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Optimization Methods of Multimodal Travel Chains

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Abstract

The current scenario of mobility demands new and creative directions of transportation research, as it results in the economic development of a country. It shows pathway for increased passenger transportation. The journey time of passenger should be decreased and the quality of journey should be increased and the process of transportation should be optimized. In order to achieve the goals, an integrated approach need to be done as part of research. The Intelligent Transportation System gives invention in process of transport, which leads to the quality in transportation system. To help that step –by – step process is realized in those areas where it can function effectively. A detailed information services of transportation system need to be evaluated. With the help of evaluation the preference of passenger can be known. In order to satisfy the requirements of passenger, the optimization method can give information on how to plan a journey in the best way. With the development of optimization methods the service quality can be increased. Especially in urban areas where the increasing population is increased and therefore the more usage of transportation tends to create problem.

Keywords: *The Optimization method, Activity Chain, Mass transport System.*

1. Introduction

Having up to date ITS systems and high amount of data does not implies automatically, provide a better transportation system. In order to use ITS systems and available data efficiently, results from more research work have to be integrated optimization methods. Smart systems need to be generated which give solutions through different ways of transportation. A complex smart system includes personalization and adaptively which relates to the dynamically changing mobility demands of the users. The extended research contributes gives solutions with models, optimization strategies and systems of advanced information services based. As a result the travel information is known, which help to determine travel behaviour and personalize activity chains. With the generation of personalized journey chain an optimum defined travel time can be obtained. High quality transport services can be provided through planning and realization of smart solution system.

The technological development and changing journey needs, which are used by society, there lays new scientific challenges towards researchers. The capacity of transportation system is limited, the increase of mass transport is primarily obtained by share of public transportation system. Passenger tends to choose public transport, if they experience high quality transport. To reach this goal prevention need to be taken. The research focus on the improvement of transport features, like information and time. This can be gained by the implementation of evaluation of results of information services. The optimization is performed by developing optimization methods regarding activities and journey trip. Where utility is the function of total travel time. The order of each passenger is set with consideration, maximum number of trips with least travel time.

2. Objectives

The aim corresponds to management strategic objectives. Which prefers the development of integrated planning of travel chains. The below structure was created as part of solution in integrated systematic approach. Research aim was to extend method for evaluation of multi modal journey planners. Research aimed to analyse differences and similarities of user groups regarding the evaluation aspects of multimodal journey planners. Research main objective is investigate the new application of new survey method to measure the weights regarding main aspects of passenger groups. Research goal was to develop such an optimization method for daily activity chains which can identify travel chains so travel time is reduced. Research is to define and divide parameters of activity chains. Goal is to identify the utility function of activity chain optimization and to model such a system architecture, which includes the operational model of an application to be realized.

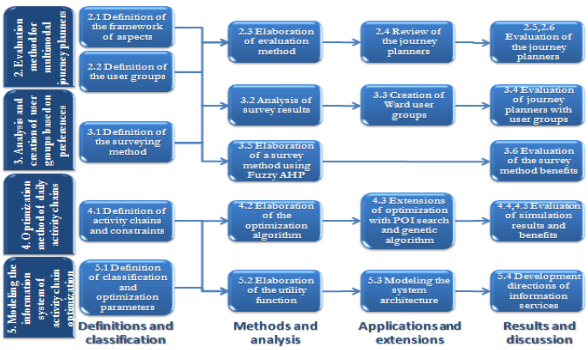

Fig.1 Structure of the dissertation

3.Optimization Methods

The travel information aspects were collected and assessed from the passenger perspective. The evaluation of multimodal journey planners was performed in two main steps. For the scoring step the Multi-Criteria Analysis (MCA) was adapted and executed, because it produces clear and well-comparable results. The weighting, as a second step, was introduced in order to take into consideration different preferences of the passenger groups

The Ward method was used to create new user groups. The user groups have higher similarity considering the answers of their members regarding aspects of journey planners. Thus it is easier to develop new targeted features for user groups with similar answers. This analysis provides as an output a number of clusters or groups, in which the users are classified

The Analytic Hierarchy Process (AHP) is an effective tool for setting priorities among different alternatives . Using AHP I introduced a new survey method, which provides consistent results. With the Fuzzy AHP method I defined weights of aspects regarding journey planners in a consistent way.

