A Modified Hill-Climbing Algorithm for Knowledge Test Assembly Based on Classified Criteria

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References:


Abstract:

This paper presents our experience with the development of an automated knowledge test assembler. Items are selected from an item bank on the basis of precisely formulated formal criteria. The focus of our research was on the classification of criteria for item selection and on an algorithm that assembles a test using these criteria. The criteria are expressed through parameters of a heuristic function used to evaluate a test’s quality; they were derived from teaching experience and we consider them to be highly intuitive to teachers. Item selection is performed by searching a state space using modified hill-climbing. The proposed quality function is used to guide the search for the optimal test. The test assembler is implemented inside an in-house software system, developed for preparing and scoring of knowledge tests. We have shown a statistically significant improvement in the mean reliability of the tests assembled by our test assembler, compared to the tests assembled by a widely available state-of-the-art tool. The performance indicators of the test assembler were also measured and analyzed. The experiments’ results encourage both practical use of the assembler and further research.

Keywords:

Quiz assembly automation, expert system tools and techniques, hill-climbing, heuristic methods, knowledge test quality