The facilities design problem, which is concerned with assigning n facilities to n locations, has drawn the attention of many researchers. Enumeration of all possible alternatives is not possible even for problems of moderate size. This has led to the development of sub-optimal procedures which produce reasonably good solutions with less computational effort. The important aspects of solution to such problems are: selecting the proper facility for the exchange procedure, incorporating the exchange at appropriate stage and specifying the stopping rule.

This paper deals with a procedure which selects the facility, which contributes maximum towards the assignment cost, for the exchange routine. The exchange producing the maximum cost reduction is retained for the next cycle. The whole procedure is stopped according to the computational restrictions. The authors further investigate the possibility of reversing the selection procedure for the exchange routine, the timing of exchange and the stopping rule. Comparative evaluation of these two approaches have been made with respect to the solution quality and computational effort.

15Ma *Implications et Heuristiques en Combinatoire*
(National Contribution of FRANCE)

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The full paper was selected to be printed in the proceedings.

On étudie dans cette note le rôle des conditions suffisantes d'optimalité en combinatoire. On s'intéresse particulièrement aux conditions suffisantes d'optimalité partielle. Elles permettent d'abord de fixer certaines variables ou de restreindre fortement leurs domaines de variation. Elles permettent ensuite d'aider à fixer les variables restantes en minimisant le risque de s'écarter de la solution optimale.

15Mb *A Fast Algorithm for Optimal Sequencing*

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The proposed algorithm solves the following sequencing problem of quadratic assignment: Given a non negative (nxn)-matrix A minimize the function

$$p \to \sum_{i>j} a_{p(i),p(j)}$$

where p is a permutation of the numbers 1,2,...n. The algorithm has the following features: It is based on network methodes, it is fast and it yields the exact solution in the case that the matrix A has the following property: For the optimal permutation P_0 has $a_{p(i),p(j)} \leq a_{p(j),p(i)}$ for all i>j.

The algorithm operates in such a way that the set I of indices

under the main diagonal of A, i.e. $I = \{(i,j): i>j\}$, is considered. This set is successibely decomposed into disjoint rectangles $R_1, R_2, \ldots, R_r$ covering the whole set I. Each rectangle R_k is chosen in such a way that it has a minimal sum of entries a_{ij} with $(i,j) \in R_k$-minimal in respect to a certain submatrix of A depending on the step of the algorithm. The entry sum of the rectangle R_k can be regarded as a cut in a related network. So to determine this rectangle means to solve the problem to find a cut in the network with minimal capacity in respect to all cuts in the network. This problem can be solved efficiently by solving a number of max-flow-problems where the number is of order n. This implies that the proposed sequencing algorithm works fast. An application of the algorithm yields the exact solution to the travelling salesman problem for special cases.

15Mc *A Fuzzified Pattern Method*

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The PATTERN method is recognized as the integrated application of relevance tree technique to normative forcasting. The method has a lot of merits when studying complex problems, while it has some defects as follows; 1) The procedure of how to construct a relevance tree is not clarified. 2) Any tests on methods are not proposed to measure the adequacy of relevance tree. 3) Too much issues must be required in order to express detail of subobjects. 4) Too much time is needed to construct and evaluate the relevance tree. 5) Too much cost is required to construct the relevance tree and to evaluate issues.

The basic point that induces these difficulties is that the PATTERN method is based on the reductionism. In order to avoid it, we try to introduce fuzzy set concept. This trial will be reasonable because the evaluating process in the PATTERN method is considered as fuzzy treatment in itself. The object on some level is expressed by a fuzzy set and the grade of an issue belonging to a fuzzy set is expressed by a membership function. Thus two methods are compared from several points of view and some properties are clarified in our paper. The relevance number of issue, total relevance figures, reversibility of evaluating issues through levels etc. are considered by comparing two methods. For a numerical example, random digit experimentation is tried in order to compare the two methods.

Operational Research '81

Ninth IFORS International Conference
on Operational Research

Hamburg, Germany, July 20–24, 1981

Neuvième IFORS Conférence Internationale
de Recherche Opérationnelle

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ABSTRACTS

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IFORS '81: O.R. in the Interest of International Cooperation

