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ABSTRACT

Nowadays, developing countries cannot assign the resources to remedy all its ancient structures at one stage, so they must set priorities and devise selecting methadologies for which construction will receive attention before the others. This is a very complicated operation which depends not only on the defects of the construction and its safety but also the historical value, sociological factors, and economic effects.

The process of restoration is a highly specialized operation. Its aim is to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents.The need for a system that can perform the task of prioritizing considering all this factors and without wasting a lot of time is crucial, and developing a computer algorithm to perform this task will help preserving the monuments in crisis times as well as in the normal circumstances.

In this study, an expert system in restoration of historical building is proposed.The expert system duties are divided into handling two major branches. The first is assessing the construction safety, and the second branch contains the evaluation of cultural importance of the construction.

The study was confined to the masonry bearing walls in the first branch only, while the second branch is applicable for any construction system. The assessing of the construction safety was done by visual inspection as an easy, fast and non-expensive first stage. According to its results,it is decided weither there is a need to perform the second stage of the algorithm, which is structural analysis and materials testing, being a stage that consumes resources such as money, time, and quallified persons.

The second branch , being descriptive factors and difficult to measure, was handled with a combination of analytical hierarchy process and scoring method. The iden was dividing every factor into several measurable factors. These factors were

represented in a questionnaire and a comparison of their importance to each other was filled by expertise. Thus the relative importance (weight) of each factor was calculated easily and accurately by reducing complex decision of estimating several numbers to a series of one-on-one comparisons, although these weights are saved as a part of the database they can be changed if needed by redistributing the questionnaire by other researchers. The constructions scores of these factors are filled in the main program, and by multiplying the scores with the weights, the cultural importance is computed for each construction.

The output of the computer algorithm and associate program is developed after integrating the previous two branches in the form of two lists. One for the constructions that require immediate interference (based on the structural assessment), and the other is for the structures that require interferences to remedy defects that do not threaten the safety of the structure in the short term. In both lists the constructions are arranged descending according to their cultural score

Evaluation of Restoration Priorities in Monuments (ERPM) is the expert system produced from this research to determine the monuments that should have the priority in restoration, it was applied to three main restoration projects with all the steps, and a fourth that stopped after the visual inspection because the program showed that there is no need for the structural analysis. The results were accepted in all of its steps (cultural assessment, visual inspection, structural analysis, and prioritizing).

It is strongly recommended to use the developed algorithm and program (ERPM) to find the monument with high priority of restoration according to high number of factors and expertise judgments, which saves cultural losses in the form of neglecting the monuments in urgent need of intervention until they are demolished, and restoring others with less urgency. Moreover this is achieved while saving money, manpower, and time by using new technologies and computerized methods.

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