Implementation Of Efficient Carpool Service Application Using A* and Genetic Algorithm In Cloud Computing.

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Abstract- *In today's world, traffic congestion seems to be a very serious problem in urban areas. This traffic congestion leads to less occupancy of seats in the vehicle and increase in number of vehicles affecting the environment. So this traffic congestion problem, can be effectively solved by using Carpooling. It occupies empty spaces in the vehicles thereby decreasing the problem of traffic congestion. Intelligent carpool system (ICS) is described in this paper, which provides carpool services. Intelligent carpool system (ICS) is an application which can be used via smart handheld device and used to solve carpool service problem(CSP).In this Intelligent carpool system (ICS) application, we apply genetic algorithm and A* algorithm for ride sharing. The genetic algorithm, which we are using in this paper, is the genetic carpool route and matching algorithm (GCRMA) that will provide ride matching and ride sharing. The proposed GCRMA significantly reduces the computational complexity and the processing time. Along with GCRMA, A* algorithm is also used in this project. A* algorithm finds the shortest path between the source and destination of passengers.*

Keywords- Intelligent Carpool System (ICS), A* Algorithm, Carpool Service Problem (CSP), Genetic Carpool Route And Matching Algorithm(GCRMA).

I. INTRODUCTION

Urban and industrial growth has been increased due to recent economic development which leads to large number of vehicles on the streets. Various options are available in urban area for public transportation. People prefer private vehicles over public transportation systems. Private vehicles are preferred for their smooth, comfortable and flexible transport which is not the same case in public vehicles. However, use of personal vehicle causes serious traffic congestion problem in urban area as each car is used by only one or two individuals and increase in empty seats. Serious traffic congestion affects the environment badly. Traffic congestion leads to increase in travel time, air pollution, carbon dioxide (CO2) emissions and fuel use because cars cannot run efficiently. Solution to the serious traffic congestion problem is carpooling. Carpooling is the sharing of car journeys so that more than one person travels in a car. Carpooling is used to offer empty seats to additional passengers by providing best solution for traffic congestion. Carpooling will lead to increase in occupancy rate. Carpooling reduces each person's travel costs such as fuel costs and the stress of driving as one vehicle can be used by more people. Sharing journeys reduces carbon emissions, traffic congestion on the roads, and the need for parking spaces, hence carpooling is also a more environmentally friendly and sustainable way to travel . In this paper, Intelligent Carpool System (ICS) is proposed to solve traffic congestion problem. Intelligent Carpool system is a android application can be used via smart handheld device. By using intelligent carpool system application along with global positioning system, passengers and drivers can access real-time carpool service. Proposed intelligent carpool system provides carpooling by giving input as current locations and other required information by user's smartphones, tablet computers or other devices. There are several existing systems which provides carpool services such as ShareYourRide, CarpoolGlobal, Carma, sidecar, Flinc, Zimride and go2gether. But these systems lack the dedicated optimization technique where as some systems lack real time access of location using GPS. These existing systems are not efficient and not convenient for accurate ride matching. Also security is not provided by these existing systems. Intelligent carpool system uses genetic algorithm for ride matching and A* algorithm is used to find shortest path between source to destination.

II. RELATED WORK

The carpool service problem has been solved in various ways according to existing systems. Integer programming was used to solve CSP in existing systems. Integer Programming method comes in the family of exact optimization and it gives similar outputs for different runs of the same problem. Hence, this method was not efficient to solve CSP. The CSP has been solved by some of the existing systems such as CarpoolGlobal system and ShareYourRide. Users can find matching output for their request via

CarpoolGlobal System. However, this system cannot give real time location as it cannot work on Geographical Information System (GIS). There are some existing systems, which support digital GIS for matching request via location information such as ShareYourRide. But ShareYourRide does not support Global Positioning System (GPS).

III. SYSTEM ARCHITECTURE

This proposed system comprises of Mobile Client Module and Cloud Global Service Module. Mobile Client Module and Cloud Global Carpool Service communicate with each other through HTTP protocol with the help of Web Services.

A. Mobile Client (Android):

This is one of the module, which we have used in our project. This module consists of two sides-driver and passenger. Both will have different applications on their respective handsets. The application on passenger's side will be used to book the seat, sharing the seat with other passenger. The application on the driver's side will be used to check the number of passengers for the available vehicle and the driver will have the advantage of accepting the request of number of passengers to be allocated for the vehicle. Use of Communication manager is done for efficient communication between driver and passenger and cloud. GUI i.e. Graphical User Interface is used for smooth communication between them. Cloud manager is used to maintain the information of android on cloud. The Google Map is used to map the route which has been calculated and shown accordingly.

B. Cloud Global Client System (Cloud):

This is an important module in our project. The communication manager is used to communicate between driver and passenger with cloud. Information from MC module is taken to match the requests for carpool service on Cloud Global Carpool Service Module (CGCS). This module consist of open GIS system. GIS is Geographical Information System which consist global geographical information such as Google Maps etc. This module works on Genetic Based Carpool Route and Matching algorithm (GCRM) and A* algorithm.. The data and information is stored in the cloud for security of data. The data is in the form of MySQL wherein the databases are stored in the cloud. The computations of selection, crossover, mutation is done by the GCRMA i.e. the Genetic Carpool Routing and Matching Algorithm which is used for finding suitable carpool matches along the same route.

