DEVELOPMENT OF RULE BASED EXPERT SYSTEM FOR DESIGN GUIDELINES OF DOMESTIC BUILDINGS

THESIS SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING OF UNIVERSITY OF MORATUWA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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CONTENTS

LIST OF FIGURES

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ABSTRACT

Use of expert systems for Engineering applications is still in very primitive stages in Sri Lanka. However it is being used satisfactorily in many developed countries over several areas of the Engineering applications. In Medical diagnostic applications it had been used successfully over many decades. Later it has been spreaded over some other disciplines such as Engineering fault diagnosis and selecting bad ones from production lines etc. Further it has been reported that attempts are being done to carry out Engineering designs. Algorithmic methods are still prevalent in structural Engineering designs and these are mainly data driven and non-availability of any single data will stop the running of design process. Expert systems are knowledge driven and non-availability of piece of knowledge will not stop the process.

Rule based expert system approach is very popular among the system builders due to its flexibility in applications. In this assignment rule based method was utilized in the process of developing a proto type computer model "BUILDGUIDE" on the design guidelines for domestic buildings, operating in the DOS environment.

Chapter I of this report is dealing with the background details of the study including objectives of the study and methodology used and aspects of the Artificial Intelligence and Expert Systems. Chapter 2 of this report is on the literature review of the Expert systems and various aspects of them including structure of them, advantages, disadvantages, uncertainty of data and reasoning and methods of developing expert systems etc.

Chapter 3 of this report is reserved to discuss about the structuring of design guidelines for domestic buildings, usefulness of design guidelines of domestic buildings and related topics. For this purpose the design entity was considered in

three basic stages namely, preliminary design, outline or conceptual design and detailed design stages. Further a description about the expert system development software is available.

An output of a sample session for a small domestic building is included in the chapter 3.5 to illustrate about the output report of the BUILDGUIDE system. Finally a comprehensive comparison of design and diagnosis processes is provided, as it is necessary to understand it clearly before developing an expert system on design and diagnosis. The "CONFAULT" system, which has been formulated to diagnose the faults of Reinforced Concrete structures by identifying sub fault types, is used with the BUILDGUIDE system for the comparison. Further, this report consists with a chapter on brief description of the expert systems for design applications.