POLITECNICO DI TORINO

Dipartimento di Automatica e Informatica

PhD in Computer and Control Engineering

XXX cycle

Supervisor

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Models and methods for urban mobility and logistics

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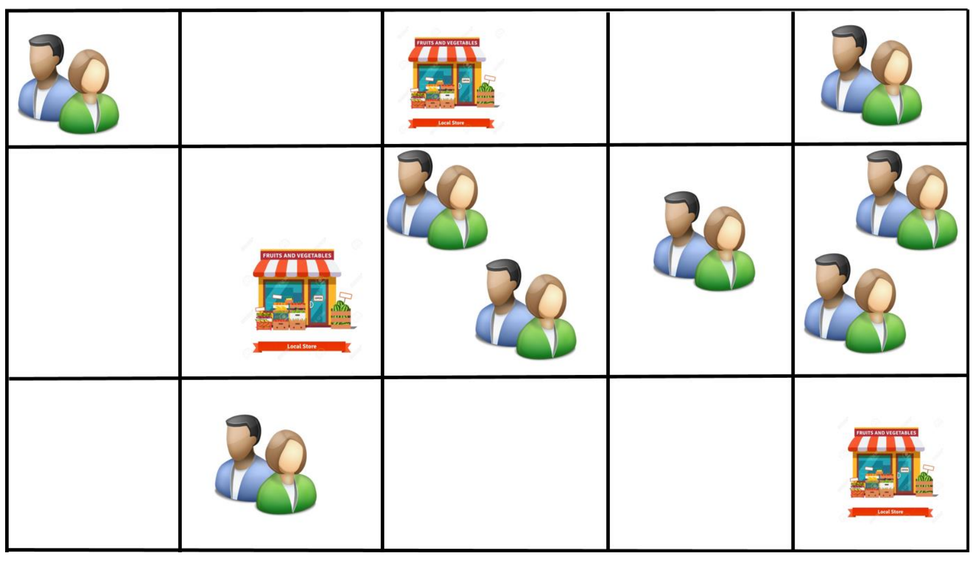
1. Introduction / Context

Due to high urbanization, traffic congestion and difficult delivery requirements (see e.g. e-grocery [2]) new delivery methods have been developed. One of these methods is crowd shipping.

A company uses crowdshipping if it asks to its users to deliver packages in exchange for a reward.

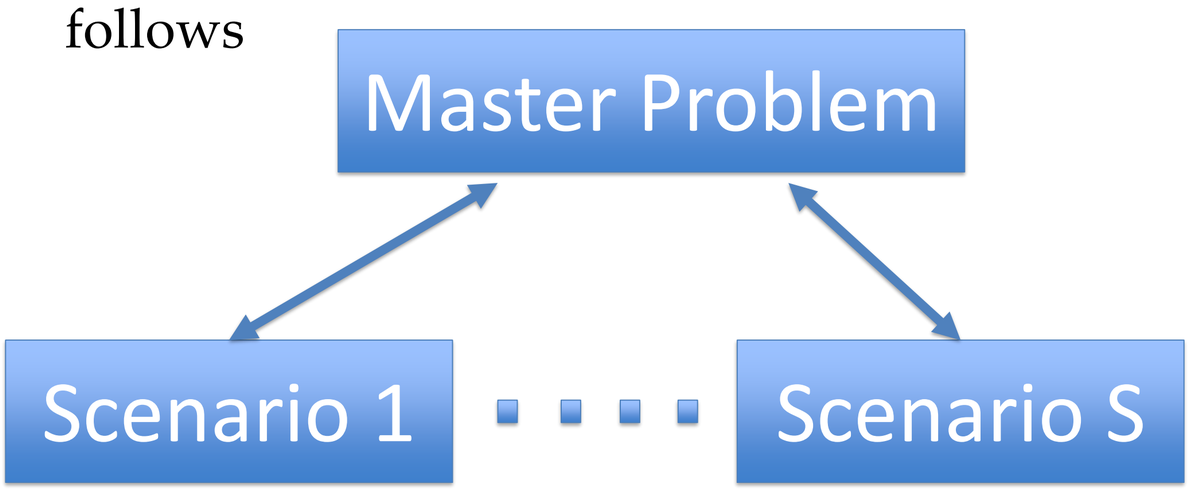


2. Goal / Objectives

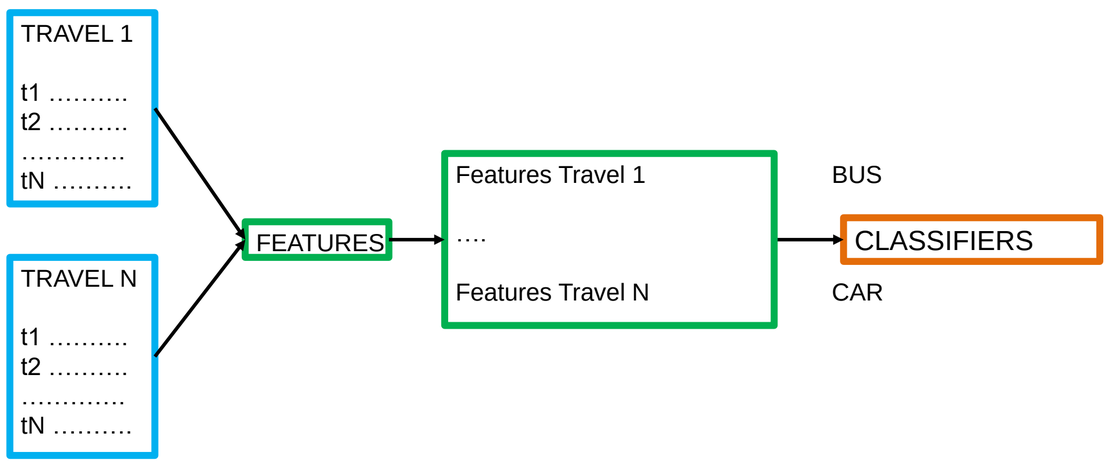
How to deliver all the packages by using the minimum amount of money.

3. Method

We defined a mathematical model (deterministic [1] and stochastic) of the problem. Nevertheless, if it considers more type of customers the optimal solution is difficult to find. For this reason we develop an heuristic that divides the problem as follows



Furthermore, in order to assign each package to each person, it is important to know which travel mode (CAR/BUS) has been chosen by each person. We have developed a classifier for doing such a task which architecture is shown in the following



4. Results

By using the aforementioned heuristic the running time of the optimization algorithm is compatible with a real application of the problem. Furthermore, the difference between the heuristic solution and the optimal one are less than the 5% in all the tested instances. Moreover, by using the above-mentioned classification architecture and by wisely choosing the features, we are able to detect the use of CAR or BUS with a precision of the 95%.

5. Conclusions

Due to the numerical experiments it is possible to claim that crowdshipping can be implemented effectively.

6. References

1. E. Fadda, D. Mana, G. Perboli, R. Tadei (2017). 'Multi Period Assignment problem for Social Engagement and Opportunistic IoT' 41th IEEE International COMputers, Software, and Application Conference (COMPSAC 2017), Torino, Italy, 4-8 July.
2. G. Perboli , E. Fadda, L. Gobbato, F. Perfetti, R. Tadei (2015). 'E-grocery and last mile logistics: do we need a supply-chain reference model?', 8th meeting of the Euro Working Group on Transportation 2015 (EWGT 2015), Deltf, The Netherlands, 14-16 July.