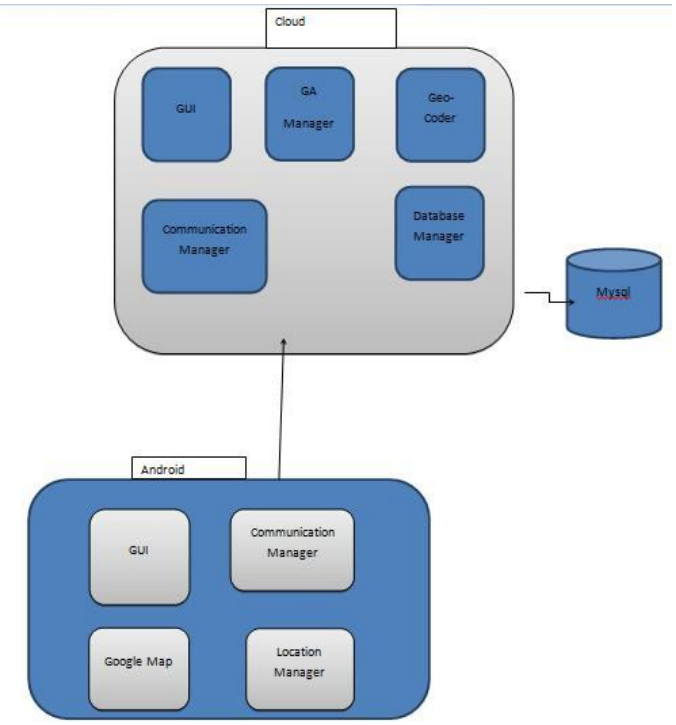

Figure 1. System Architecture Diagram

C. Proposed genetic algorithm

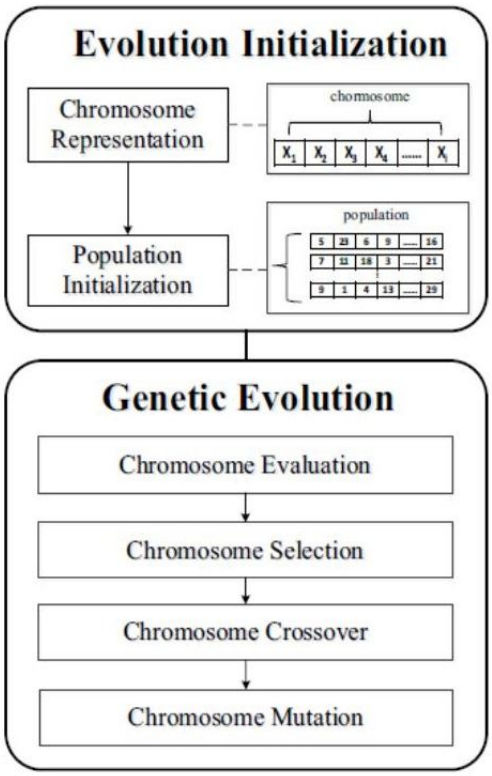

Figure 2. Genetic Algorithm

Genetic Based Carpool Route and Matching algorithm comprises of two primary modules as:

1. Evolution Initialization Module (EI)
2. Genetic Evolution Module (GE)

1. Evolution Initialization Module:

Initialization of chromosomes is done in this module. This module assigns passengers to a particular driver. It has Chromosome Representation and Population Initialization procedures.

a) Chromosome Representation: It gives solution to the Carpool Service Problem (CSP) with respect to the requirements of passengers and drivers.
b) Population Initialization: Initial population is generated randomly. Matching of candidates from initial population pool is done.

2. Genetic Evolution Module:

This module provides optimal solution for Carpool Service Problem (CSP). It takes input as output of EI module. This module comprises of following procedures:
(1) Chromosome Evaluation
(2) Chromosome Selection
(3) Chromosome Crossover
(4) Chromosome Mutation

In Chromosome Evaluation, quality of each chromosome is determined by using fitness value. This procedure will find out sequence for picking up and dropping off passengers of corresponding driver. It also gives the most efficient route. Fitness value is calculated by using the travel cost of most efficient route. In Chromosome Selection procedure, selection of chromosomes for the next generation is done according to the fitness value. Chromosome Crossover procedure is used to recombine the selected chromosomes. Genetic diversity is maintained by Chromosome Mutation.