Survey of Sessions

	Monday, July 20, 1981				Tuesday, July 21, 1981			
Stream	9.00 11.30	11.30 12.00	A 14.00 15.30	B 16.00 17.30	C 9.00 10.30	D 11.00 – 12.30	E 14.00 – 15.30	F 16.00 – 17.30
1. O.R. in Organizations	Opening Plenary Session R. Cyert (U.S.A.) Future Direction for Operations Research	Opening Ceremony HORSE — Hamburg O.R.-Software, O.R.-Solutions, O.R.-Systems Exhibition	**Mainstream Session: Multinational Enterprises** (H. von Falkenhausen)		**Workshop: Multinational Enterprises** (H. von Falkenhausen)		**Mainstream Session: Modelling for Decision Making in Organizations** (B. Roy, J. L. Le Moigne)	
2. O.R. in Developing Countries			**Workshop: Introduction and Promotion of O.R.** (O. Carlsson et al.)				**Mainstream Session: O.R. in Developing Countries** (A. N. Elshafei)	
3. O.R. in the World				O.R. in Asia	**Technical Session: Technical O.R. in China** (Ku Chi Fa)			
4. O.R. in the Public Sector				O.R. in the Public Sector	**Mainstream Session: Regional Planning and Infrastructure** (F. Hanssmann)		**Workshop: Regional Planning and Infrastructure** (F. Hanssmann)	
5. Decision Analysis Multiple Objective Programming			**Technical Session: Decision Analysis** (R. L. Keeney)		**Technical Session: Multiple Objective Programming** (J. Spronk, W. Dinkelbach)			
6. Mathematical Programming							**Technical Session: Redundancy in Math. Programming** (S. Zionts, J. Telgen)	
7. Locational Problems Transport			**Technical Session Air and Railroad Transport** (T. Hasegawa)		**Technical Session: Planning and Urban Transportation** (O. Saatcioglu)		Transport Systems	
8. Production Management			**Workshop: Resource Allocation Problems** (J. Weglarz)				**Technical Session: Production Management** (L. F. Gelders)	
9. Graphs and Networks			Networks and Linear Programming		Graph Theory	Networks		
10. Energy								Energy Planning
11. Finance							Investment	
12. Simulation and Modelling			Simulation I	Simulation II	**Workshop: Validation Models and Assessment** (S. I. Gass)			Model Building
13. Games, Queues Markov Processes			Games I	Games II	Queueing Problems I	Queueing Problems II	Markov Processes	
14. O.R. Applications			O.R. Evolution	O.R. and Ecology	Medical Applications	Food Industry		
15. Mathematical Techniques			**Workshop: New Results in Forecasting** (E. F. Kasper)					Maintenance
16. Engineering, Informatics Optimization							Engineering Problems	Optimization Techniques

IFORS '81: 120 Sessions, 350 Papers

IFORS '81: O.R. in the Interest of International Cooperation

Survey of Sessions

Thursday, July 23, 1981				Friday, July 24, 1981			
G	H	I	J	K	L	M	
9.00–10.30	11.00–12.30	14.00–15.30	16.00–17.30	9.00–10.30	11.00–12.30	14.00–15.30	16.00
Mainstream Session: World Societal Problems (R. Tomlinson)		**Workshop: Modelling for Decision making in Organizations** (B. Roy, J. L. Le Moigne)		**Workshop: World Societal Problems** (R. Tomlinson)		Decision Making	Closing Plenary Session J. Lesourne (France): From Operations Research to Systems Analysis. A Change in Vocabulary or a New Conceptual Framework?
Workshop: O.R. in Developing Countries (A. N. Elshafei)				**Workshop: Energy – Economy Modelling for Developing and Industrializing Countries** (J. E. Samouilidis)			
				O.R. in Europe			
Economic Planning	National Economics	Water Supply	Economics				
				Multicriteria Decision Making	Multiple Objective Programming	Utility Theory	
Technical Session: Integer Progr. and Combinatorial Optimization (M. Gondran)		**Technical Session: Linear and Non Linear Programming** (U. Eckhardt)			Large Scale Programmes	Mathematical Programming	
Mainstream Session: Locational Models (D. Erlenkotter)		**Workshop: Locational Models** (D. Erlenkotter)		Location Problems			
Resource Allocation	Production Processes	Scheduling	Production Planning	Inventory Control	Cutting Stock Problems		
Technical Session: Computational Complexity and Heuristics (J. Lenstra)				**Technical Session: Graphs and Networks** (D. de Werra, F. Maffioli)		Routing Problems	
Mainstream Session: Energy Planning Models (P. Meier)		**Workshop: Energy Planning Models** (P. Meier)					
Workshop: Financial Planning in an Insurance Business (H. Goovaerts)				**Technical Session: Planning in Financial Institutions** (J. M. Williamson)			
		Technical Session: Simulation (R. G. Sargent)					
				Workshop: Military O.R. (J. D. Kettelle)		Military Applications	
Logistics	Statistics	Fuzzy Sets	Facilities Layout Problems			Combinatories and Assigment	
		Informatics	Optimization				

Hamburg, Germany, July 20–24, 1981