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Personal Car Pooling Using Machine Learning

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ABSTRACT

The ever-increasing growth of cities has implied longer commuting distances (travel times) for their population and traffic congestion problems affecting public transport systems. These factors motivate the use of private vehicles causing an increase on traffic, longer idle times, reduced vehicle capacity utilization, higher mobility costs and a significant increase on vehicle emissions, one of today's major environmental concerns. By having more people using one vehicle, carpooling reduces each person's travel costs such as fuel costs, tolls and the stress of driving. The datasets are processed using Dijkstra algorithm, KNN algorithm.

Keywords: Dijkstra algorithm, KNN algorithm, Machine Learning

I. INTRODUCTION

The expenses, both environmental and fiscal, of single occupancy vehicles could be reduced by utilizing the empty seats in personal transportation vehicles. Carpooling and ride-sharing target those empty seats: taking additional vehicles off the road reducing traffic and pollution, whilst providing opportunities for social interaction. However, historically carpool scheduling often limited users to consistent schedules and fixed rider groups–carpooling to the same place at the same time with a set person or a group of people.

Arrangements for carpooling can be made through many different mediums including public websites, social media, acting as marketplaces, employer websites, smartphone applications, carpooling agencies and pick-up points. Carpooling stands out as an effective and social approach to exploit available transportation resources, i.e., fill the empty seats in private vehicles. It allows people to share a ride for similar departure and destination locations.

Machine Learning (ML) is the study of computer algorithms that can improve automatically through experience and by the use of data. It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. It can be used to predict multiple parameters that are required to implement long distance carpooling and regular carpooling simultaneously and also lets anyone share their ride much more easily [1].

II. LITERATURE SURVEY

Fu-Shiung Hsieh recommended a model and a problem-solving architecture based on a real geographic information system (GIS). The approach toward the dynamic carpooling problem is based on the requests of passengers and the trajectories of car drivers collected in the past. To calculate the distance between locations requires the use of a software library that seamlessly

integrates with the geographic information system (GIS)[2].

Oussama Dakroub, Carl Michael Boukhater, Fayez Lahoud, Mariette Awad, Hassan Artail in this paper, the Dijkstra Algorithm is used by the network of users to subdivided into small areas centered on a driver. A check is done on each passenger to see if a car with empty seats passes near him or her, and the assignment is performed incrementally. This solution has a fast runtime as compared to other carpooling solutions.

KNN This method is one of the simplest and efficient methods of classification. At the time of quality check, some reliable constant controls of probability densities are difficult to understand because the user is not aware of them. So, this KNN classification method is implemented to calculate such type of calculations. With the help of training datasets, the location of K nearest neighbor is predicted. Euclidean distance is used to find how close the training dataset is from target. Find the k-nearest neighbors and assign them to group of rows which is examined. Repeat the step for the rows outstanding in the target set. In this application the highest value of K can be selected, after that the software application automatically builds a similar parallel model on the values of K up to the maximum value defined. KNN algorithm with support of WEKA tool concludes that training dataset, input and output variables must derive in. The best value of K is used to build parallel models on all the values of K up to max known value.

III. PROPOSED SYSTEM

The aim is to let any person with a vehicle can share his/her ride with anyone using this application and which can be used for both long distance and short distance carpooling using robust Machine Learning algorithm like KNN algorithm and Dijkstra shortest path algorithm.

For this system, gathering and capturing of information is crucial for both the users and drivers such as GPS coordinates which comes from geographic information system (GIS).

Dijkstra shortest path algorithm

The algorithm finds the shortest path between that node and every other. It can also be used for finding the shortest paths from a single node to a single destination node by stopping the algorithm once the shortest path to the destination node has been determined. Dijkstra's algorithm can be used to find the shortest route between one city and all other cities [3].

KNN Algorithm

K-nearest neighbors (KNN) algorithm is a type of supervised ML algorithm which can be used for both classification as well as regression predictive problems.
It is widely disposable in real-life scenarios since it is non-parametric, meaning, it does not make any underlying assumptions about the distribution of data.

K-nearest neighbors (KNN) algorithm uses 'feature similarity' to predict the values of new datapoints which further means that the new data point will be assigned a value based on how closely it matches the points in the training set.

KNN is a lazy learning and non-parametric algorithm. It's called a lazy learning algorithm or lazy learner because it doesn't perform any training when you supply the training data. Instead, it just stores the data during the training time and doesn't perform any calculations. It doesn't build a model until a query is performed on the dataset. The Working process of the algorithm can be explained in the following steps:

Step 1 – For implementing any algorithm, we need dataset. So, during the first step of KNN, we must load the training as well as test data.

Step 2 – Next, we need to choose the value of K i.e., the nearest data points. K can be any integer.

Step 3 – For each point in the test data do the following

3.1 – Calculate the distance between test data and each row of training data with the help of any of the method namely: Euclidean, Manhattan or Hamming distance.

The most commonly used method to calculate distance is Euclidean.

3.2 – Now, based on the distance value, sort them in ascending order.

3.3 – Next, it will choose the top K rows from the sorted array.

3.4 – Now, it will assign a class to the test point based on most frequent class of these rows.

Step 4 – End

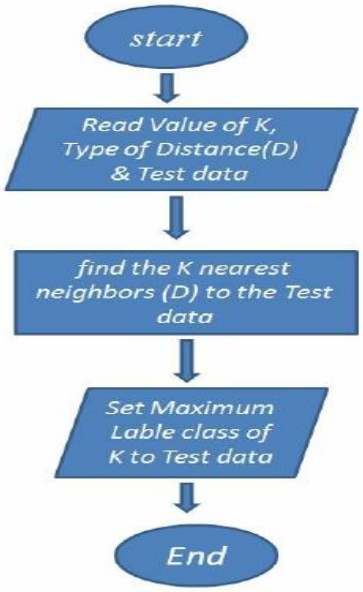

Fig-1: Procedure of KNN algorithm

IV. CONCLUSION

In this paper, KNN algorithm which a supervised algorithm was applied on the dataset to predict users and drivers' common route so that drivers can share their personal rides and the Dijkstra algorithm is used to navigate. The aim of this paper is to make personal carpooling much more accessible to wider public and giving freedom to the people to share their personal rides with other which will not only save money but also helps to conserve the fuel resources, improving social life, decreasing the waiting time in queue to park the vehicle, reducing the number of accidents and environmental pollution which in turn results in green environment, wellbeing and improving the quality of life of the people.

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