D. A* Algorithm

1. Create a search graph G, consisting of the start node, no. Put no in OPEN list.
2. Create a CLOSED list, which is initially empty.
3. If OPEN list is empty, exit with failure.
4. Select the first node from OPEN list, remove that node, and put it on CLOSED list. Called this node n.
5. If n is a goal node, exit successfully with the solution obtained by tracing a path along the pointers from n to no in G. (The pointers define a search tree and are established in Step 7.)
6. Expand node n by generating the set M, of its successors that are not already ancestors of n in G. Install these members of M as successors of n in G.
7. Establish a pointer to n from each of those members of M that were not already in G (i.e., not already on either OPEN or CLOSED). Add these members of M to OPEN. For each member, m, of M that was already on OPEN or CLOSED, redirect its pointer to n if the best path to m found so far is through n. For each member of M already on CLOSED, redirect the pointers of each of its descendants in G so that they point backward along the best paths found so far to these descendants.
8. Reorder the list OPEN in ascending order of f values. (Ties among minimal f values are resolved in favor of the deepest node in the search tree. f(n) = g(n) + h (n) where *n* is the last node on the path, $g(n)$ is the cost of the path from the start node to *n*, and $h(n)$ is a heuristic that estimates the cost of the cheapest path from *n* to the goal)
9. Go to Step 3.

IV. RESULTS

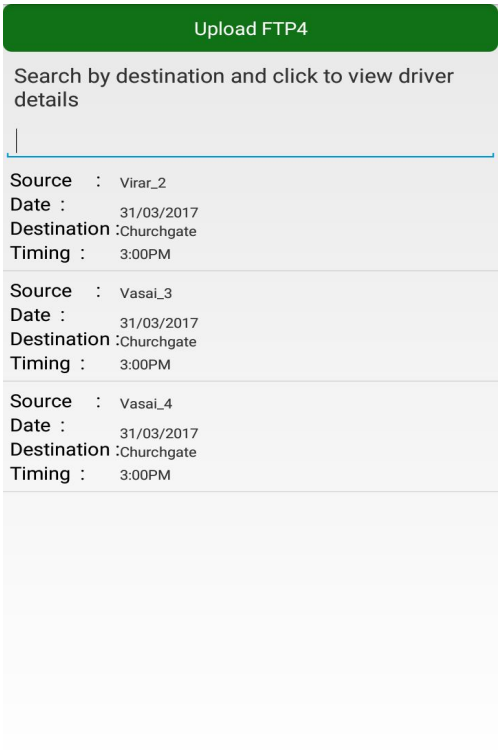

Figure 3. Carpool Matching Request using genetic algorithm

Figure 4. Shortest Path Using A* Algorithm

V. CONCLUSION

In this paper, we have proposed Intelligent Carpool System, which can find carpool matches at any time and in any place. The carpool service problem is efficiently solved by proposed GCRMA algorithm, which is based on genetic algorithm. Proposed GCRMA provides efficient and optimized solution by providing accurate carpool matches in less computation whereas A* is the optimized algorithm to find shortest path between any two locations. Mobile Client (MC) and Cloud Global Carpool Service (CGCS) are the two main modules of our proposed intelligent carpool system. MC module is used by drivers and passengers to interact with the proposed CGCS module. MC module is also used to submit requests and receives subsequent matches with the help of mobile communication network and their personal mobile devices. The service oriented carpool computing can be supported with the help of GIS and GPS technology by proposed CGCS module. Stress level can be reduced with the help of carpooling by escaping from driving in high traffic situations.

REFERENCES

[1] R.Malarvizhi and K.Saraswathi, "Content-Based Spam Filtering and Detection," International Journal of Engineering Trends and Technology (IJETT), vol. 4, no. 9, pp. 4237-4242, 2013.

[2] P. K. Panigrahi, "A Comparative Study of Supervised Machine Learning Techniques for Spam E-Mail Filtering," in Fourth International Conference on Computational Intelligence and Communication Networks, 2012.

[3] K. Tretyakov, "Machine Learning Techniques in Spam Filtering," in Data Mining Problem-oriented Seminar, 2004.

[4] J. A. A. a. C. M. J. George Dimitoglou, "Comparison of the C4.5 and a Naïve Bayes Classifier for the Prediction of Lung Cancer Survivability".

[5] E. S. M. &. A.-A. R. E. El-Alfy, "Using GMDH-based networks for improved spam detection and email feature analysis. Applied Soft Computing," pp. 477-488, 2011.

[6] H. &. Y. B. Xu, "Automatic thesaurus construction for spam filtering using revised back propagation neural network," Expert Systems with Applications, pp. 18-23, 2010.

[7] J.-W. L. a. C.-Y. L. Daw-Ran Liou, "Learning Behaviors of Perceptron," ISBN 978-1-477554-73-9.

[8] D. Sivanandanam, Principles of Soft Computing.

[9] I. A. a. G. P. V. Metsis, "The Enron-Spam datasets," [Online]. Available: http://www.aueb.gr/users/ion/data/enron-spam/.

[10] "ID3 algorithm," [Online]. Available: https://en.wikipedia.org/wiki/ID3_algorithm.

[11] A. M. H. E. a. M. E. B. HSSINA, "A comparative study of decision tree ID3 and C4.5," ID3 and C4.5, pp. 13-19.

[12] D. &. R. S. Kevin, "Optimally splitting cases for training and testing high dimensional classifiers," BMC Medical Genomics, 2011.

[13] K. T. G. &. V. I. Sechidis, "On the stratification of multi-label data. Machine Learning and Knowledge Discovery in Databases," pp. 145-158.