

An approach integrating k-means and NSGA2 for a cost-minimization and reliability maximization problem

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Cheng-Ta Yeh, Ph.D., Associate Professor

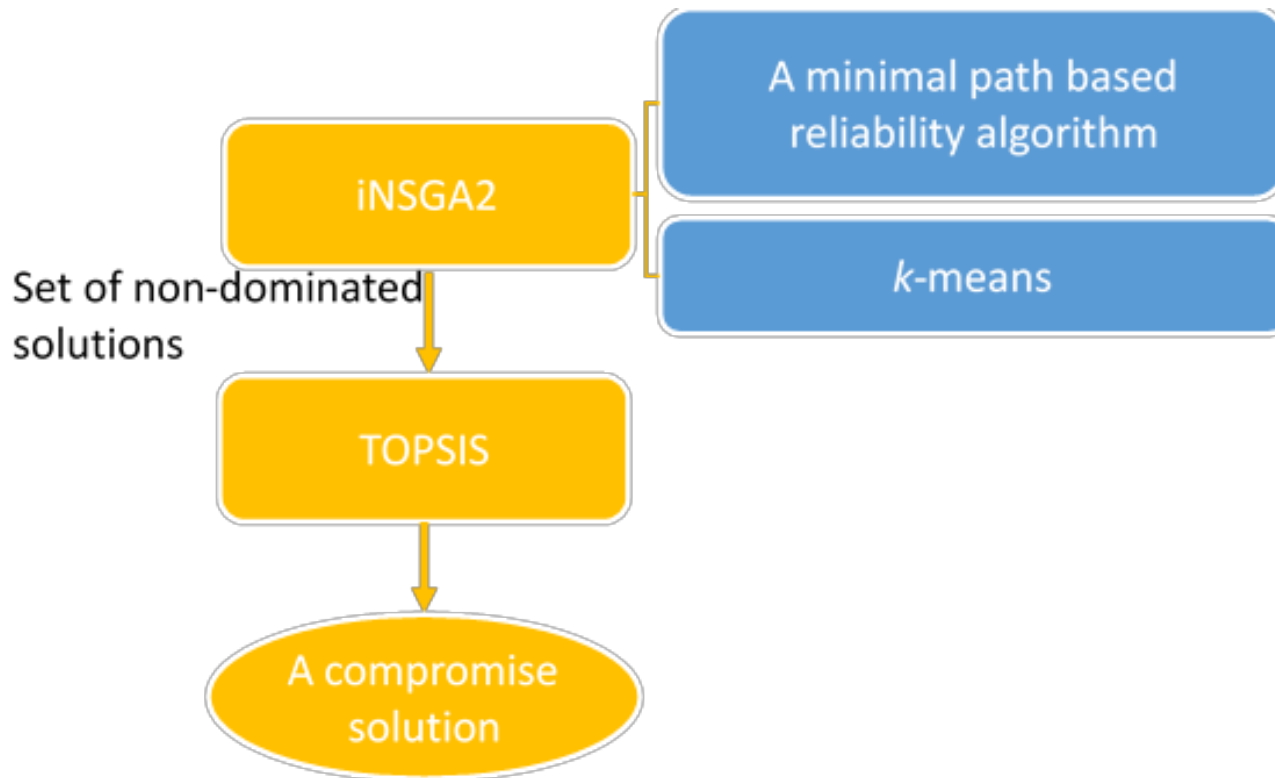
Department of Information management/ Fu Jen Catholic University

葉承達副教授

資訊管理學系/輔仁大學

An electronic transaction network (ETN) plays a very important role in communications among trading partners. Transmission reliability is of concern to system supervisors. This study adopts a binary-state physical line allocation strategy, minimizing cost and maximizing transmission reliability for an ETN with a known network structure, in which the ETN is represented by arcs and nodes. The strategy is to allocate adequate binary-state physical lines to arcs. Particularly, the physical lines allocated to the same arc could be in correlated failure owing to maintenance. That is, the ETN can be modeled as a multi-state flow network with correlated failures for reliability evaluation. For solving this bi-objective optimization problem, an improved fast non-dominated sorting genetic algorithm II (iNSGA2), integrating the NSGA2 and k -means algorithm, is proposed, where the k -means is utilized to expand the search space of the NSGA2. A set of non-dominated solutions is found by the iNSGA2, and then, the technique for order preference by similarity to an ideal solution (TOPSIS) is adopted to determine the compromise alternative from the set. By solving this problem, the system supervisor can improve ETN stability at a reasonable expense without changing the network structure.

Cheng-Ta Yeh is an Associate Professor in the Department of Information Management, Fu Jen Catholic University, New Taipei City, Taiwan. He received the bachelor degree in the Department of Information Management from Shih Hsih University, Taiwan, in 2004, the master degree in Institute of Commerce Automation and Management from National Taipei University of Technology, Taiwan, in 2006, and the Ph.D. degree in the Department of Industrial Management, National Taiwan University of Science and Technology (NTUST), Taiwan, in 2010. From Aug. 2012 to Jan 2014, he was a postdoc in the Department of Industrial Management, NTUST. His research interests include machine learning, system optimization, network reliability analysis, and management decision analysis. At present, he has published over 35 papers in several famous international journals, such as Applied Mathematics and Computation, Applied Soft Computing, Computers & Operations Research, European Journal of Operational Research, IEEE Transactions on Reliability, Information Sciences, International Journal of Systems Science, and Reliability Engineering & System Safety.



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