The Genetic Algorithm (GA) was applied to compute all possible combinations of flexible demand points. The calculation was implemented in Matlab simulation tool. The alternative demand points were searched by Overpass API, if there are flexible demand points. The travel time matrix is calculated using Google API queries between demand points for all possible activity chains

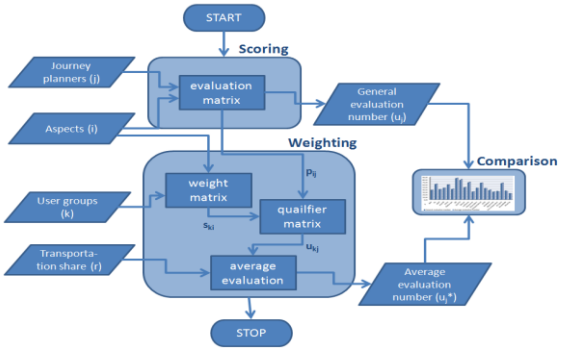

Fig 2 Process of the evaluation of multimodal journey planners

Conclusions

The results of the research are applicable both in the scientific and the practical field. The elaborated methods. The idea of the elaboration method for multimodal journey planners originates from an initiative of the European Commission in 2011, when the best multimodal journey planner was sought, but no quantitative calculation method was behind it.

References

Esztergár-Kiss D. (2012) Optimization *of multimodal travel chains in the passenger transpor*t, International Transport Conference for Engineers and PhD Students, Budapest, Hungary, 19.06.2012, pp. 21-24. ISBN: 978-963-313-069-8

Esztergár-Kiss D., Scissor Cs. (2012) *Analysis of multimodal journey planners using a multi-criteria evaluation method,* 19th ITS World Congress, Vienna, Austria, 22-26. October 2012, Paper EU-00662

Esztergár-Kiss D., Crissa Cs. (2012) Közforgalmú Vol. LXXII. No. 6, pp. 21-31., ISSN 0023-4362 *

Esztergár-Kiss, D. (2012) *Journey planners – comparison and evaluation, Second Workshop on Transport, Vehicle and Logistics* TVL-2, Budapest, Hungary, KJK2012-2-K7, pp. 1-10., ISBN 978-963-313-070-4

Esztergár-Kiss D., Crissa Cs., Kózel M., Tóth J. (2013) *Vales idejű utastájékoztatás mobil eszközön, Transportation Science Conference (Közlekedéstudományi Konferencia Győr) 2013*. Győr,Magyarország, 2013.03.21-2013.03.22, pp. 35-47.,ISBN: 978-615-5298-09-07

Esztergár-Kiss D., Válóczi D. (2013) *Method for the Organization of Daily Activity Chains, Proceedings of the 3rd International Conference on Models and Technologies for Intelligent Transportation Systems 2013*, TUDpress Verlag der Wissenschaften Dresden, Dresden, Germany, 02.12.2013-04.12.2013., pp. 47-55., ISBN: 978-3-944331-34-8

Esztergár-Kiss D., Serres A., Caesar B. (2014*) Evaluation of journey planners based on survey data, WIT Transactions on Ecology and the Environment, The Sustainable City IX, Volume 191, pp. 839-850*., ISBN: 978-1-84564-820-6, DOI: 10.2495/SC140712

Esztergár-Kiss D., Válóczi D. (2014) *Tevékenységi láncok szervezésének elméleti modellje, 4th Transportation Science Conference for Engineers and PhD* (4. Közlekedéstudományi hallgatói és PhD konferencia), Budapest, Hungary, 25.06.2014, pp. 73-77., ISBN: 978-963-313-131-2

Caesar B., Esztergár-Kiss D. (2014) Utascsoportok statisztikai elemzése kikérdezéses adatok alapján, MMA Symposium 2013: Innovation and Sustainable Surface Transport Conference (Innováció és Fenntartható Felszíni Közlekedés Konferencia IFFK), Budapest, Hungary, 2014.08.25-2014.08.37, Budapest, Paper 16, pp. 87-92., ISBN: 978-963-88875-3-5

Esztergár-Kiss D., Caesar B. (2015) User group evaluation based on survey data, Transportation Research Procedia, Vol. 10, pp. 256-265, DOI: 10.1016/j.trpro.2015.09.075