

Artificial Bee Colony Algorithm for Solving Shelf Space Allocation Model

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Abstract

Retail shelf space is one of the most precious resources in retail chains. The proper product assortment is conducted by figuring out which product to be displayed to maximize the revenue. Moreover, deciding the location and the amount of shelf space assigned for each displayed product critically affects the overall performance of the retail chains. This study introduces a mathematical model to optimize the retail revenue by manipulating the above decisions while considering products' cross-elasticity on the demand. Unlike the majority of the previous studies, the space allocated to each product is considered as a continuous variable that has a lower bound of one product faces not as multiples of it. The resulting model, a NP-hard one, is solved using an adaptive meta-heuristic algorithm based on artificial bee colony (ABC). Numerical examples are used to illustrate the performance superiority of the proposed adaptive ABC over the basic one to achieve an optimum or a near optimal solution to the model.

Keywords

Retailer Shelf space; Assortment; Space allocation; Artificial bee colony; ABC optimization parameters

Biographies

Gamal Nawara is an emeritus professor at the Industrial Engineering Department, Faculty of Engineering, Zagazig University; Zagazig, Sharkia, Egypt. He received his B.Sc., from University of Ain Shams, Egypt 1963 in Mechanical Engineering and Ph.D., from University of Leipzig, Germany 1969 in Industrial Engineering. Prof. Nawara has several distinguished activities in the field of industrial engineering. He is a planner, evaluator and coaching projects, project manager, and trainer in several projects. In the last decade, he has focused on Development of Small and Medium Enterprises. He is also a member in number of Supreme council of Egyptian universities. Prof. Nawara has more than 50 articles on different industrial engineering topics.

Mohamed Grida is an assistant professor of Industrial Engineering at Zagazig University. He holds a MSc. degree in industrial engineering from the American University in Cairo and a PhD from the Zagazig University. He worked as a visiting researcher in Hong Kong University of Science and Technology. His research interests include modeling and optimization of supply chain systems, containers logistics systems, and retail systems.

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