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Machine Translated Evaluation Techniques In Validating The Web Based Testing Framework

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Abstract*—Automatic test generation based on the user specification and user eminency and providing test strategy and performing intelligent evaluation and updating the same is the core idea of this paper. The existing systems utilize the option of 0-1 integer liner program technique, by using the fractional optimal solution by identifying the nature of the user's specification. The primal-dual interior algorithm uses in the proposed approach, which is one of the most efficient algorithms for solving the linear programming relaxation problem.This techniques involves and efficient way of discarding the unevaluated node selection. By filtering selected nodes and unselected nodes, our system provides an effective branching strategy to reduce the size of the branch and bound search tree .At each stage the feasibility of finding the optimized solution for the problem is identified. Based on this finalized state of the problem an optimized solution is provide for the user to validate the data and apart from this ,the performance of the candidate will be evaluated and reported to the user.

Key words*: Web-based testing, static test generation, multiobjective optimization,

I. INTRODUCTION

We are also seeing more freely accessible education website to support web-based education. The main aim to this website is to bring free education to the world .online examination is an assessment that use internet in its application. User must sign in on a web link by entering their username and password. Then they choose the subject that will be tested and the student start answering the questions that is shown on the screen. After finished the examination, the student should click on a certain button that would require finishing the examination process. Online examination can make the exam easier for students because the students don't need any paper and pen to do the examination. The students don't waste more time to answer the questions because they only click on the correct answer that is provided. The main advantage of online examination is that user can know our scores just after the exam. The main idea of this paper is testing.web based testing has been popularly used for automatically self-assessment. In recent trends, Usage of internet has been an extreme demand of the business world and public, it has become indispensable to business, education, and our personal lives. In earlier days, usual client-server configuration with minimal flexibility or scalability are supported in addition to limited functionality with applications. In the last few years, this situation has dramatically changed. An "N-tier" model has been widely adapted to significantly improve quality factors such as scalability, flexibility, functionality, and availability.

Web applications have been incorporated with assignment decisive systems by the different organizations due to that, the predominant factors of quality and reliability of these applications is more and more crucial and consequently testing of these applications is very expensive, time overwhelming and a big dispute. In general, Web-based applications gather information and data from several heterogeneous sources. This raises the issue of integration as well.

This paper proposes an analysis model that captures the dynamic features of web-based applications, and models the behavior in a technology independent way. We have designed an web-based application for an objective type questionnaire test with flexible conditions of exam that can be helpful in any sort of the intelligent test examination. And the testing part that utilizes static test generation paradigm with the help of QTP (quick test professional) tool in order to test the web based application .We comprised this proposal in six modules of stages. We specified the multiobjective tests at first and generated an objective test questionnaire for which an automated result of the exam taker will be obtained. Then we formulated and generated a static test so as to test with Quick test professional tool. And the performance of the test has been evaluated graphically with reliability, time, memory and flexibility parameters.

II. RELATED WORK

STG(static test generation) and CAT(computerized adaptive testing) are the two model of web-based testing.CAT generate test paper sequentially and STG generate automatically based on multiple specification.STG categorized into two main group s integer programming and heuristic-based method. Linear programming (LP or linear optimization) is a method to achieve the best outcome in a mathematical model whose requirements are represented by linear relationships[4].

Linear programs that can be expressed in canonical form:

$$\text{Maximize } C^T X$$
$$\text{Subject to } Ax \leq b$$
$$\text{And } x \geq 0$$

Linear programming can be applied to various fields of study. it can also be utilized for some engineering problems[3].

Web testing is software testing that focuses on web applications. The testing of a complete web-based system before going live can help address issues before the system is revealed to the public.

