ADVERTISING BUDGET OPTIMIZATION BASED ON STATISTICAL LEARNING AND EVOLUTIONARY COMPUTATION

Ying Sun[1], Zhizhong Mao[1], Mitsuo Gen[2], Gaofeng Zheng[3]
and Runwei Cheng[3]

[1]School of Information Science and Engineering
Northeastern University
No.11, Lane 3, WenHua Road, He Ping District, Shenyang, 110004, P. R. China
sunstonelz@gmail.com; maozhizhong@yahoo.com.cn

[2]Graduate School of Information, Production and Systems
Waseda University
2-7, Hibikino, Wakamatsu, Kitakyushu 808-0135, Japan
gen@waseda.jp

[3]JANA Solutions Inc.
Minatoku, Tokyo, Japan
zhenggf@jana.co.jp; crw@jana.co.jp

ABSTRACT. *With the expenditure proliferating and an ever-growing competitive marketplace, companies have given more attention to optimizing their advertising budget. Advertising budget problem appears such as how to determine the total budget level for an advertising campaign. In this paper, an optimization method is proposed to deal with the advertising budget problem of mixed-media advertising. Different from the existing methods which take the maximal advertising effect as objectives, the proposed method formulates advertising budget problem as a nonlinear programming problem with the objective of minimizing advertising budget under the constraint on response goal achievement. A novel media mix model is constructed to deal with the duplication among selected media. Furthermore, a Bayesian estimation method dedicated to parameterizing the media mix model is proposed. A genetic algorithm is adopted to find the optimal solution of advertising budget problem. Finally, a case study on real project is presented to illustrate the effectiveness and efficiency of the proposed method.*
Keywords: Advertising budget, Media mix, Bayesian estimation, Optimization

1. **Introduction.** Recently, companies allocate more money on advertising to increase their sales and then gain more profits. Consequently, advertising budget has become more important and led to stricter financial control [1]. Advertising budget of a business typically grows out of the marketing goals or objectives of a company. Once an advertising objective has been decided, developing such a budget concerns with the problem of determining how much should be spent to achieve a desired level of sales in a given period [2].

There exist several general methods for the determination of advertising budget. These methods can be usefully classified as either primarily judgement-oriented methods or primarily data-oriented methods [3-8]. Most of the general methods use some rules of thumb or just give the criterion of determining the advertising budget. Hence, whether the determined budget is optimal is unknown. In the past few decades, considerable researches have focused on how to allocate a fixed advertising budget to maximize the effect of advertising. However, only a few researches investigated the issue of how to decide an optimal advertising budget [9-16].