Developing an intelligent agent for Automatic Question Paper setting

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Abstract: **Intelligent agents are the software programs that perform certain tasks on behalf their users. They are particularly useful for automating tasks that are complex and repetitive. Setting of question paper is a too complex and tedious job which requires diverse range of constraints to be taken into consideration. The traditional method of question paper generation is less efficient and time-consuming and requires automation. In order to improve the success rate of question paper setting, we have introduced Intelligent Agent for Automatic Question Paper setting. This system will help to set the question paper without taking much time and efforts which will beneficial for education domain to improve education quality and test student's ability in proper way. In this paper we tried to introduce the architecture and working of our 'Automatic Question Paper Generator Agent (AQPA)' which is based on the techniques of random number generation and backtracking.**

Keywords: *Agent, Random* **number generation, Backtracking algorithm , AQPS Architecture.**

I.   INTRODUCTION

Nowadays in the teaching technique in the educational field, examination is not only an evaluation of students' learning ability but also a means to testing teachers teaching effect on the student. Our traditional examinations show low reliability and validity. As our science and technology develops, computer has entered the educational field and become a powerful tool of teaching media and management [1]. Examinations based on computers can greatly enhance the efficiency and make Automatic question paper setting, scoring and score statistics intelligent. Thus, the actual effect of teaching can be reflected authentically, objectively and comprehensively, which will in the end improve the teaching quality. Automatic question paper generation on computers refers to the process in which questions are extracted from the examination base automatically selected and can make question paper that can meet the requirements of question paper setting.

At present the traditional method of setting question paper is selecting question from the text or reading full syllabus of particular subjects then only we can able to make the question paper it very time consuming for the person who is setting the paper as well as the person has to take more and more efforts for setting an examination question paper for the students.

With the use of AQPS agent, learning providers do not have to waste time preparing the questions of the exercises or text since they are automatically generated.

In this paper we have tried to introduce an intelligent agent for "Automatic question paper setting system (AQPS) which will automatically select the question from the database based on the technique of andom number generation and backtracking algorithm.

II.   RELATED WORK

In [2] Automatic Generation of Question Bank Based on Pre-defined Templates is discussed. In this paper all possible questions are generated by parameterized concepts from a set of pre-defined templates. The generated questions cover all selected topics in all level of difficulties in form of a multiple-choice question (MCQ). The system proposed here contains three subsystems: Knowledge Descriptor, Questions Generator, and E- learning Executer. The Knowledge Descriptor subsystem allows the instructor to describe the learning contents. The Questions Generator subsystem receives the learning contents and generates the corresponding multiple questions. The E-learning Executer subsystem uses and allows the students to use the generated questions in education process. System generated correct and wrong options question (CWOQ) algorithm is generated and had sub algorithm like only One Solution, two Solutions, all Of The Above, and none Of The Above algorithms.

Automatic question generation on the basis of the discourse connectives [3], question generation system divided into two modules content selection and question formation. Content selection consists of finding the relevant part in text to frame question from while question formation involves sense disambiguation of the discourse connectives, identification of question type and applying syntactic transformations on the content. Researcher concentrates on seven discourse connectives like because, since, although, as a result, for example and for instance on that basis Question type will be decided like if sentence consist since then question type would be Why. System has been evaluated for semantic and syntactic soundness of question by two evaluators
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Mind the Gap: Learning to Choose Gaps for Question Generation [4], in this paper approaches, the problem of generating good questions into two parts: first, the selection of sentences to ask about, and second, the identification of which part of the resulting sentences the question should address. To achieve the goal of selecting better gap-fill questions, author has broken down the task into stage 1) sentence selection, 2) question construction, and 3) classification/scoring. For generating question, features are used i.e. Token count, lexical, syntactic, semantic and NER feature is used to generate the Gaps fill question. and generated question were analysed manually and rated the question.

Linguistic Considerations in Automatic Question Generation [5], the system consists of a straightforward pipeline. First, the source text is divided into sentences which are processed by SENNA software, SENNA provides the tokenizing, pos

tagging, syntactic constituency parsing and semantic role labelling used in the system. For each predicate and its associated semantic arguments, a matcher function is called which will return a list of patterns that match the source sentence's predicate-argument structure. and paper focuses on evaluating generated questions primarily in terms of their linguistic quality. Evaluation conducted by one file, on chemistry which has 59 questions and 142 questions generated through system.

