

# An Examination System Automation Using NLP

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**Abstract** - This world has witnessed a great deal of examination portals which are deployed across various servers and used to conduct online examination for a variety of purposes, some of which may include undertaking a quiz for entrance examinations, at the national and international level, whereas other portals are designed to conduct a test for placement purposes. However, what we have observed is that the majority of portals are made to be used for multiple-choice assessments [1]. Here, it is not intended to work on the technology that is already existing, but some technology that is very exceptional. Here we talk of the descriptive online examination system. Multiple choice based questions are easy to deal as they have a question, a few options and a field in the same question that stores the correct option in the database. While in the case of theory questions it is not so. It brings in or uses the concepts of NLP to assign grades to answers. The model's task is to perform some operations on the answer string in order to allocate the proper grades to the answers submitted by the examinee. Answers are nothing more than strings. Essentially, an elaborative online examination setup is where the data is gathered and evaluated properly. It is then examined and the created model accurately assigns grades to the responses to the question the front-end uses html version-5 javascript css version-3 bootstrap while the back-end is developed in python and uses the django web framework nltk library is used for nlp and sqlite version 3 for database

**Keywords:** - descriptive examination, deep learning, natural language processing, django.

## I. INTRODUCTION

The current examination system depends on physical work from printing to moving papers to the examination center, then monitoring, and amending the answer sheet, which is a massive mess for any examiner, it is the most tedious chore and sometimes leads to resource loss. This demonstrates that the conventional examination system isn't cost-effective nor time-efficient, and resources are squandered in the process as well. The new online testing system features only multiple-choice type of questions where as majority of the exams have descriptive questions for which multiple-choice answers doesn't work and hence they aren't

that efficient and compatible to replace it at a larger level. Even the widely known systems have a basic storage system. By matching the correct option with the answer or option in the database the result is calculated. In the proposed model they have taken the online examination and assessment system to an advanced level by allowing the test taker or the student to provide descriptive answers that will get assessed on their own i.e. computerizing the whole offline examination system with the proficiency of computers, having no scope for a human mistake involved, this can be done using NLP. In 2009, Futrelle et al deduced NLP-NG,

which is a new Natural Language Processing system related to biomedical text scrutiny where BioMed Central body with 300 million word is used to detect domain-specific text from a variety of text scripts [5], it will also have greater time efficiency as it will produce results instantly and will be more secured and reliable. The reason relational database is used in this system is, Database queries used for information extraction allow generic extraction and minimizes reprocessing, and provide automated query generation components for casual users [8]. NLP has a significant part to play when discussing the technology used to build a model for assessing descriptive responses. Kaur et al used data mining and NLP to extract keywords from text [4].

## II. AIM AND OBJECTIVE

### a) Aim

The aim is to implement an automated online examination system, which would assess the examination responses as accurately as possible automatically, without any human involvement while providing faster or instant assessment results ultimately reducing physical resources and examination rigging [1].

**b) Objectives**

- The prime goal of this paper is to make the test evaluation even more explanatory and unbiased assessment, while making it possible to carry out the examination assessment without an examiner and instant evaluation.
- To take descriptive tests online while being assessed at the same speed and accuracy as compared to conventional MCQ-based tests.
- Another main objective is to reduce human or manual work [1].

**III. LITERATURE SURVEY**

**Paper 1: Detection of users suspected of using multiple user accounts and manipulating evaluations in a community site:** Identifying users who might be creating several user profiles and altering scores on a community website involves the use of various techniques and algorithms to identify potentially fraudulent behavior some common technique include IP address analysis checking IP addresses of users to identify potential cases of multiple accounts being created from the same location behavioral analysis analyzing user behavior such as the time of day they access the site the content they view or post and the language used to identify patterns of suspicious activity [3].

**Paper 2: “Automated Online Exam Proctoring”, IEEE Transactions on Multimedia:** A paper an article titled automated online exam proctoring from the IEEE transactions on multimedia details the creation and assessment of an automated system for keeping track of online tests and spotting any cheating using the device that employs machine

learning algorithms sensor data video and audio channels to identify and stop cheating during online exams the systems architecture design and performance assessment are all covered in length in this article the findings of the evaluation reveal that the system is extremely precise. in detecting several sorts of cheating such as glancing away from the screen or utilizing unapproved gadgets [7].

**Paper 3: Task Based Automatic Examination System for Sequenced Test:** The task-based automatic examination system for sequenced test, this is a computer-based system designed to automate the process of grading and generating feedback for sequenced tests these are a type of examination in which a student must complete a series of tasks or questions in a specific order the task-based automatic examination system uses a combination of programming techniques and algorithms to create a comprehensive examination platform the system features an automated grading system which gives immediate feedback followed by scores based on the candidate responses the system also generates detailed reports and analytics that help instructors and educators to assess student performance and identify areas to improve [6].

