Chapter 11
Software Tool for Test Paper Generation

ABSTRACT

In this chapter, the authors discuss the features of the tool which is developed using the algorithms designed and implemented as part of the research work carried out. They have named it a test paper generation system (TPGS). At some places, they have used question paper generation system (QPGS) instead of its alias TPGS. The main modules of this tool are (1) test paper template generation, (2) question conflict detection, (3) test paper template-based question selection, (4) syllabus coverage evaluator for test paper, (5) and answer paper evaluator.

INTRODUCTION

In this chapter we discuss the features of the tool which is developed using the multi-objective algorithms designed and implemented as a part of the research work carried out. We have named it as Test paper Generation system (TPGS). Main modules of the tool are-

1. Test paper Template Generation
2. Question Conflict Detection
3. Test paper Template based Question Selection
4. Syllabus Coverage Evaluator for Test paper
5. Answer Paper Evaluator

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TPGS has been implemented using PHP as front-end and MySQL as back-end on XAMPP server with 2GHz processor and 1GB RAM. It is a web-based tool designed to facilitate automatic generation of qualitative test paper satisfying subject's module constraint, taxonomy's cognitive level constraint, time constraint, type of question constraint, exposure limit of question constraint, question conflict constraint, syllabus coverage constraint, solution key constraint, etc. and there by provide a benchmark for test paper generation system.

THE TPGS TOOL

The functionalities supported by the first module namely Test paper Template Generation is as follows-

Test Paper Template Generation: The two-dimensional test paper template generation is considered as a multi-objective optimization problem. The best approach to generate dynamic examination test paper is by selecting an efficient algorithm to generate a two-dimensional dynamic template. By using the evolutionary computational search technique of evolutionary approaches and the cognitive level assignments of educational taxonomies, this module experimentally proves that the generated test paper templates are most appropriate for dynamic examination test paper generation. The evolutionary approach-based algorithms such as the evolutionary algorithm and the pareto-optimal evolutionary algorithm along with the incremental bi-proportional matrix scaling algorithm outperformed traditional algorithms in terms of coverage of units/modules of a subject, cognitive learning domains of educational taxonomies and marks distribution in the generated test paper. The dynamic template provided the flexibility to select all/few modules of a subject; all/few levels of the cognitive learning domain as well as assign varying total marks and thereby design various types of user specified templates for generating different types of test papers for examinations such as in-semester (20 marks), end- semester (80 marks) and practical (50 marks).

The Figure.1 displays the screenshot for accepting the input of test paper template generation using evolutionary approaches. Flexible options are provided to select module(s) of a subject, select taxonomy level(s), specify the percentage of importance assigned to module coverage as well as percentage of importance assigned to cognitive level coverage. Also, the user is permitted