Mamdaniís Fuzzy Inference System as a tool for multimodal split modelling

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This paper presents results of applying Fuzzy Inference System for estimation of the number of potential Park and Ride users.

Usually it is difficult to evaluate the number of users because it depends on human factor and data in the considered system are uncertain. In such situation the traditional mathematical approaches can not take into consideration rough data.

Therefore a fuzzy approach can be applied in this case. A fuzzy methodology is treated as a proper way to describe choice of mode of transport, and especially that uncertainty accompanied of choosing process has rather fuzzy character. The proposed approach is based on the Mamdani Fuzzy Inference System and for calculation there is used Matlab software with Fuzzy Logic Toolbox.

Mamdani model requires, as an input data, knowledge of the shape of membership function. These functions can be calibrated taking into consideration results of questionnaires conducted among users of Park and Ride system. Due to lack of representative sample of users, one has decided to use results of expertsí questionnaires as a input data for calibration the shape of membership functions. Describing factor will be generalized cost of the trip for different modes of transport. Proposed approach consists of two main stages: modeling of share of public/private transport trips and Multimodal model estimating number of Park and Ride users.

Verification of presented methodology is treated as an indirect proof. Proposed approach can be applied for estimation of bi-modal split. Then the results are compared with traditional approaches based on logit functions. Comparable results of proposed fuzzy approach with traditional logit models can be treated as a confirmation of chosen methodology.