**IV. EXISTING SYSTEM**

There have been numerous examination portals deployed across various servers in this world and used to administer online tests for a variety of purposes, some of which may include undertaking a quiz for Olympiads & entrance exams, at the national and international level, whereas other portals are designed to conduct a test for placement purposes. However, what we have observed is that the majority of portals are made to be used for multiple-choice assessments

**V. COMPARATIVE STUDY**

Sr. No.	Paper Name	Author/publication	Technology	Advantages	Disadvantages
1.	An automated classifier for engineering test questions: A process for Bloom's taxonomy.	K. Jayakodi, M. Bhandara and I. Perera IEEE, 2020	WordNet	It has high Accuracy of detecting the correct main category of a question.	
2.	Detection of users suspected of using multiple user accounts and manipulating evaluations in a community site	N. Ishikawa, K. Umemoto, Y. Watanabe IEEE, 2020	Maxent, Mecab	Increase the credibility of communication site.	It is difficult to verify the effectiveness of this method. This is due to the lack of reliable information about users who have multiple user accounts.
3.	Automated Online Exam Proctoring”, IEEE Transactions on Multimedia	Y. Atoum, L. Chen, A. X. Liu, S. D. H. Hsu, and X. Liu IEEE, 2020	OEP system	No need of invigilator (Less man-power)	Supports only MCQ based examination.

*Table 1: Comparative Study*

In the Paper, “An automated classifier for engineering test questions: A process for Bloom's taxonomy.” The evaluators can examine and create test questions of various levels to gauge students' knowledge on a variety of topics, this can help the candidates to improve in the subjects they find difficult [2].

## VI. PROBLEM STATEMENT

Just multiple-choice problems are available within the online test system, which is extremely inefficient. Students can now use this system, which enables descriptive tests, is extremely effective, and allows them to see the answer and fix any exam-related mistakes they made.

## VII. PROPOSED SYSTEM

The examinee can submit descriptive answers that will be evaluated independently in the suggested model. The evaluated responses will be entered into the database and can be viewed at any time, and a specific student profile will be kept for better evaluation of the student. NLP is a key component of the technology used to build a model for assessing descriptive responses.[1]

## VIII. ALGORITHM

### Step 1: Start

#### Step 2:

```
og = originalAnswer.lower()
```

```
stud_ans = stud_ans.lower()
```

#### Step 3:

```
from .GrammerPercentages import
calculateGrammerPercentage
gramPercentage =
calculateGrammerPercentage(stud_ans)
s2 = (2 / 100) * gramPercentage
print('Grammer Percentage %=', gramPercentage,
'%', 'S2=', s2)
```

#### Step 4:

```
from .PartsofSpeechDRK import
calculatePOSPercentage
pos = calculatePOSPercentage(stud_ans)
s3 = (2 / 100) * pos
print('POS %=', pos, "S3=", s3)
```

#### Step 5:

```
from .ReturnKeywordsFromParagraph import
getKeyWordPercentage
keywordPercentage = getKeyWordPercentage(og,
stud_ans)
s4 = (2 / 100) * keywordPercentage
print('Keyword Compare %=', keywordPercentage,
'S4:', s4)
```

#### Step 6:

```
from .CosineSimilarity import findingCosineSimilarity
ot_len = og.split(" ")
std_len = og.split(" ")
o1 = len(ot_len)
s1 = len(std_len)
o11 = o1/2
cosineSimilarity = findingCosineSimilarity(og,
stud_ans)
s5 = (4 / 100) * cosineSimilarity
```

```
if(s5>2.0 and o11<s1):
```

```
print('Cosine Similarity:', cosineSimilarity, 'S5:', s5)
```

#### Step 7:

```
total = s2 + s3 + s4 + s5
total = round(total, 1)
print("Total Marks :", total)
return total
```

```
else:
```

```
return 0
```

#### Step 8: Stop

## IX. MATHEMATICAL MODEL

As python is used to code the algorithm or a library named NLTK is used. It consists of a list of common words such as prepositions and articles like a, an & the which have no use in the final answer evaluation, so they are removed. These common words are known as "stop-words". After they are been removed, the keyword existence in the answer is calculated using a sparse matrix. For keyword that exists as a word in the answer string, we put 1 in the cell. If the keyword is not present as a word in the list of words in the answer string, then 0 is placed in the cell. This way the sparse matrix is formed.

### Cosine Similarity

$$A = (1,0,1) \quad B = (0,1,1)$$

$$\text{sim}(A,B) = \cos \theta = \frac{A \cdot B}{\|A\| \|B\|}$$

You can use this information to compute a similarity index between two strings by applying cosine similarity to the vectors.