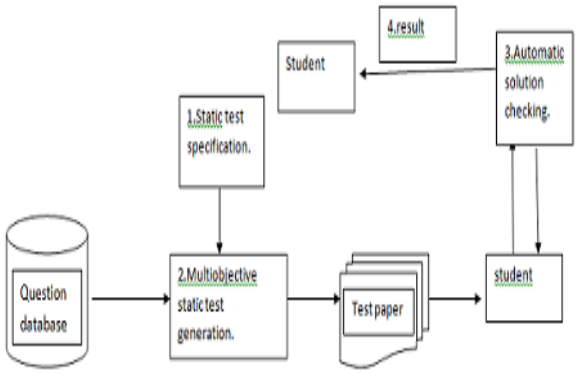


Figure 1: web-based testing workflow with automatic assessment

Linear programming -based Integer programming , which was proposed in 1986 by Adema et al.[10], [11], used the LANDO program to solve the 0-1 integer linear programming of STG. In[12], [13], Boekkooi-Timminga attempted to combine ILPwith heuristics method, the heuristic is a technique designed for solving a problem more quickly and finding an approximate solution to improve runtime performance . Heuristics method may be used in conjunction with optimization algorithms to improve their efficiency. But this method is ideal one and they can solve STG for very small data sets. These Heuristic-based methods were proposed to solve small data sets and this method ineffective for larger data sets. In [14], a genetic algorithm (GA) was proposed to generate quality test papers. Genetic algorithm is a method which is very easy to understand and it practically does not demand the knowledge of mathematics. It solves problems with multiple solutions. But certain optimization problems cannot be solved by means of genetic algorithms. Genetic algorithm applications in controls which are performed in real time are limited because of random solutions and convergence, in other words its means that the entire population is improving, but it could not be said for an individual with in this population. Therefore, this is unreasonable to use genetic algorithms for on-line controls in real systems without testing them first on a simulation model. In [15], differential evolution (DE) was proposed for test paper generation. Differential evolution is similar to genetic algorithm with some modifications on Solution representation, fitness ranking function, Crossover and mutation operations to improve the performance.DE is a method the optimize a problem by iteratively trying to improve a candidate solution with regard to a given measure of quality. A basic variant of the DE algorithm works by having a population of candidate solution called agent. These agents are moved around in the search-space by using simple mathematical formula to combine the positions of existing agents from the population. If agent new position is an improvement then it is accepted and the forms part of the population, otherwise simply eliminate the new position.. The process is repeated. In [16], particle swarm Optimization (PSO) was proposed to generate multiple test Papers by optimizing, which is defined Based on multicriteria constraints. That finds a solution to an optimization problem in a search space, PSO have no mutation calculation. The search can be carried out by speed of the particle. During the development of generations, only the most optimist particle can transmit information onto the other particles, and the quickness of the analyzing is very fast. But this method cannot work out the problems of scattering and optimization In [17], ant colony optimization (ACO) was proposed to generate quality test papers. Ant Colony System (ACS) is an agent-based system and which is simulates the natural behavior of ants and develops mechanisms of learning. ACS was proposed by Dorigo and Gambardella in 1997 and a new heuristic to solve combinatorial Optimization problems. This new heuristic called as Ant Colony Optimization (ACO).but it theoretical analysis is difficult and also time to convergence uncertain. Hence these methods generally take long runtime for generating good quality question papers mainly for large data sets of questions.

In [18] the purpose of this research is to automatically construct multiple equivalent test forms that have equivalent qualities indicated by test information functions based on item response theory. There has been a concession in previous studies between the computational costs and the equivalent qualities of test forms. To alleviate this problem, they propose an automated system of test construction based on the Bees Algorithm in parallel computing. We establish the effectiveness of the proposed system through various experiments. The demerit of this paper is BST mitigated the problem with computational costs; it did not fundamentally solve the problem. Another problem with these methods is that they did not take into consideration the maximum number of possible test forms from an item bank. The method cannot guarantee the maximum number of test forms. This method can be utilized for overlapping constraints.

