Drawing a random number

Random numbers are used for a great variety of applications in almost any field of computer and economic sciences today. Examples range from stock market forecasting in economics, through stochastic traffic modelling in operations research to photon and ray tracing in graphics. The construction of a model or a solution method requires certain characteristics of the random numbers used. This is usually a distribution classification, which the sequence of random numbers must fulfill; of these some are very hard to fulfill and others are next to impossible. Today mathematics allows us to transform distributions into others with most of the required characteristics. In essence, a uniform sequence which is transformed into a new sequence with the required distribution. The subject of this article is to consider the well known highly uniform Halton sequence and modifications to it. The intent is to generate highly uniform multidimensional draws, which are highly relevant for today’s traffic models. This paper shows among others combined shuffling and scrambling seems needless, that scrambling gives the lowest correlation and that there are detectable differences between random numbers, dependent on their generation.

The AKTA roadpricing experiment in Copenhagen

Sensitivity of variable definitions in sp-analyses - An empirical study of car-users’ evaluation of length, cost and time components.

Impact of a priori Distributions on Mixed Logit Model Estimation. Tests on Synthetic Data
Sensibility of Variable definitions in SP-analysis. An empirical study of car-users, evaluation of length, cost and time

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Discrete Choice Models - Estimation of Passenger Traffic
This thesis gives an overview of what has been done in the research area of passenger transport modelling, with a focus on the model type in the core of a model complex. After a formulation of the choice problem (choice probability, the set alternatives), a method for estimation and requirements for data, a literature review follows. Models applied for estimation of discrete choice models are described by properties and limitations, and relations between these are established. Model types are grouped into three classes, Hybrid choice models, Tree models and Latent class models. Relations between model, data and estimation are described, with a focus of possibilities/limitations of different techniques.

Two special issues of modelling are addressed in further detail, namely data segmentation and estimation of Mixed Logit models. Both issues are concerned with whether individuals can be assumed 'homogeneous', that is, can be described by the same model (fixed coefficients). First, a new method for data segmentation is proposed, which segments data by individual preferences. Segmentation by individual preferences will diminish the severity of the assumed homogeneity of individuals (assumed for estimation of choice models). For application of the method an algorithm is provided with a case.

Also for the second issue, estimation of Mixed Logit models, a method was proposed. The most commonly used approach to estimate Mixed Logit models, is to employ the Maximum Simulated Likelihood estimation (MSL), which simultaneously finds optimal coefficients values (utility elements) and parameter values (distributed terms) in the utility function. The shape of the distributed terms is specified prior to the estimation; hence, the validity is not tested during the estimation. The proposed method, assesses the shape of the distribution from data, by means of repetitive model estimation. In particular, one model was estimated for each sub-sample of data. The shape of distributions is assessed from between model comparisons. This is not to be regarded as an alternative to MSL estimation, rather as a complimentary test to
assess the shape of distribution prior to a MSL estimation.

The method is tested on synthetic data where different shapes of distribution are assumed for distributed terms. Differences in choice of alternative are asserted for different distributions and MNL estimation is seen to have some difficulty in explaining the choice of alternative. For the MSL estimation, some problems with the traditional determination of which shape of distribution to employ, are demonstrated. Further, all tested distributed terms (different shape of distribution) were significant; neither of these distributions were superior to the others. The proposed method for determination of shape of distribution, was able to recover the ‘correct’ shape of distributions and to pinpoint which term had the highest level of variance and therefore seems very promising. Following the method was applied to ‘real’ data, where distribution of coefficients were found. All the shapes of distributions found, complied with sound knowledge in terms of which should be uni-modal, sign specific and/or skewed distributions.

The thesis concludes by summing up the results and recapturing the areas where further research is needed.

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