CQG (Cloze question generation)[6] system that generated list of cloze questions given in English article. CQG system is divided into three main module, Sentence selection, key selection and distracter selection. In the first stage, informative and relevant sentences are selected and in the second stage, keywords (or words/phrases to be questioned on) are identified in the selected sentence key selection will not be noun or adjective it would find on the basis of NER. Distracters (or answer alternatives) for the keyword in the question sentence are chosen in the final stage. First two stages are not domain specific. third stage is domain specific , because quality of distracter depends on domain so distracter will be selected on the basis of the key selected and through web, list of distracters will be generated and knowledge based distracter list will generated. And evaluation of the system is done manually through three phases 1).Evaluation of the selected sentence 2).Evaluation of selected keyword and 3).Evaluation of selected distracter.

Automatic Question Generation system called G-Ask [7], which generates specific trigger questions as a form of support for students' learning through writing. They conducted a large- scale case study, including 24 human supervisors and 33 research students, in an Engineering Research Method course and compared questions generated by G-Asks with human generated questions. Authors identified the most frequent question types, derived from the human supervisors' questions and discussed how the human supervisors generate such questions from the source text. Compared and Citation Classification performance is done through precision and recall, and Question Quality evaluation is done through Cohen's Kappa coefficient

III. PROBLEM DEFINITION

It is widely recognized that the paper construction is really time-consuming and expensive for teachers. As well as many Related work for paper construction have been done but they are also very time consuming for making and paper for the given text. The use of Computer system Assessment reduces considerably the time spent by teachers on constructing examination papers.

There are many objectives behind this work-

- Less time consuming-
  The person or teacher will not have to spend time for setting paper
- Automation-
  Automatic paper well be set by the system without taking much efforts
- Quality education
  It used to provide the good quality examination process. Will bring reforms in the examination system like any time and on demand examinations,

IV. PROPOSED SYSTEM

Generally, there are several groups of people involved in a question paper setting. But traditional model of question paper setting is much time consuming. In our proposed architecture, we introduce a new model which analyses previous model question papers and setting a new question paper. Therefore, the AQPS systems with this architecture are highly effective, flexible, light weight and can be extended by choosing required functionality from AQPS. As depicted in figure, the proposed AQPS system architecture contains several basic components as follows

- Hash table database.

- Repeated question checker module.

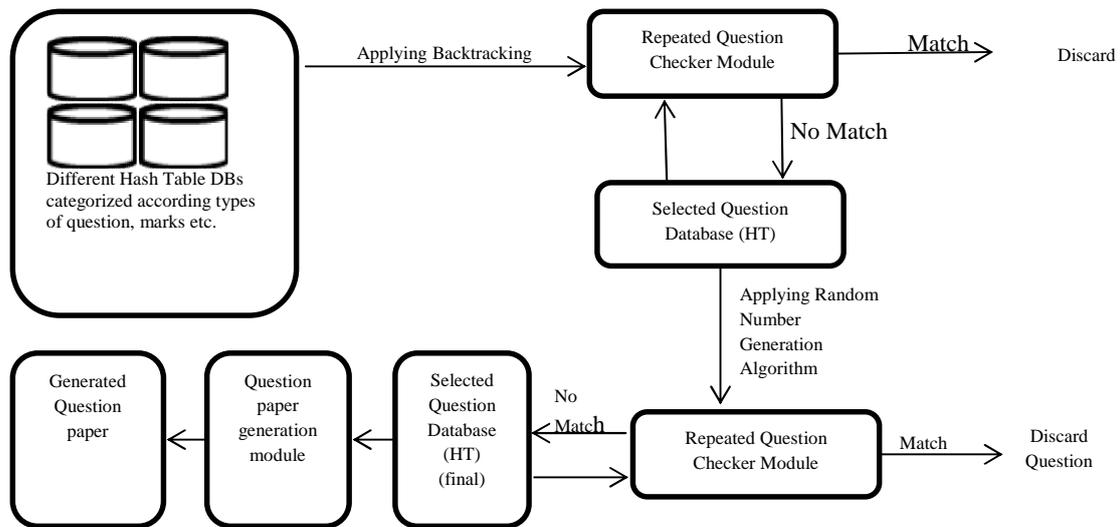- Question paper generation module.

a)**Architecture**-

Fig: Architecture of AQPS

As shown in above proposed architecture of AQPS, we focused on hash table database to store question and authors tries to proposed new concept that is question checker module

- **Hash Table DB** : It is used to store question from which we have to set paper set, hash table is a data structure which provide us feature of storing object with key,it is easy to find out the required object very quickly by mapping key, and it also take optimum space to store data. There is different question DB accordingly marks, type of question, etc. From which we can select any one database to generate question paper.

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- **Repeated Question Checker Module:** This module perform the operation of checking repeated questions, it match new retrieved question with selected question DB, if question is matched then this question is discarded means it does not store repeated question in selected question DB, and if new retrieved question is does not match with any question in selected question DB then this question i.e. new retrieved is add to the selected question DB.