In [18], Educational Data Mining is an emerging inters disciplinary research area that deals with the development of methods to explore data originating in an educational context. This method uses computational approaches to analyze educational data. This paper analysis the most relevant studies and carried out in this field to date. It introduces EDM and describes the different groups of user, types of educational status and the data they provide. It then goes on to catalog the most classic tasks in the educational environment that have been resolved through data mining techniques and finally some of the most promising future lines of research are discussed. A decisional tool has been constructed to help make decisions is the merits of this paper and describe how to improve the quality of the service provided by the university based on students' success and failure rates. The data mining tool has to be integrated into the e-learning environment as one more traditional authoring tool .but the full integration of data mining in the educational environment will become a reality, and fully operative implementations could be made available not only for researchers and developers but also for external users. Domain

specific interactive data mining to find the relationships between log data and student behavior in an educational hypermedia system to analyze learning data and to figure out whether students use resources and possibly whether their use has any impact on marks .in [20] there is a growing interest in automated test assembly algorithms and optimization heuristics. Combined with recent advances in computer technology, computer-assisted optimization models and procedures are now able to build parallel forms that meet complex content constraints targets. The current study was arranged to study the efficiency and effectiveness of the computerized-adaptive sequential testing (CAST) procedure, which used the normalized weighted absolute deviation heuristic, to make parallel forms for criterion-referenced achievement tests and medical licensure exams. A observation of the parallel forms created in each situation provided an idea of how well the testing objectives were met under highly constrained but realistic conditions. The constraints that were studied include: content place, rational level, test length, component exposure, statistical target, and number of parallel forms. Computer adaptive testing (CAT) can improve the measurement process by reducing testing length, improving test administration standardization, increasing measurement precision, improving testing security, increasing the flexibility for examinees by allowing for testing on-demand and scoring and reporting results immediately. To overcome this limitation, Luecht and Nungester created a test assembly procedure called computer-adaptive sequential testing (CAST) that draws from the strengths of CAT while still allowing for quality assurance across test forms.CAT also has many limitations, the most important of which is the loss of control in the assembly stage of test development by content specialists. That test quality is limited when CAT is used since this real-time automated procedure eliminates the item assembly and test review process formerly completed by content consultant and they also note the CAT requires a great deal of trust in statistical criteria and outcomes, often at the budget of content stipulation and test cohesion .in [21] Student assessment is a very important issue in educational settings. The main objective of this work is to establish a web-based tool to assist teachers and instructors in the assessment process. This system is called SIETTE, and its theoretical bases are Computer Adaptive Testing and Item Response Theory. With SIETTE the students can take these tests on-line and the teachers can defined their tests The tests are developed according to teachers' specifications and are flexible, that is, the questions are preferred intelligently to fit the student's level of knowledge. Provide accurate estimations of student's knowledge with significantly shorter tests. Limitation in terms of efficiency of usage since it utilizes applet as its interface. JCrasher: Automatic robustness testers, describes the program development process in terms of operations, and define exit critter which should be satisfied for completion of each operation. Separate the objectives of the inspection process operations to keep the inspection team focused on one objective at a time: Operation Overview Preparation Inspection Rework Follow-up Objective Communications/education Find errors Fix errors Ensure all fixes are applied correctly[2] .Classify errors by type, and rank frequency of occurrence of types. To identify which types to spend most time looking for in the inspection. Describe how to look for presence of error types. Analyze inspection results and use for constant process improvement (until process averages are reached and then use for process control). A demerit of this paper is they didn't provide any comparative study with other standard techniques like Test driven development. System level performance measures were not considered in evaluating the efficiency of the testing.

