

C-10: Expert systems for pavement management systems

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Pavement Management Systems are devised to ensure proper progress of "the process of coordinating and controlling a comprehensive set of activities in order to maintain pavements, so as to make the best possible use of resources available." The set of activities in a Pavement Management System comprise data acquisition, analysis, optimization and implementation, all supportive of databases.

Reduction of subjectivity to emotions, assimilation and analysis of a vast amount of data and reduction of time spent in problem solving are some of the advantages of using a Pavement Management System.

Human reasoning process can also be emulated in computers. For a specific domain of knowledge, the reasoning pattern of an expert can be copied on to a computer by means of software called an expert system. Expert systems are used in advising, diagnostics, predictions, analysis, control etc.

LISP and PROLOG are examples of the declarative languages which are used in the construction of expert systems. Expert system shells contain strategies for knowledge representation, inference and control. Elementary structures for modelling specific domains as well as text editors are usually included in shells. The user has to add only the knowledge pertaining to the domain, and the system can be readily used. Vp-EXPERT and 1st CLASS are such examples of expert system shells.

As a starting point, it was decided to adopt the intervention levels suggested in *Highway engineering*, C.H. Oglesby, R.G. Hicks. This method is adopted in California.

Rules were formulated based on the same example. The primary variable was the distress type. Secondary variables were percentage of area affected (A), the portion of length affected (L) and the skid resistance.

By combining the diagnostic nature and predictive nature of the expert systems, the information such as remaining life of the road surface, cost effective treatment and the increase in life for the adopted treatment etc. could be worked out. Proper cognitive modelling relevant to Sri Lanka conditions should be employed.

An expert system can be a powerful tool in diagnosis, prediction, planning, monitoring and control.

Proper cognitive modelling of the problem and selection of the proper expert system building tool (shell or a language) is necessary prior to the construction of an expert system.

Combination of the expert system with the database of road network that is being regularly updated can be of immense help to engineers who are called upon to make rational decisions, fast.