- **Question Paper Generation Module**: This module generate paper according to question paper format, this module contains a pre-defined different question paper format for designing a question paper. The format can be seasonal, unit test, annual, aptitude, reasoning, multiple choice, etc. it will be select different questions from selected question DB and

place in question paper format which we have selected.

To select different questions for paper set we apply different algorithms like backtracking and random number generation algorithms. Backtracking is a general algorithm for finding all solutions to some computational problems, notably which satisfy some constraints , that incrementally builds candidates to the solutions and abandons each partial candidate as soon as it determines that candidate cannot possibly be completed to a valid solution.

Many Applications have led to the development of several different methods for generating random data. Several computational methods for random number generation exist. Many fall short of the goal of true randomness though they may meet with varying success some of the statistical tests for randomness intended to measure how unpredictable their results are. However cryptographically secure computational based methods of generating random numbers do exist for generating random numbers.

b) Proposed algorithm for AQPS-
Algorithm:
INPUT-no of question in hash table
VARIABLE-x, r, J, Q, Z
   x- question bank in hash table
   r- repeated question
   J-new bank of selected question
   Q-final question set questions
   Z-final paper set

Step1- create and initialize hash table for storing the questions bank.

Step2-Backtracing implementation (BTA)

Step3- consider x is the no of questions in HT and r be the repeated question found then BTA will subtract the repeated question.

i.e $x - r = J$

Now J=new question bank

Step4-J=new question bank

$$J = \sum_{i=0}^{k=n} J = 1,2,3,4\ldots\ldots n$$

Selecting Random values from J.i.e Q .

Step5-listing Random values from J i.e Q

Step6-Now

$$Q = \sum_{i=0}^{k=n} Q = 1, 2, 3, 4\ldots\ldots n$$

Step7-Discard repeated question from Q.

Step8-Z=Final question paper bank

.
Step9-Put Z in QPGM

Step10-Question paper generated

c) **working**-

As describe in fig above Architecture of AQPS for setting question paper of particular subject . Firstly we will store our question bank in Hash Table i.e (object=question & key=topic or unit).Hash table act as a database of question bank from which we will select the required key (i.e. topic or unit).By applying Backtracking algorithm number of question are selected according to key requirement. These selected questions are mandatorily checked in repeated question checker module. If any question is selected repeatedly then it is discarded otherwise store in selected question database. In such way unique questions which are not store in selected question database (HT).

Now we apply RNG algorithm on selected question database for setting final question paper. In this RGN algorithm we select question randomly. The Randomly selected question again checked in repeated question checker module. In this repeated question are found then discard otherwise unique question are store in final selected question database. The final data (q) are store in FSQD is our final selected question paper for question paper.

Now these selected questions are transfer to QPGM which have pre-defined question paper format. We selected particular format then question are placed on that particular format and this will be our QG paper which will generated by using this architecture.

V. CONCLUSION

With the development computer technology, the quality of educational domain has been rising, and with striking changes in the mode of examination, intelligent Question paper setting algorithm is becoming increasingly important. Aiming at the solution procedure of such a typical constraint satisfaction issue of paper setting, this model suggests adopting group intelligent searching method-of random number generation algorithm Backtracking algorithm automatic question paper setting. It is suggested by the result of such simulation that when comparing with traditional and automatic methods to generate question papers, random number generation and backtracking algorithm can find out the optimal plan in paper setting in the shortest time, especially when the number required is big, it can still maintain a high success rate, thus better realizing the strategy of question paper setting, and laying a firm foundation for constructing a perfect automatic examination system based on computers.

REFERENCE

[1]. Automatic Test Paper Generation Based on Ant Colony Algorithm by Dan Liu, Jianmin Wang, Lijuan Zheng in 10 JOURNAL OF SOFTWARE, VOL. 8, NO., OCTOBER 2013

[2]. Automatic Generation of Question Bank Based on Pre-defined Templates by Ahmed EzzAwad and Mohamed Yehia Dahab in International Journal of Innovations & Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 3, Issue 1 April 2014.

[3] Automatic Question Generation using Discourse Cues by Manish Agarwal_, Rakshit Shah_ and PrashanthMannem.

[4] Mind the Gap: Learning to Choose Gaps for Question Generation by Lee Becker, sumitbasu and lucyvanderwende.

[5] Linguistic Considerations in Automatic Question Generation by KarenMazidi and Rodney D Nielsen.

[6]Automatic Cloze-Questions Generation by AnnamaneniNarendra, Manish Agarwal and Rakshit shah LTRC, IIIT-Hyderabad, India.

[7] G-Asks: An Intelligent Automatic Question Generation System for Academic Writing Support by Ming Liu and Rafael A. Calvo