A. Existing System

In recent trends, testing that focuses on web applications called web testing are done before deploying the website in the live. The large-scale web-based testing is static test generation (STG), which generates a test paper automatically according to user specification and it is based on the multiple assessment criteria. The generated test paper can attempted over the web by users for assessment purpose. Generating a high-quality test papers is a challenging task under the multiobjective constraints.. It is a 0-1 ILP that is not only NP-hard but also need to be solved efficiently. Earlier optimization software and heuristic-based intelligent techniques are ineffective for Static Test Generation, as they do not have guarantee for high-quality solutions of solving the large-scale 0-1 ILP of STG. The existing system proposes an efficient ILP approach for STG, called branch-and-cut for static test generation (BAC-STG). The existing system they study on various data sets and a user evaluation on generated test paper quality have shown that the BAC-STG approach is more effective and efficient than the previous STG techniques. The existing system, an approach called static test generation is used that generates a test paper automatically according to the user specification for the purpose of assessment [1]. Papers are generated based on a high quality multi objective technique. Reliable capability is the main concern that was focused here. Using the user's specification, a fine solution called fractional optimal solution is used in order to identify the nature of the specification that are then utilize by the option called 0-1 Integer Linear program technique[4]. The multiple objective static tests are generated from the database constitute of questions in order to frame test paper for students. The evaluation of the test paper is done by the automatic solution checker. The testing that has been carried out here is a manual black box testing. These in turn neglect the functional testing. And the process of reliability check by means of repeated testing is not achieved. The existing system does not allow further changes on individual questions of a generated test paper after the test paper generation process. Thus the existing faces a failure criterion in terms of functionality and reliable capability measures algorithm.

B. Probilm Definition

Dynamic changing of functionality and Modification of data dynamically involves/ needs an effective system to test it.[6] A prevalent manual operation provides a huge flaw in the system and we need an automated process to do continuous and frequent test without any manual intervention and relying of a specific human resource.

a) Question dataset

Let $Q=\{q_1,q_2.....q_n\}$be a data set consisting of n questions=$\{P_1,Pp2,.....P_M\}$ be a set of m different topics, and $X=\{x_1,x_2.....x_l\}$be a set of I different question types. Each question $qi \epsilon Q$ *where* $i \epsilon \{1,2,...m\}$ has eight attributes $A=\{q_{id},o,a,e,t,d,c,y\}$

- ***Question qid***. It is used to store the question identity.
- ***Content s*:** It is used to store the content of a question.
- ***Answer a***: It is used to store the answer of a question.
- ***Discrimination degree e:*** It is used to indicate user Proficiency. It is an integer ranging from 1 to 10
- **Question time t:** It is used to indicate the average time needed to answer a question.
- ***Difficulty degree d:*** It is used to indicate how difficult the question is to be answered correctly and It is an integer ranging from 1 to 10.
- ***Related topic c:*** It is used to store a set of related topics of a question.
- ***Question type y*:** It is used to indicate the type of a question. There are mostly three question types, namely fill-in-the-blank, multiple choices.

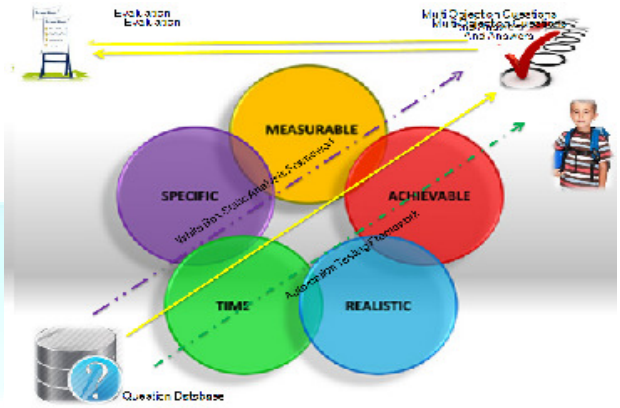
b) Static test specification

A static test specification S = {N, T, D, C, Y} is a tuple of five attributes which are defined

- ***Number of questions N***: It is an input representing the number of questions specified for the paper.
- ***Total time T*:** It is the total time taken to complete exam.
- ***Average difficulty degree D***: It specifies the average difficulty degree of questions in the paper.
- ***Topic distribution C*:** It specifies the proportion of topics. If the number of renovator questions is entered, then the number will be into the corresponding proportion.
- ***Question type distribution Y*:** It specifies the proportion of question types.

