

# Online Examination and Evaluation System

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**Abstract** - Currently, online test systems have adapted easily to today's technologically advanced world. Examinations are an intrinsic part of the educational process. The evaluations are conducted by teachers manually, regardless of the fact that the tests are conducted online. Our examinations can be classified into two main types of evaluation, namely, objective answer evaluation and subjective answer evaluation. As of now, online answer evaluation is available for the objective questions, hence the manual assessment of the theory answer is a tedious task for the teacher. The teacher checks the answer manually and gives the marks. In this paper, the literature survey of existing solution is analyzed.

**Key Words:** cosine similarity, NLTK.

## 1. INTRODUCTION

Exams are formal assessments in which candidates demonstrate their knowledge and expertise on a specific topic. Every year lots of students from different domain give exams. Usually the exams conducted are in the form of objective, subjective or practical based. Student understanding is best assessed with subjective questions, which can be used to determine how well a student has understood a subject.

### 1.1 CHANGES IN EXAM DURING PANDEMIC

In the times of the COVID pandemic, many educational institutes saw their campuses terminating operations in offline modes. In this situation there has been a need to evaluate a students performance through other means than having physical examinations. Due to the recent widespread impact of COVID-19 virus, There had to be thought of a safe and effective method of conducting exams. One of the methods that is unconventional as compared to physical exams is conducting exams through an online medium. This ensures that a physical distance is implemented between students among themselves and examiners. Moreover even in cases unaffected by the pandemic online exams substantially promote examiners to take examinations that are in remote places or in times of natural calamities like storms and floods. Online exams can be conducted without employing large number of resources however having a computer and internet connection is necessary

Now that online exams are a popular method to conduct examinations of candidates around the world it is necessary to enhance the technology that is being used to enable this method and make it more secure, foolproof and more accessible.

## 2. LITERATURE SURVEY

### A. Online Subjective answer verifying system Using Artificial Intelligence

Online Subjective answer verifying system Using Artificial Intelligence was proposed [1] allocating the marks on the basis of three factors: Grammar, Keywords and Question Specific Terms. The system requires a model and keywords in the database to evaluate. The system is also supposed to check the grammar in the submitted answer. To evaluate the grammar a Grammar API Text Gears API is used. For Keywords evaluation cosine similarity factor is used to calculate the similarity in students answers to that of teachers model answer.

### B. Tool for Evaluating Subjective Answers using AI(TESA)

The authors of this system had a goal of developing a system in which subjective answers are evaluated, and marks are automatically calculated based on the model answer key provided by the client. As part of the project, the researchers optimize and examine different ways of forming and structuring answers and evaluate the results accordingly. The key objective is to determine a method for converting scanned answer sheets into a readable text format. And to devise a way to calculate the final grade of the student's answer based on the comparison of student answers to model answers.

TESA provides a 3 phase evaluation process for subjective answer evaluation [2]. To achieve the evaluation in phase 1. OCR technique is used to extract text from handwritten student answer sheets and then in phase 2. Jacardian similarity and BERT system is used to evaluate the answer sheet with respect to model answer and finally in phase 3. marks are assigned to students on the basis of weighted average.

The setback which was resulted in the system was due to the model required a very large data set for model training

and It does not take into account the order in which words appear and the grammatical meaning behind sentences.

#### **C. Automatic Thai Subjective Examination using Cosine Similarity**

Thai Subjective Examination with Automatic Cosine The preparation stage and the similarity assessment stage are the two main stages of similarity. The preparation stage, which consists of two processes: preprocessing and TF-IDF computation, attempts to create a standard answer in terms of the TF-IDF vectors. Second, the similarity scoring step is used to assess student responses and assign student scores. Data pre - processing, TF calculation, and similarity and scoring computation are the three steps in this stage.

#### **D. An Analysis of Automated Answer Evaluation Systems based on Machine Learning [4]**

An Analysis of Automated Answer Evaluation Systems based on Machine Learning analysis the present systems efficiency and compares different system on various factors

#### **E. A Python Tool for Evaluation of Subjective Answer: APTESA**

In this system evaluation of the subjective type of answers is done by matching keywords and Phrases in the answer given by the student [5], with the keywords and phrases of the original or model answer. The keywords and Phrases of the original answers are stored in the answer base of the system. Answer base has all the entities for keywords and phrases, along with the number of marks to be given if it exists. The system is developed using PYQT.

