Dokuz Eylul University
Industrial Engineering Department
Fifth Departmental IE/OR Mini Conference

08-09 January 2014
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ÖZETLER

(1)
Integrated Production Scheduling and Distribution Planning in Dairy Supply Chain By
Hybrid Modelling
Doç. Dr. Bilge BİLGEN

In this paper we address the production scheduling and distribution planning problem in a yoghurt production line of the multi-product dairy plants. A MILP model is developed for the problem. The objective function aims to maximize the benefit by considering the shelf life dependent pricing and several cost components. Several key features of the industry are included. The hybrid modelling approach is adopted to explore the dynamic behavior of the real world system. The efficiency of the proposed model is demonstrated in a case study for a leading dairy manufacturing company in Turkey.

(2)
A Rule Based Constructive Randomized Search Algorithm for Solving ALWABP
Araş. Gör. Şebnem DEMİRKOL AKYOL

ALWABP is a special case of the ALBP, in which task execution times are worker-dependent. Since task times are dependent on the worker, who executes the task, the concept of assigning works to workers is occurred in additional to the ALBP. In other words, ALWABP is a double assignment problem (tasks to workers and workers to stations). We propose a rule-based constructive randomized search algorithm for solving ALWABP. Moreover, we calculate the ergonomic risk factors for the ALWABP and propose some a preemptive goal programming approach to reduce the risk level.

(3)
A Hybrid Complete Rescheduling Approach for Dynamic M Identical Parallel Machine
Scheduling Problem with a Single Server
Araş. Gör. Alper HAMZADAYI

We address the dynamic m identical parallel machine scheduling problem that considers random job arrivals and machine breakdowns. The setup operations are performed by a single server and setup times are sequence-dependent. To deal with the dynamic nature of the problem, a hybrid rescheduling policy that reschedules the system immediately when an unpredictable event occurs, otherwise reschedules periodically is adapted to tackle the changing environment of the system. Unpredictable events are defined as machine breakdown, machine repair as critical events. A multi-objective performance measure which simultaneously considers schedule efficiency and schedule stability is developed to test the performance of the proposed approaches.
A Fuzzy Multi-objective Linear Programming Model for Biomass to Energy Supply Chain Design
Araş. Gör. Şebnem YILMAZ BALAMAN

The increasing shortages of fossil fuel resources and global warming have resulted in environment-friendly energy production systems gain importance. Improper disposal of wastes cause environmental problems that threat human health. In accordance with these facts, constructing biomass to energy conversion systems is vital in gaining economical and environmental benefits. The aim of this study is to design an effective biomass to energy supply chain network by tackling inherent uncertainties. To this aim, a fuzzy multiobjective mixed integer linear programming model is constructed. The model includes environmental and monetary objectives and it is structured as a multiperiod model.

A Hybrid Metaheuristic Algorithm for Cardinality Constrained Portfolio Optimization
Araş. Gör. Gonca YUNUSOĞLU

In this study, a new hybrid metaheuristic algorithm that combines greedy randomized adaptive search procedure (GRASP) and differential evolution algorithm (DE) is proposed to solve cardinality constrained portfolio optimization problem. The proposed algorithm utilizes GRASP to select desirable stocks and then, determines best proportions for them by using DE algorithm. The performance of the proposed algorithm is evaluated by using benchmark data sets available from the OR Library. The computational results reveal that the proposed algorithm outperforms the most sophisticated algorithms in the related literature.

A Constrained Fuzzy Arithmetic Based Approach for Solving Fully Fuzzy Transportation Problems
Araş. Gör. Kemal SUBULAN

Most of the existing methods for solving fully fuzzy mathematical programs are based on the standard fuzzy arithmetic operations and/or Zadeh’s extension principle. These methods may produce questionable results for many real world applications. Due to this fact, a new method which is based on the constrained fuzzy arithmetic (CFA) concept is proposed. The proposed method is also able to take into account decision maker’s attitude toward risk. Different types of balanced and unbalanced fully fuzzy transportation problems are generated and solved in order to illustrate the efficiency of the proposed approach. The obtained solutions are also compared with other methods available in the literature. In contrast to the compared methods, the proposed method maintains information efficient and applicable results since taking into account the supplementary information represented by the requisite constraints. It was also shown that more reliable and necessarily precise solutions can be generated by the proposed approach for a risk-averse decision maker.
(7)

A Hybrid Genetic Algorithm Based Approach for the Economic Lot Scheduling Problem
Araş. Gör. Çağla CERGİBOZAN

Economic Lot Scheduling Problem (ELSP) is a well-known problem which arises in scheduling operations. In the literature, most of the research on this problem has focused on approximating the optimal schedule. In this study, the ELSP is examined with a metaheuristic approach. A genetic algorithm with an improvement procedure is proposed for the ELSP. After implementation, evaluation of the results is made and the study is concluded.

(8)

Dynamic Loading of Heat Treatment Furnaces: A Constructive Based Online Optimizer
Araş. Gör. Fehmi Burçin ÖZSOYDAN

There is a wide range of publications reported in the literature, considering static case of well-known optimization problems. However, most of the real-life problems have indeed a dynamic nature arising from uncertainty of future events. Studies in the literature studies published so far are unable to address easily applicable approach when dynamic events affect problem domain such as arrivals/cancellations of decision variables or change of feasible search space. This paper proposes a novel approach, which can handle with both domain and parameter based changes on dynamic combinatorial optimization problems. This approach is expected to contribute to this lacking part of dynamic optimization research area.