III. PROPOSED SYSTEM

In the proposed system, the testing such as functional, black box, reliable capacity as well as respective testing automatically are concentrated in the online assessment web page that uses user's specification. The multiple objective static tests are generated from the database constitute of questions in order to frame test paper for students and the evaluation of the test paper is done by the automatic solution checker as in the existing system. Fig [2] shown the architure of proposed system. A tool named QTP, Quick Test professional, an automated functional graphical user Interface testing tool that allows the automation of user actions on a web or client based computer application is used to check all the functionality of the assessment webpage. The process of filtering the nodes is done in order to provide an effective branching strategy to reduce branch and bound search tree size[6], this in turn provide a feasible way to find an optimized solution for the problem of unevaluated nodes. It primarily uses a script language to test the procedures and to manipulate the objects and controls the application under test. Hence this system overcome the demerits of the existing system such as testing under functionality, repeated testing to check the reliable capacity of the application.



*Fig*ure 2. Illustration of architecture diagram

a) Proposed System Methodology

- White Box Static Check Framework(WBSTCF) – A custom framework to test the code and possible flaws in the system
- QTP Based Automated Testing Framework (QTPATF) – A custom validations on variety of Check points(Functional and Database) in functional perspective

b) Quality Attribute

The quality attribute of this paper is to evaluate the accuracy of the system. It provides the accuracy of the project thereby identifying an efficient workflow strategy to define the pattern of the exam under test.

c) Local Proximal Decision Algorithm

Solving complex problems is described as an incremental process where, progressively, the agent attempt to enrich his performance, getting closer and closer to a final goal. The term "agent" is taken in a broad sense [8]. It represents a single agent, a problem solver, or a co-ordinate group which acts as a single entity. We do not examine the strategic features with interacting agents. A performance is a way of doing, a scheduled that the agent is capable to produce offspring. Maintenance of routines requires regular training whose intensity increases with the level of performance. The quality of the decision is measured by an instantaneous (per unit of time) gain function (also called utility, pay-off) g: X->R, the value allowing this model in a unifying way the criteria and the constraint.

d) Multi Objective Pareto Technique

In Multi Objective Problems (MOP), algorithms have to optimize two or more conflicting constraints. The Knapsack problem is the typical example of MOP, where the goal is to minimize the weight of a sack while maximizing the profit (by placing items into the sack). MOPs do not usually have a single solution. Instead, a decision maker has to find a good trade-off between the different objectives. This is achieved by generating a set of Pareto optimal solutions. Such a set contains only no dominating solutions and its representation in the objective space is called a Pareto front. The concept of domination is defined as:

Individual X dominates Y if, and only if, X is better than Y in at least one objective, and no worse in all other objectives.

Administrator is having the full access of conducting examination.Admin will already prepared for the set of question that for each priority level. Based on the complexity level the Questions and time taken will be varied for the user. User have to specify only the complexity level then automatically questions will be started to displaying from that user can choose their answers. Each question will be separate set of marks all where only objective test that means for every question there will be four options listed in that one answer needed to be chosen from the user. Here even the admin can choose the fill in the blanks kind of questions. That will be set only for the high complexity level question. Sometimes even the user having facility to choose for the fill in blanks or multiple choice questions. Based on the user answers the result will be immediately disclosed to the user.Admin is having the access to change the result condition not listing the result to the user. The whole test summary will be listed to the admin and only the certain list will be prepared by the admin by fixing some criteria's. Quickest Professional is a tool used for automation of functional and regression tests for various software applications and enforcement. It act as functional and regression testing through a user interface such as a native GUI or web interface and created in the application are tested using QTP automation test tool .The whole test summary will be listed in the static way for all the user are appear in the exam will be having the same complexity of question. The time duration are also same for all the users but the question that order will be get changed and options listed will be changed in order. Here many set of users can appeared in the exam at same time for each section the specification are set by the admin and only that certain admin can change any setting in between based on the user request. Quickest Professional is a tool used for automation of functional and regression tests for various software applications and environments. It implement functional and regression testing through a user interface such as a native GUI or web interface and created in the application are tested using QTP automation test tool. In the fig [3] shown the flow of generating test paper and static test generation.

