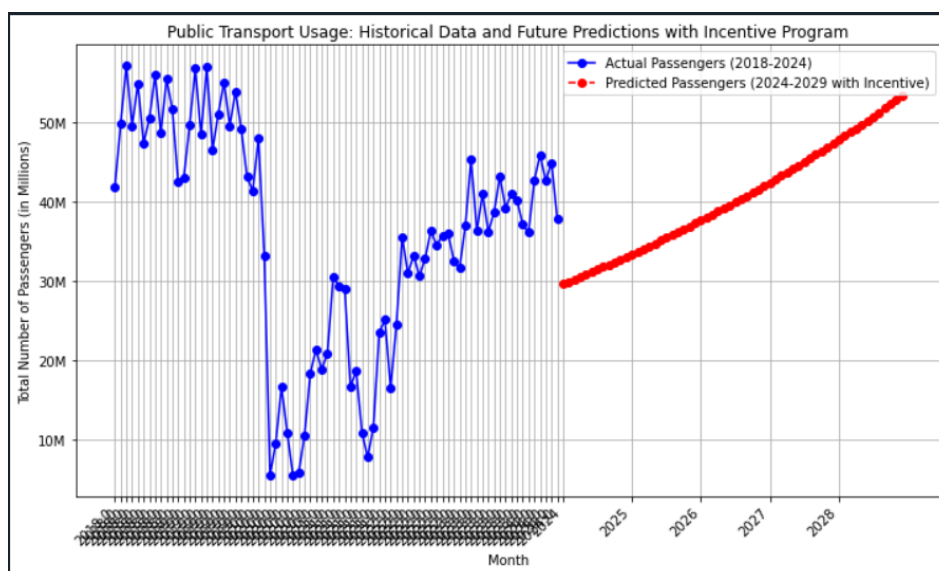
In comparison, we trained our linear regression model on the available data to predict public transport usage without any incentive programs in place. The model shows that if usage continues under the current trends without incentives, a steady decline is inevitable. This is evident in the visualization below, which predicts a noticeable drop in public transport usage

by 2029. The linear regression model, trained on the provided data, clearly demonstrates that without proactive measures like incentive programs, public transport usage will continue to decline.

Public Transport Usage: Historical Data and Future Predictions without Incentive Program
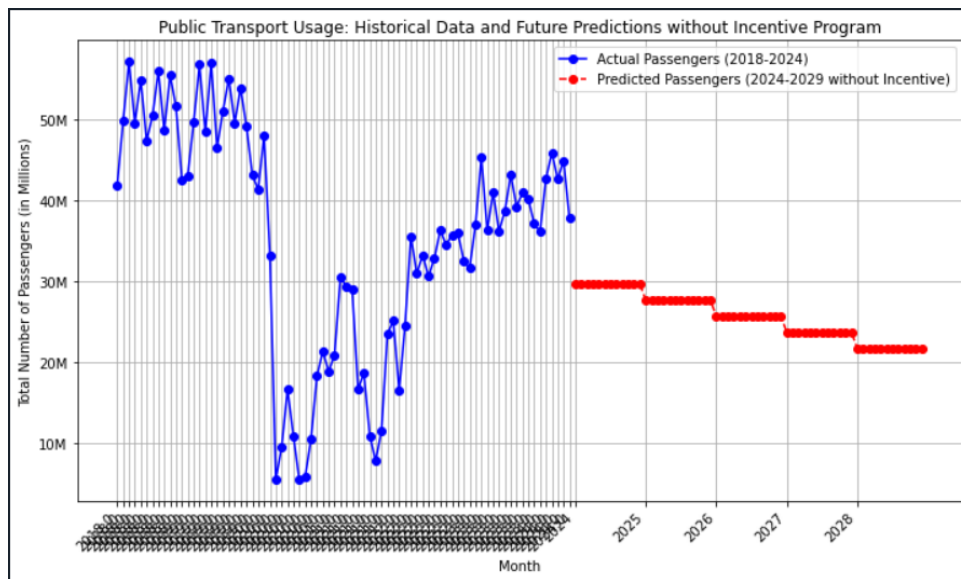
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[2]: Das, S., Boruah, A., Banerjee, A., Raoniar, R., Nama, S. and Maurya, A.K. (2021). Impact of COVID-19: A Radical Modal Shift from Public to Private Transport Mode. *Transport Policy*, 109. doi:https://doi.org/10.1016/j.tranpol.2021.05.005

[3]: André, G.-S.V.-C., Moenaert, S., De, K.-H. and Phalen (n.d.). *CASE STUDY OF SEMCO PARTNERS PROFESSOR AMAR KJR NAYAK -NON-COMPETITIVE STRATEGIES*. [online] Available at: https://threecontinentcourseforthewickedandbrave.wordpress.com/wp-content/uploads/2014/02/final-semco-group.pdf