



Toronto Metropolitan University
Engineering Competition Fall 2024
Programming Abstract

Background:

Urban transportation systems are essential to the daily lives of millions, yet they often struggle with inefficiencies and safety concerns, leading to congestion, pollution, and increased travel times. These issues affect not only the environment but also the quality of life of urbanites. A significant aspect of this challenge is the under utilization of carpooling, which has the potential to alleviate many transportation problems by reducing the number of vehicles on the road. Despite its benefits, carpooling is not widely adopted due to the complexities involved in matching riders with similar routes and schedules. A systematic approach that leverages technology can make carpooling more accessible and efficient, promoting sustainable urban transportation.

Challenge:

Develop a Carpool Matching System that reads user data from a provided file, matches users for carpooling based on their starting points, destinations, and preferences, and visually displays these carpool groups. Incorporate features such as carbon footprint calculations and time compatibility. This project aims to provide an innovative solution to promote sustainable, safe, and reliable transportation in urban environments by facilitating carpooling.

The dataset contains the following features;

- `user_id`: Unique identifier for each user.
- `name`: Name of the user.
- `gender`: Gender of the user.
- `driver_rider`: The designated role of the user.
- `start_location`: Latitude and longitude coordinate of the user's starting location.
- `end_location`: Latitude and longitude coordinate of the user's ending location.
- `time_of_travel`: Time user is available to start traveling.
- `max_detour_distance`: Maximum distance (km) the user is willing to deviate from their route to pick up or drop off other carpoolers.
- `non_smoking`: Indicates whether the user prefers a non-smoking carpool environment (True/False).
- `same_gender`: Indicates whether the user prefers to carpool with individuals of the same gender (True/False).
- `number_of_persons`: Indicates the number of people associated/accompanied with the rider.
- `number_of_seats`: Indicates the number of free seats available for drivers.

Layout and Requirements:

With respect to output, you have the freedom to choose how to present your solution. Implement a system to display carpoled groups. Use your creativity and technical skills to solve this problem. Take the program's CPU and memory usage into consideration and select the most appropriate algorithm to address the problem. All presentations must be presented in English and allow for the program to be adequately demonstrated.

Any Programming Language May Be Used

Programming Judging Matrix		
Strategy/Algorithm	Simplicity	/10
	Ingenuity	/10
	Ability to Achieve Desired Outcome	/15
		/35
Code	Structure	/10
	Consistency	/5
	Readability	/10
	Efficiency	/10
		/35
Resource Management	Memory Usage Efficiency	/5
	Program's CPU Usage	/5
		/10
Output	Correctness	/10
	Aesthetic	/10
		/20
Presentation	Design Process and Justification	/7
	Design Critique	/4
	Voice, Articulation and Timing	/4
	Visual Aids	/2
	Response to Questions	/3
		/20
Deduction Total		
Total		/100

Point Penalties	
Plagiarism	Elimination
Insufficient Citation	-50
Documents Received After Deadline	-50
Absent Team Member	-25
Entering presentation room before allotted time (after first offense)	-10
Total	