

# Carpooling Smart Management System using K-NN algorithm

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- **Abstract**

Carsharing services are increasingly common nowadays to facilitate transportation and minimizes the number of vehicles on the road, to help the environment. The paper introduces a carpooling system that helps users reach their destinations by sharing rides together, thus sharing together cost and time of road path. The purpose is to build a system that will collect people going to work together from their daily travel activities automatically.

- **Product Scope**

The system is used by any user with access to the internet. It is smart enough to learn from user daily activity his work route and then try to recommend people travelling the same route together to join same transportation. The main objective of the system is to reduce the number of vehicles on the road by grouping users with similar routes together so that they can share together cost, time of road path.

- **Intended Audience**

This document is useful for the development team, the project managers, marketing staff, testers, and documentation writers.

- **Environment Assumptions and Dependencies**

Operating environment for the Carpooling management system is as listed:

-Framework: Django Framework

-Language: Python

-DBMS: SQLite

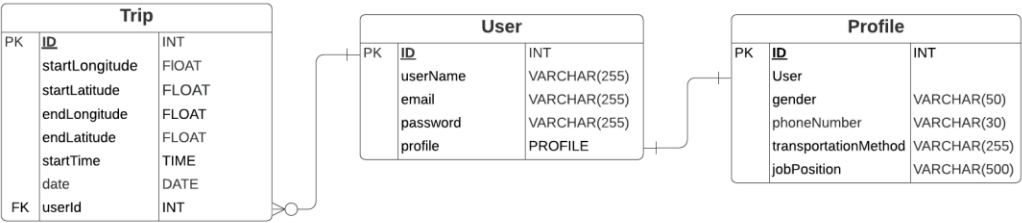
-API Used: Leaflet Maps

-Frontend frameworks and libraries: jQuery, Bootstrap, JavaScript, JSON

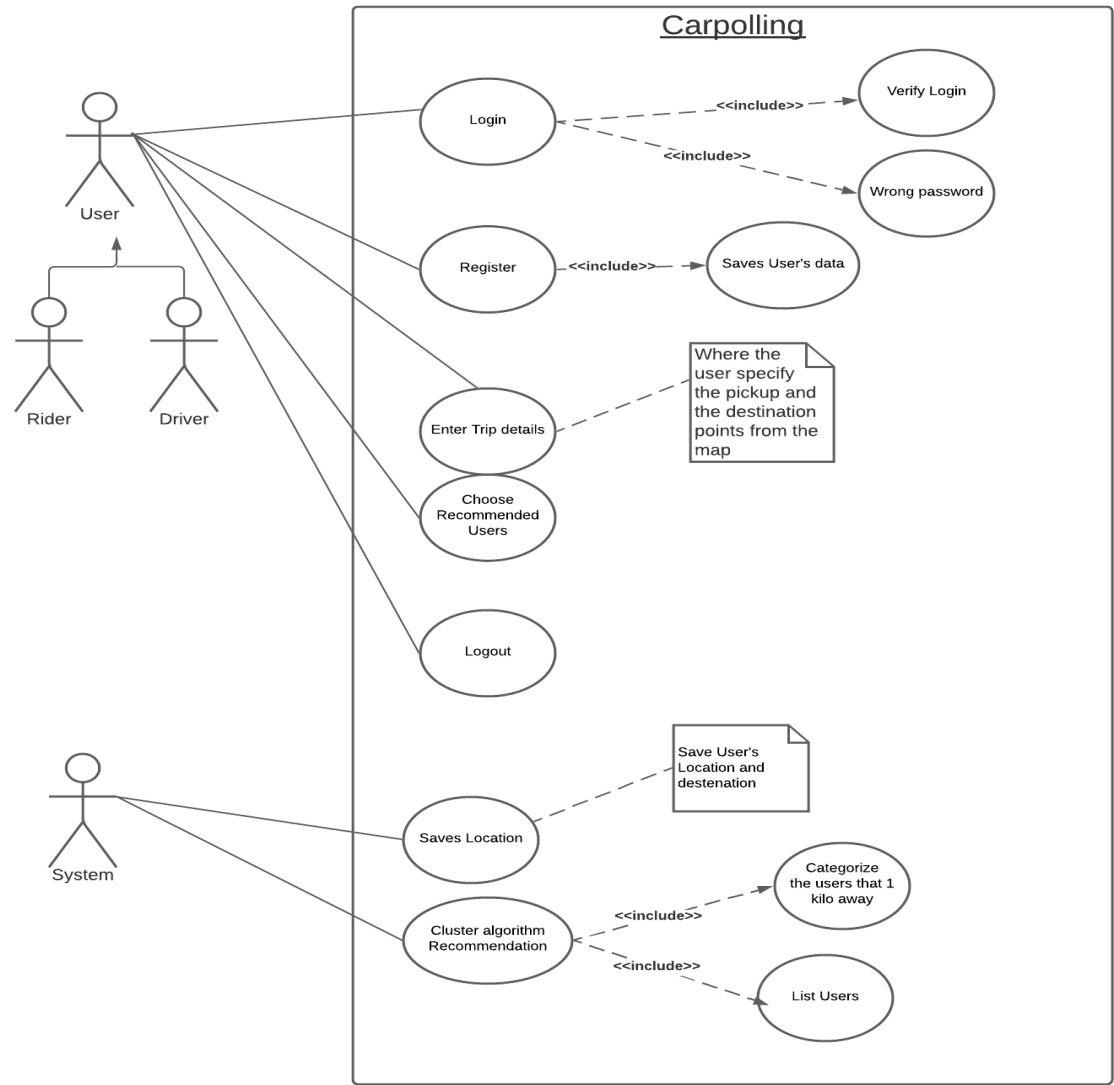
- **Analysis Phase Diagrams**

Database Schema:

Carpooling System Database Schema

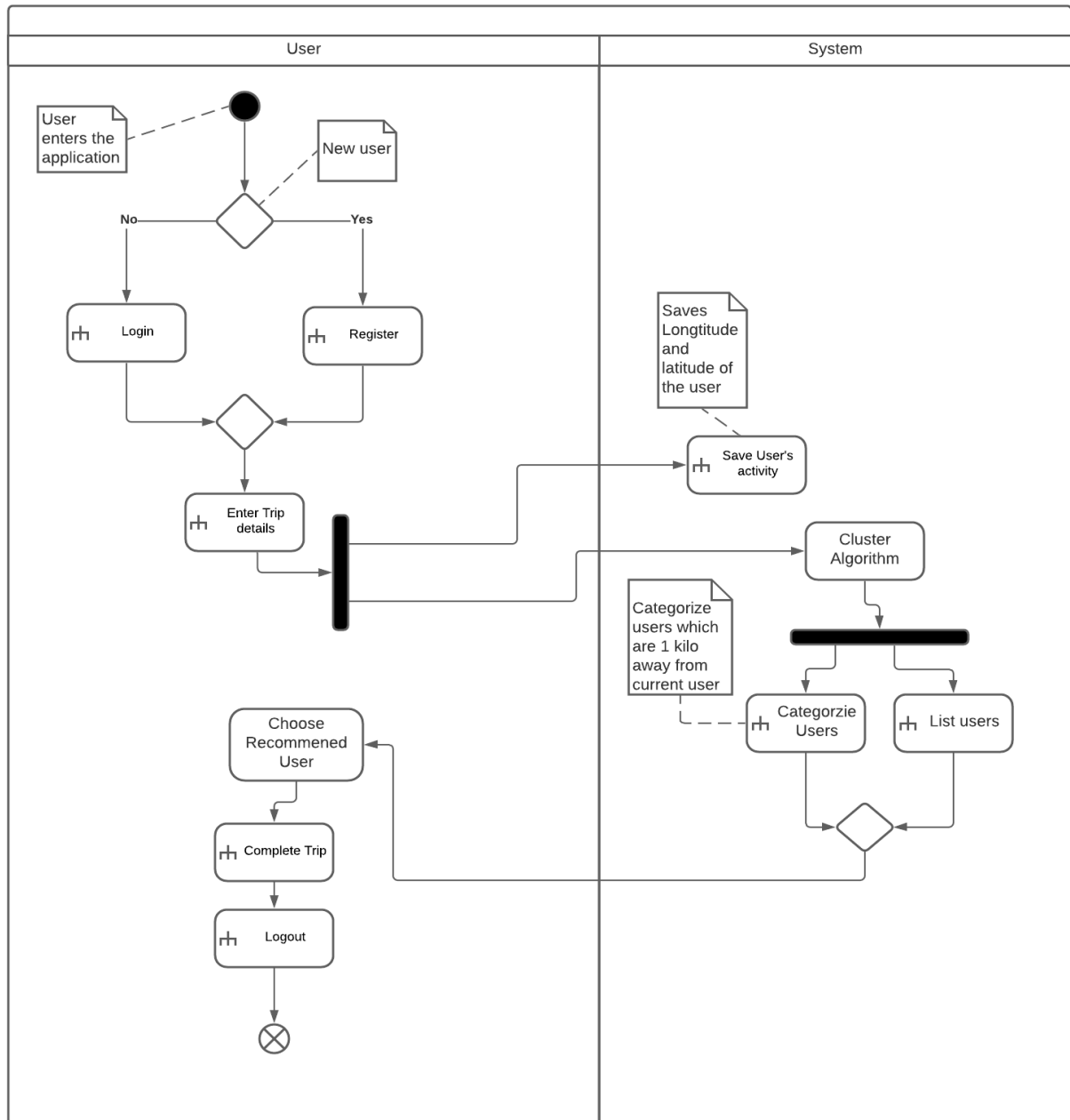


Use Case Diagram:



## Activity Diagram:

### Carpooling



- **Algorithm**

K-NN is one of the many algorithms used for solving similar ride-share systems, which is finding the nearest users that share the same path to gather them in a vehicle or help them share an external vehicle. The algorithm was shown to get the best results based on experiments done comparing the similarity measure of the results obtained by different other techniques. It is also a supervised lazy algorithm, which means the generalization of the training data is postponed until a query to get the results is made to the system. The algorithm is applied to all the users in the system to find the nearest passengers that best match the current user's route. We used the Euclidean Distance as the distance metric in the algorithm.

- **Specific Requirements and Features**

Functional Requirements	Non-Functional Requirements
1) Logs in into the system	<ul style="list-style-type: none"><li>• Authentication of user will be done by login by user name and password</li></ul>
2) Logout from the system	
3) Registration	
4) Track User's current route	
5) Recommend other users based on User's Trip using K-NN Algorithm	<ul style="list-style-type: none"><li>• The system recommends a number of people within a certain distance</li></ul>
6) Display the details of certain users	
7) Filter Nearest users based on certain criteria	<ul style="list-style-type: none"><li>• User can specify certain criteria like (gender, age, job positions)</li><li>• User can choose users based on their preferred transportation method so that they can all gather and share a ride by that method</li></ul>

- **References**

- [1] A Comparison of Machine Learning Techniques in the Carpooling Problem
- [2] Real-Time Carpooling Application based on K-NN Algorithm: A Case Study in Hashemite University, Jordan
- [3] A Machine Learning Recommender Model for Ride Sharing Based on Rider Characteristics and User Thresholding Time
- [4] A Carpooling Recommendation System for Taxicab Services
- [5] Grouping Similar Trajectories for Carpooling System