Developing the Assessment Questions Automatically to Determine the Cognitive Level of the E-Learner Using NLP Techniques

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ABSTRACT

The key objective of the teaching-learning process (TLP) is to impart the knowledge to the learner. In the digital world, the computer-based system emphasis teaching through online mode known as e-learning. The expertise level of the learner in learned subjects can be measured through e-assessment in which multiple choice questions (MCQ) is considered to be an effective one. The assessment questions play the vital role which decides the ability level of a learner. In manual preparation, covering all the topics is difficult and time consumable. Hence, this article proposes a system which automatically generates two different types of question helps to identify the skill level of a learner. First, the MCQ questions with the distractor set are created using named entity recognizer (NER). Further, based on blooms taxonomy the Subjective questions are generated using natural language processing (NLP). The objective of the proposed system is to generate the questions dynamically which helps to reduce the occupation of memory concept.

KEYWORDS

Blooms Taxonomy, Learning Management System, Multiple Choice Questions, Named Entity Recognition, Natural Language Processing

1. INTRODUCTION

Always, Education is the best approach to achieve success in everyone’s life that can be happened through online or in classroom method. In this digital world, online education is highly preferred by the learner because of its anytime, anywhere approach which enriches the knowledge to convince the industrial expectation of the relevant domain that helps survival in the workplace. This type of education imparts the knowledge dynamically to the learner. One of the online methods is the E-Learning system which integrates the major components of E-Content for learning and the assessment part to explore the understanding level of the learner. Mitkov (2003) and Mitkov et al. (2006) projected a semi-automatic question generation in an electronic content using NLP-based methodology. The principal segment of online learning is to ask the question to discover the cognitive practice that induces advanced cognitive skill namely intellectual capacity and reasoning (Bhirangi & Bhoir, 2016).

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In education providing a quality service is more complex and challenging issues in practical (Agrawal & Sharma, 2014). Assessments are the main tool to test the skill level of the learner. It is the way to judge or assess novice’s knowledge or the expert’s achievement in their course. The main purpose of the assessments in E-Learning courses to identify how soundly the learner has learned the E-Content by a tutor or a supervisor. The question in the assessment is more important which is classified in two different types such as objective type and subjective type. In online education, the learner takes the self-assessments via MCQ, Quiz or through fill-up the blanks. Objective type assessment method is easy to evaluate and soon the ability level of the learner is determined quickly. One of the objective type questions is multiple choices which are the most admired type. When the learner is strong enough in the learned concept then it is easy for them to answer that helps to identify the deep understanding capacity level of the learner. MCQ boost the learner to learn more and it gives the path for active learning (Nicol, 2007). The subjective type questions are in one sentence but the answers may be one or more sentences as an explanation, or in short form of an answer. Learner tries to explain the logical concept in their own feel or based on their opinion. It helps the learner to think where the learned concept can be applied and how it can be applied? The subjective question helps to improve the cognitive level of the learner.

Bloom’s taxonomy has the most important hierarchical arrangements for teaching-learning processes with the six different levels of taxonomies that are practiced. Blooms classifier is the best tool to determine the knowledge level of the learner. The six different levels are ranged from low level to high level of taxonomies which are used to find the low level of knowledge to the extreme level of knowledge. In manual process, require lots of time to prepare the assessment questions on the basis of blooms taxonomy which is the difficult task for the teacher.

In recent years, research is highly focused on the Automatic Question Generation in MCQ section. There are several methods of assessment in E-Learning. The assessment methods are Multiple Choice Questions (MCQ) checks that the learner’s talent to relate understanding by the available possible answer to real-life conditions. True or false are selected, when the learner is clear and definite in the answer. This type of assessment is easily conducted. Fill-up the blanks are the type used when to recollect the specific facts for the learner. Similarly, the next type is matching the terms correctly. It assesses the learner’s ability level by remembering the facts and matches the link between the terms. It will be better to generate the question automatically.

The assessments are conducted as a prerequisite in the beginning stage of the learning to check how much knowledge does the learner possess? After taking up the course check how much the learner has erudite through assessment? Then it is easy to find how much the learner has learned. Hisi et al. (2018) implemented the new technologies inclusion and its dissemination gives a very wide field of novelty in the various fields, of human and the resources such as saving time, financial profit successively. Baporikar (2016) stated that Information Technology enabled services is far better in the teaching-learning process.

Here focusing to generate two different question patterns to test the skill level of learner. The MCQ questions are created with a set of distracters using Named Entity Recognizer and the subjective questions are created based on blooms taxonomy level using natural language techniques to find the skill level of the learner in the learned concept. Objective questions are generated automatically in the form of MCQ with a set of distracters. For a Sentence, a correct answer and the set of distracters are generated using named entity method. Based on blooms taxonomy the low-level subjective questions are developed to test the knowledge of a learner. The system has been executed in computer science domain to check the skill level of the learner.

The paper is structured as follows. The related task of generating question is described in Section 2. The system architecture and design are briefed in Section 3. The Proposed System is given in Section 4. Section 5 deals with the experimental result. In Section 6 System Evaluation is carried out and finally in Section 7 concluded with the future works.
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