The mode of accepting answers in ApTeSa is through text files. The name of the text file, containing an answer, is given as an input into the system. If a non existing file is provided an error message is generated. After the acceptance of the file system initiates its processing. The system receives the keyword corresponding grades awarded from the solution base .It is verified that the system contains the required keywords, and if the given answer has a keyword, the mark corresponding to that keyword is added to the mark given to that answer.. Same procedure is used for evaluating phrases. The total marks to be given are calculated by adding up the marks for keywords and phrases. The advantage of this system is that it provides flexibility to update the automatically given marks.

#### **F. Subjective Answer Evaluation using Natural Language Processing and Machine Learning**

This proposed Subjective Answer Checking System Uses Natural Language Processing and Machine Learning [6]. This Subjective Answer Evaluation software gives mark to subjective question based on Answer length, keyword

matching, Grammar check, Cosine similarity and Contextual similarity by comparing it against the Model answer provided by teacher. In this system even if the students answer does not match the teachers answer word to word still the system is capable of generating an output based on the context using Natural Language Processing.

#### **G. Research and Development of Online Examination System**

This system is based on true false answer evaluation system. JSP Model 1 development model is used to develop an online examination system [7].The system has a combination of client side and server side development technology. There are such functions as question management, paper generation and test online, which makes it easier for teachers to organize examinations and students to study the course.

#### **H. Design and Development of the Online Examination and Evaluation System Based on B/S Structure**

The browser-server structure is used in the Online Examination and Evaluation System (OEEES). By functions content displaying layer, application-running layer, data-operating layer, and database, the examination and assessment are logically split into four portions. [8]

The first layer, the content-display layer, is a user interface system that interacts directly with users. The application running layer, which is the second layer, is the heart of OEEES, since it facilitates connection between users and databases through programmes such as those for creating paper, testing, maintaining time, and analysing data. The third layer of the system, the data-operating layer, goes to the database. It takes data requests from the application layer, sends SQL orders to the database, and then delivers the results to the application layer. The database layer is the foundation of the entire system. All information will be kept in a database.

#### **I. The Research and Design of Online Examination System**

The authors created an online examination system based on Web, with a deployment structure based on the B/S pattern, that employs the Java modelling language, IDEA (IntelliJ IDEA 13.1.3), Tomcat, JDK technology, and a MySQL database. In Web mode, the system can handle a high number of simultaneous test data receipt and dissemination, authentication, online examination and test results, and other activities. [9]

#### **J. A Systematic Review on AI-based Proctoring Systems: Past, Present and Future**

The [10] author's major goal is to describe the various systems that exist in online proctoring by going over the

main parameters that are taken into account when creating the system. Their paper compares AI-based proctoring systems against non-AI-based proctoring systems. The authors have noticed trends that have emerged from the research conducted throughout the development of AIPS.

#### **K. Online Examination with Short Text Matching**

In this system, the author uses text mining techniques that include keyword matching, sequence matching, quantitative analysis, semantic analysis, and a short answer marking system called IndusMarker. [11] IndusMarker is a tool for performing structural matching. The predefined response structure developed through a structure editor for short text matching of responses. This system uses JSON to transfer data between the web application and the server and use it instead of XML.

#### **L. Survey on Trends and Methods of an Intelligent Answering System**

The authors have created a system for completely automating the question answer system in which the teacher provides a URL after which the system uses web scraping technique to automatically extract questions and answers from the provided URL. [13] The system further saves questions and summarizes the obtained answers into the database. The summarized answers provided by students is compared against the word matrix of standard answers and depending upon the number of matches, the student is awarded marks. The main objective of system is to create a completely automated QA system called as Intelligent Classroom.

#### **M. Intelligent Classroom System for Qualitative Analysis of Students' Conceptual Understanding**

The authors have created a system for completely automating the question answer system in which the teacher provides a URL after which the system uses web scraping technique to automatically extract questions and answers from the provided URL. [13] The system further saves questions and summarizes the obtained answers into the database. The summarized answers given by the students is compared with the matrix of standard answers key and depending upon the number of matches, the student is awarded marks. The main objective of system is to create a completely automated QA system called as Intelligent Classroom.