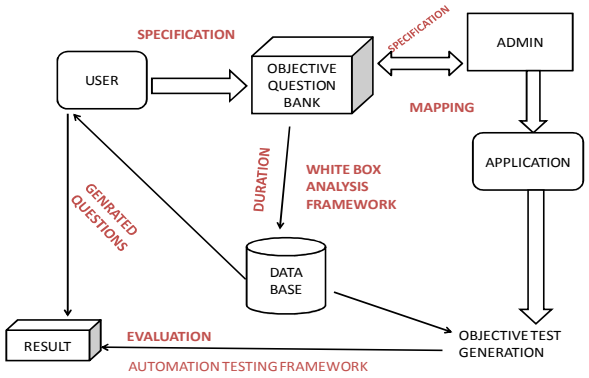


Figure 3. Data flow diagram

IV. EXPERIMENTS AND RESULT

In this section, we evaluate the performance of the proposed primal-dual interior algorithm approach for STG.This experiments are conducted on a windows XP,using an Intel core 2 Quad 2.66GHz CPU.The primal-dual interior approach is implemented in visual studio version 2005,the performance of primal-dual interior is measured and compared with other techniques including GA[22],PSO[16],DE[15],ACO[23],TS[12],DAC[27],BAC[1], ,we compare the primal dual interior algorithm and QTP tool with the BAC-STG technique, which has been shown to be more effective for large scale 0-1ILP.we have two set of experiments. In the first experiment we evaluate the quality and run time efficacy of proposed approach. In the second one evaluate the effectiveness of proposed approach by conducting a user evaluation for the quality test papers generated from different specification based on the master level and basic level dataset. The performance of proposed approach is analysed based on paper quality and run time. To evaluate the quality we define Mean discrimination degree and mean constraint violation.

a) Definition 1(Mean Discrimination degree).let p1,p2,....p_n be a generated test paper on a question dataset Q w.r.t different test specification T_i ,i=1,2.....n,the mean discrimination degree $M_q^Q$is defined as

$$M_q^Q = \sum_{i=1}^{n} M_{Pi} \div n.l \qquad (1)$$

Where $M_{pi}$is the average discrimination degree of P_i.
Constraint violation indicate the difference between test paper specification and generated test paper.CV measured according to total time, average difficulty degree, topic distribution and question type distribution between test paper and generated test paper specification.

b) Definition 2(Mean CV).The mean CV M_c^Q off n generated test papers p1, p2…pn on a question dataset Q w..r.t test paper specification S_i,i=1…n is defined as

$$M_c^Q = \sum_{i=1}^{k} CV(P_i, Si) \div n.l \qquad (2)$$

Where CV (Pi, Si) is the CV of P_i w.r.t S_i.

A high quality test paper P should have maximize average discrimination degree and minimize CV.The overall quality of generated test paper depends on user aspects could be defined in certain range. We set some threshold for a high quality test paper. We generate four large-sized dataset, namely D1, D2, D3, and D4 for performance evaluation. The four data set contains no of questions 20000, 30000, 40000 and 50000 respectively. There are mainly two types of question type in each dataset, namely fill-in the blanks and multiple choices. To evaluate the performance of proposed system we have designed some test specification. The number of topic is specified between 2 and 30.the total time is set between 10 and240 minutes, and it set proportion to the number of selected topic for each condition. The average difficulty degree is stipulation between 3 and 9.we perfume this experiments using nine algorithms.GA(genetic algorithm),PSO(particle swam optimization),DE,ACO(ant colony optimization),TS,BAC,DAC,BAC-STG,PDI.

Performances on quality .fig.4 show the result of mean discrimination degree and mean CV.In fig.4a show proposed approach achieved higher mean discrimination degree than the BAC-STG.The proposed system quality close to the maximal achievable value. The average CV of proposed system decreases whereas the average CV of other algorithms increase quit fast when the dataset become larger.

