

Multi Agent System for Ride Sharing and Carpooling



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Declaration

I declare that this dissertation does not incorporate, without acknowledgment, any material previously submitted for a Degree or a Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations.

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Abstract

This thesis describes the research done to implement a ridesharing solution in Sri Lanka using a multi-agent system based approach. Particularly this research focuses on implementing a carpooling/ridesharing solution using real geospatial data extracted from a geographic information system. Emphasis is placed on solving the complex problem of user route matching based on journey start, end locations and route overlap. Carpooling is the sharing of car journeys so that more than one person travels in a car. By having more people using one vehicle, carpooling reduces each person's travel costs such as fuel costs, tolls, and the stress of driving. Carpooling is seen as a more environmentally friendly and sustainable way to travel, since sharing journeys reduces carbon emissions, traffic congestion on the roads, and the need for parking spaces. Carpooling/ridesharing however has many challenges such as socio-cultural challenges, which need to be looked into when implementing a solution.

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A multi agent based solution is proposed due to the complex and dynamic nature of the problem. For this system, users are simulated using the simulation capabilities of a multi agent system. Route data for the simulated users are generated using a list of addresses in the Western Province of Sri Lanka. The list of addresses are then converted to geo location data and randomly paired using a randomized pairing algorithm to generate routes for the users. Agents generated with the simulated routes are allowed to interact with one another to group together and form ride shares or carpools. A Route Match Agent is implemented with a custom route match algorithm in order to find the best pairings for ride shares and carpools. Carpools are identified as an extension of rideshares, established between multiple users who have overlapping journeys with approximately the same route distances. The system also includes a social network module where connections between users are mapped as first and second degree connections. The available rideshares/carpools for user are then ranked based on the social connections. Running tests against the system showed that it is effective in finding the optimal carpools for users. The simulation also showed that for successful carpools to be established, a large user pool from the same area is required.

Contents

Chapter 1 Introduction.....	1
1.1 Prolegomenon	1
1.3 Problem definition	1
1.4 Aim and Objectives.....	3
1.5 Outline.....	3
1.6 Summary	4
Chapter 2 Analysis of carpooling/ridesharing solutions	5
2.1 Introduction.....	5
2.2 Research into the challenges of carpooling and ridesharing.....	5
2.3 Solving the carpooling problem using multi agent systems	6
2.4 Other solutions to the carpooling problem.....	10
2.5 Summary	12
Chapter 3 Multi Agent Systems and their applications.....	13
3.1 Introduction.....	13
3.2 Agent Definition	13
3.3 Multi agent system implementation.....	15
3.4 Multi agent system architecture	13
3.5 Communication, cordination and negotiation.....	13
3.6 JADE.....	20
3.7 MAS in Traffic and Transportation	20
3.8 Summary	21
Chapter 4 Solving complexity using a multi agent system.....	22
4.1 Introduction.....	22
4.2 Hypothesis.....	22
4.3 System requirements and features	22
4.4 Solution overview	23
4.5 Summary	24



University of Moratuwa, Sri Lanka.

Electronic Theses & Dissertations

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Chapter 5 Design.....	25
5.1 Introduction.....	25
5.2 System layered architecture	25
5.3 Interface Layer	26
5.4 Agent Layer	26
5.5 Ontology Layer	27
5.6 System activity diagrams	28
5.7 Summary	32
Chapter 6 Implementation	33
6.1 Introduction.....	33
6.2 Interface module implementation	33
6.3 Agent layer implementation.....	33
6.4 JADE agent behaviors.....	33
6.5 System agents.....	35
6.6 Route Match Agent Algorithm	38
6.7 Ontology layer implementation	40
6.8 Database layer implementation.....	40
6.9 Social network module	40
6.10 Maps data Layer.....	41
6.10 Implementing the application using JADE	43
6.11 Summary	44
Chapter 7 Evaluation.....	45
7.1 Introduction.....	45
7.2 Evaluating the route match algorithm.....	45
7.3 MAS Simulation	46
7.4 Simulation Results	47
7.5 Summary	51
Chapter 8 Conclusion	52
8.1 Introduction.....	52

8.2	Discussion	52
8.3	Future work	54
8.4	Summary	55
References		56
Appendix A: JADE Architecture Overview		60
A.1	Introduction	60
A.2	JADE Architecture Overview	60
Appendix B: List of simulated users and their routes		63
B.1	Introduction	63
B.1	List of addresses for user simulation	63
B.1	List of simulated users and their routes	63
Appendix C: FIPA ACL Message Structure		69
C.1	Introduction	60
C.2	FIPA ACL message structure	69



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List of Figures

Figure 5.1: System architecture	26
Figure 5.2: Database Diagram	28
Figure 5.3: Store driver journey in system.....	29
Figure 5.4: Store passenger journey in system	30
Figure 5.5: Journey match process.....	31
Figure 6.1: Flow of agent behaviour.....	35
Figure 6.2: Haversine formula	39
Figure 6.3: Finding journey overlap	40
Figure 7.3: Rise is the number of optimal ride shares with number of simulated users	48



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List of Tables

Table 7.1: Optimal rideshare established for 50 users	47
Table 7.2: Number of rideshares against number of simulated users	48
Table 7.3: All possible dual member carpools for 100 users.....	50
Table 7.4: Carpool with 4 users	30
Table 7.5: Carpool with 3 users	51
Table 7.6: Carpool with 3 users	51



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