#### **N. Comparative Analysis Of String Similarity And Corpus-Based Similarity For Automatic Essay Scoring System On E-Learning Gamification**

The system implemented by authors is primarily intended for grading essays. The study employs a system that implements the string similarity (cosine similarity) and

corpus based (LSA) algorithms, as well as a performance and accuracy examination of the methods [14]. The automatic scoring system program is made up of two systems: a web service and a web client. To communicate between the two systems, a Web Service is employed. The suggested approach is implemented by comparing the similarity of student responses to professor responses, with lecturers evaluating the meaning and understanding of the student response.

#### **O. Text Classification for Subjective Scoring Using K-Nearest Neighbors**

The k-nearest neighbors technique is used in this research to classify text for subjective assessment. Based on word matching and word ordering, the suggested method creates a new similarity measure [15]. The KNN algorithm uses the nearest neighbors, or samples, to find the target class (score). The method must define the similarity measure or distance measure in order to find the closest samples. The higher the measure's value, the better the similarity quality.

#### **P. Adaptive and Automated Online Assessment Evaluation System**

The authors of this system have developed a solution for scoring in the questions with answers like short essay type. In this solution, the instructor adds a question to the question bank, creates an assignment, and automatically captures the final result. Feedback responses and ratings are provided to users immediately after testing. Their system provides a platform for academic institutions to improve the task evaluation process. The system has three phases [16]. In the first phase, the best respondents to short questions are predicted using natural language processing and web-based techniques. The second phase involves question and answer generation and question and answer extraction for essay-type question scoring, including information retrieval, sentence splitting, sentence splitting approaches, tokenization, and part-of-speech tagging. In the third phase, a text analysis approach is used for the qualitative evaluation of the structured response. The WordNet library is used to compare answers to tagging schemes, and the answer scoring process is performed using keyword and sentence analysis.

#### **Q. The Intelligent Essay Assessor**

The Intelligent Essay Assessor (IEA) the technology used here is a collection of software tools for evaluating the quality of essay content. The IEA use Latent Semantic Analysis (LSA), a computational model of human knowledge representation and a method for extracting semantic similarity from text. LSA is first trained on text that is domain-representative. Then, using LSA representations of the meaning of their words, student essays are compared to essays of conceptual importance

and amount of relevant content. Closely agreed with human experts as well as expert judgment Agreed on a wide range of issues [17].

### R. Answer Evaluation Using Machine Learning

Here for automated subjective answer evaluation the authors have used matching keyword concept from dataset supported machine learning algorithm. For using this the application scans the solution to question then the system will split the solution keyword using OCR. supported keywords written within the answer and therefore the keywords within the dataset, the application will provide marks within the range of 1 to 5 .In the system, answers are provided in jpeg format. The keywords, maximum marks and minimum length is acquired. The system separates words from given answer and words are going to be stored in csv file and checks percentage of keywords matched in it and marks are displayed accordingly [18].

### S. Cosine Similarity Metric Learning for Face Verification

The research employs the cosine similarity measure to develop a face verification system that determines whether a person is who he or she claims to be by analyzing facial photos. Due to image changes in lighting, position, face expression, and age, this is a difficult undertaking. The authors of this study offer a new method for learning a proximity metric for facial verification called Cosine Similarity Metric Learning (CSML) in order to improve the face verification method [19].

### T. Comparison of Pixel and Object-Based Classification Techniques for Glacier Facies Extraction

To classify glacier facies, this work utilizes extremely high resolution WV-2 satellite measurements in both pixel and object based domains. The precision of the target's spectral response pattern will determine whether the classification is pixel or object based. This study pits the ever-popular pixel based classification methodology against the growing object-based classification technique, using picture classification as the major way of information extraction. This research tries to find the most accurate information extraction technique for the WV-2 imaging in the provided scenario [20].

## 3. CONCLUSIONS

This article presents a systematic literature review on different technologies used for online examination system, objective and subjective based evaluation system, different approaches to conduct examination using proctoring methods. After reviewing all the papers we have decided to develop a complete examination and evaluation system which will include proctoring,

examination conduction and evaluation modules for both subjective and objective answer type questions.

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