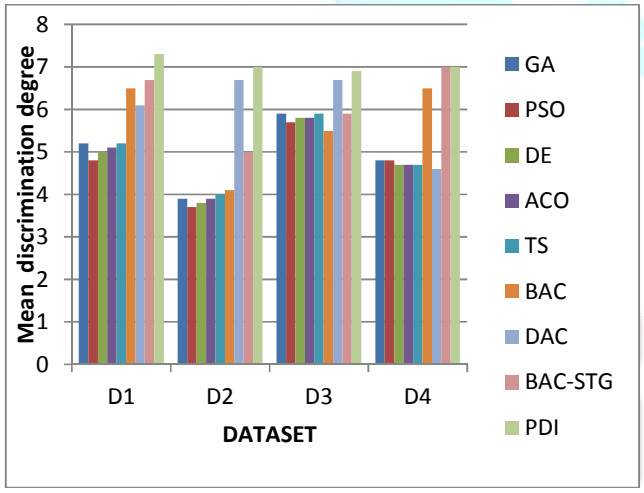


Figure 4a. Mean discrimination degree

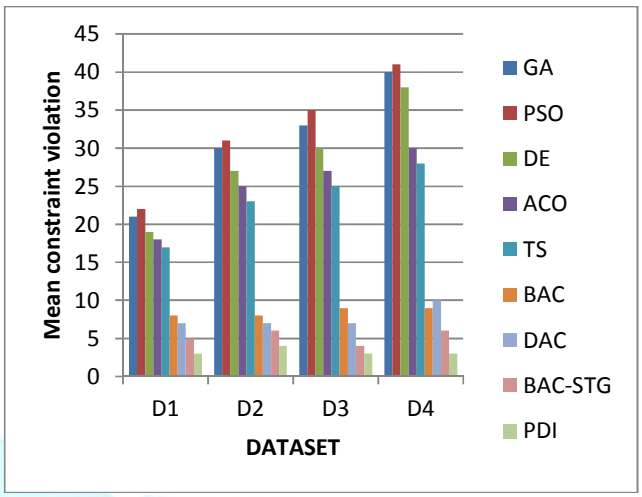


Figure 4b. Mean Constraint violation

Performance on run-time. The run time measured based on time. How much time taken to generate a test paper based on user specification. The proposed system requires less than 2 minutes to generating test paper. The other techniques are not efficient to generate high-quality test papers.

B. Web-Based Testing Framework

In this research, I have investigated a web-based testing system for e-learning in programming. The proposed system framework, which consists of the following components: web server, programme question database server using MySQL, STG, automatic quick fix analysing, and automatic question adjustment. The STG compound is achieve based on the proposed primal-dual interior algorithm and BAC-STG approach. The automatic solution checking component is implemented based on the mathematical equivalence checking algorithm [1]. These components are implemented in ASP.Net.The system can be accessed through a web browser.

V. CONCLUSION

In this paper we have proposed the testing such as functional, black box, reliable capacity as well as respective testing automatically are concentrated in the online assessment web page that uses user's specification. QTP is an automated testing software designed for testing various software applications and environments-provides functional and regression testing automation for software applications.QTP Supports keyword and scripting interfaces and features of graphical user interface.Uses the Visual Basic Scripting Edition (VBScript) scripting language to specify a test procedure, and to work the objects and controls of the application under test. The process of filtering

the nodes is done in order to provide an effective branching strategy to reduce branch and bound search tree size [3], this in turn provide a feasible way to find an optimized solution for the problem of unevaluated nodes . This paper has introduced a new technique for modeling static and dynamic aspects of web based applications. The technique is based on identifying atomic elements of dynamically created web pages that have static structure and dynamic data contents.

These elements are dynamically combined to create composite web pages using the sequence, selection and aggregation A major advantage of this model is that it relies on the principles of the HTTP and HTML construction, thus is independent of software implementation technology. The model can be extended to represent data definitions and uses in the software. A number of issues in testing still remain, including the testing of stateless and stateful applications, as well as regression testing. We also plan to address ancillary problems such as automatically deriving test cases and validating output of web applications. This model will also support maintenance of web applications by providing a structure in which to describe and analyze software modifications. The drawback of QTP is High installation cost and cannot test with all browser types and versions such as Safari, Opera. The quality of these generated test papers should be comparable. Finally, the current systems allow further changes on individual questions of a generated test paper after the test paper generation process.

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