(9)

A Local Search Algorithm for Vehicle Routing Problem with Mixed Pickup and Delivery Service
Araş. Gör. Mustafa AVCI

The Vehicle Routing Problem with Mixed Pickup and Delivery (VRP) where each customer has either pickup or delivery demand. The common assumption that goods may only be picked up after all deliveries have been completed is not made here. The VRPMPD is known to be NP-hard because it generalizes the VRP which is a well-known NP-hard combinatorial optimization problem. In this study, a local search solution approach is developed for the VRPMPD. In this local search methodology, we use a non-monotone threshold strategy which diversifies the search process while the Variable Neighborhood Descent (VND) algorithm is used for intensification. The proposed approach was tested on well-known VRPMPD benchmark instances derived from the literature. The computational results indicate that the proposed algorithm produces high-quality solutions to the problem instances.
An Evidential Reasoning Approach to Decision Analysis
Araş. Gör. İlker GÖLCÜK

Multiple Attribute Decision Making (MADM) involves elicitation of several kind of information such as criteria weights, preferences of decision maker, and the concordance and discordance thresholds etc. Information involved in decision processes generally exhibits imprecision and uncertainty. Evidence theory, known as Dempster-Shafer theory and belief functions theory, is a sort of uncertainty theory, deals particularly with the imperfect knowledge and ignorance. In this study, evidence theory is very briefly introduced and its possible applications are discussed. Theoretical advancements and its applicability on the production and service environments are analyzed. Promising developments such as expressing belief and plausibility measures in terms of interval valued type-2 fuzzy sets are revisited and discussed.

A New Design of Mathematical and Constrained Programming for the Cyclic Flow-Shop Robotic Cell Scheduling Problem Considering Multiple Robots
Atabak ELMİ

This paper addresses the robotic scheduling problem in blocking hybrid flow shop cells that consider multiple part types, unrelated parallel machines, multiple robots and machine eligibility constraints. Initially, a mixed integer linear programming (MILP) model is proposed to minimize the makespan for this problem. Due to the complexity of the model, a simulated annealing (SA) based solution approach is developed for its solution. To increase the efficiency of the SA algorithm, a new neighborhood structure based on block properties is applied. The performance of the proposed SA is assessed over a set of randomly generated instances. The computational results demonstrate that the SA algorithm is effective with the employed neighborhood structure. Additionally, this study shows that the appropriate number of robots depends on the sequence of processing operations to be performed at each stage.

Perishable Inventory Management and Dynamic Pricing
Araş. Gör. Elif DOĞDU

The benefits of dynamic pricing methods have long been known in industries, such as airlines, hotels and electric utilities, where the capacity is fixed in the short-term and perishable. But we consider the problem of inventory management of perishable products which are called Consumer Package Goods. In recent years, there has been an increasing adoption of dynamic pricing policies in retail and other industries as well, where the sellers have the ability to store inventory. The problem is to maximize the retailer's profit. We first formulate the problem as a deterministic non-linear mixed integer program. The NMIP is a complex discrete optimization problem. Its solution by exhaustive enumeration schemes such
as branch-and-bound is time consuming and usually does not guarantee a good solution in reasonable time. So we proposed using meta-heuristics to solve this type problem. Firstly, we modeled a perishable inventory problem and then we solved this problem using Particle swarm optimization.

(13)
Fuzzy version of linear assignment problems for MCDM: A case study of multi-criteria ABC analysis for spare parts in a textile firm
Araş. Gör. Fatma Selen MADENOĞLU

In this study, we present a fuzzy version of linear assignment problem in a textile firm for multi-criteria ABC analysis of the spare parts that improves on this approach by accounting for additional criteria, such as durability, availability, replenishment time and criticality of stock keeping units, thereby providing more managerial flexibility. The ranking of alternatives under uncertainty can be assisted the decision maker with this method to evaluate the alternatives and the criterias and in the decision process determine with the linguistic terms the effect of the decision-makers make the decision process more realistic.

(14)
An Adaptive Network Based Fuzzy Inference System for Modelling Biogas Production Process at a Wastewater Treatment Plant
Halil AKBAŞ

The aim of this study is to model the biogas production process at a wastewater treatment facility by using Adaptive Neural Fuzzy Inference System. Since it is the first study in this subject to encourage the widespread use of biomass as an alternative energy source in Antalya, the study has an importance. Modern modeling techniques, such as Adaptive Neural Fuzzy Inference System and Evolutionary Algorithms, are capable tools for optimizing the plant operation and for assisting in the decision-making process at wastewater treatment plants. They are going to be taken into consideration in detail at the thesis study.

(15)
Vehicle Routing Problems with Backhauls
Gül ÖZKAN ÖZDAĞ

Capacitated Vehicle Routing Problem (CVRP) can be defined as; \( m \) vehicles initially located at a depot are to deliver discrete quantities of goods to \( n \) customers in case of determining the optimal route by using capacitated vehicles and satisfying every customer demand. In this thesis, Vehicle Routing Problem with Backhauls is used, which is an extension of the Capacitated Vehicle Routing Problem. The customers' set is divided into linehaul and backhaul customers. Our application consists of two parts; first part we apply correspondent mathematical programming and second part we apply a hybrid metaheuristic combining Genetic Algorithm and Simulated Annealing.
Design and Evaluation of Sustainable Supply Chain Networks
Pelin YILDIRIM

Literature on inventory management problem
 Çağatay GÜNDÜZ

Supply chain network design for perishable products
Ayşe Emel BİRİCİK

Applications of management engineering for disaster management in Turkey
Yunus Emre ERGENÇ

The presentation aims to give information about description of disaster, disaster management, phases of disaster management and as an application Izmir Provincial Disaster Plan. The study includes the information on natural disaster for Turkey presented in conference is taken from EM-DAT: The OFDA/CRED International Disaster Database and illustration of total pin map of Turkey about total distribution of natural disaster. Future researches de.ne .Resource allocation for emergency after disasters in Izmir.and .Stochastic inventory model for Turkish Red Crescent Society.