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# Research Seminar

offered by Lin Chen (University of Auckland)

in August 2014,

in Lyngby, Denmark

**Subject:** Multi-Objective Optimisation for decision making in road maintenance

**Problem:** Road maintenance is an important backbone of any society and heavily affects economy, environment, society and politics. Decision making is a critical part of road maintenance, which helps to achieve the goals and requirements of road maintenance. It decides the appropriate maintenance strategies for a road network and accordingly determines the benefits and costs of the maintenance. Because of the various challenges faced by modern road maintenance, decision making becomes very complicated and traditional decision making methods often fail to identify the appropriate maintenance strategies. Hence, Multi-Objective Optimisation (MOO) is introduced to assist decision making in road maintenance. We discuss the applications of MOO in practical decision making cases of road maintenance and present an effective bi-objective optimisation method for decision making in road maintenance.

**Main Results:** After studying the core of decision making problems of road maintenance, we confirm that MOO has the ability to solve decision making problems and identify a set of Pareto solutions. These solutions (1) indicate the achievable outcomes of road maintenance, (2) guarantee to be the best alternatives of strategy decisions and simplify the decision making process, (3) help in understanding the trade-offs of decision making outcomes, and (4) improve the decision making quality. Hence they are very useful in decision making process in road maintenance. We also discuss different types of MOO methods in the

context of practical decision making in road maintenance and present a bi-objective optimisation method named Dichotomic Approach. This method can effectively analyse a large number of segments and strategies and efficiently identify a set of well distributed Pareto solutions to assist decision making in road maintenance. However, this method is only effective when handling two objectives. When more objectives are proposed by decision making, an effective MOO method is still needed.

Participants: Students and researchers from Technical University of Denmark.

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