The following term is Term Frequency, which is simply the frequency of a term 't' in a document 'd'.

$$\text{TF}(d,t) = \text{number of occurrence of the term 't' in a document 'd'}$$

Where,

t is the term

d is the document

Another term to be introduced is Inverse Document Frequency, which simply refers to the term's importance in the corpus.

$$\text{IDF}(t) = \log(D / t)$$

Where,

t = number of documents and

D = total number of documents

The last term to be discussed is TF-IDF. It displays the word count as well as the importance of each word in a document or list of documents.

$$W_{x,y} = \text{tf}_{x,y} \log(N / \text{df}_x)$$

Where,

$Tf_{x,y}$  denotes the frequency of term  $x$  in document  $y$ .

$df_x$  denotes the number of documents containing term  $x$  &

$N$  denotes the Total Number of Documents.

### X. SYSTEM ARCHITECTURE

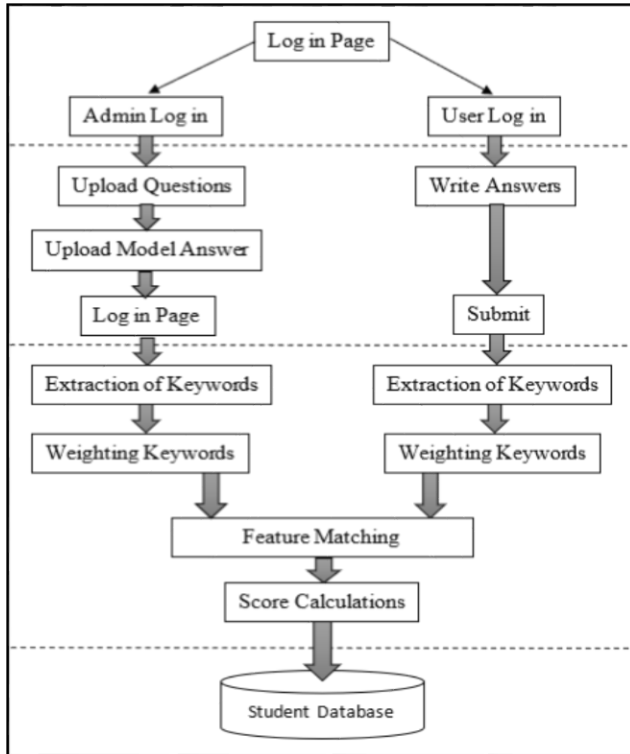


Fig 1: system architecture

The above figure represents the system which has been implemented in this paper which basically uses

- A login system for the faculty as well as the candidates.
- The faculty would have the authority to add questions as well as correct answers which would be consider for evaluation.
- The candidates need to login and choose their subject to start the corresponding exam.
- The correct answers and the responses submitted by the candidates would be compared and evaluated and scores would be stored the database.

### XI. ADVANTAGES

- High Efficiency.
- Online System.
- Being Online, Saves physical resources.
- Doesn't require a Human Examiner.
- Answers are estimated at that moment itself.
- The pupil can see the results and can correct the

miscalculations committed while appearing for the test.

- Faster Evaluation.
- Test Rigging, is not possible anymore.

### XII. DESIGN DETAILS

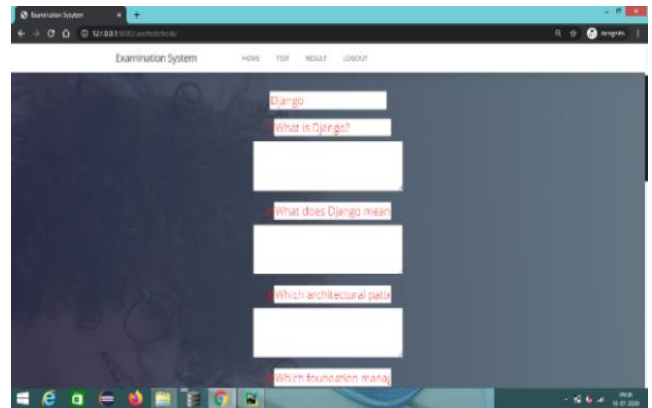


Fig 2: Examination Screen

As we see in the above figure the screen displays the Examination Screen which the candidate/examinee would be presented with at the examination scenario. The Subject is displayed to be “Django” and the questions with a text area to answer them are provided. Below in figure (3) the sparse matrix for three students who answered the question " What is Django?" can be seen.

Email	What is Django?	Answer Keywords	Django	Free	Open	Source	Web	Application	framework	Python	Marks
0 sai@gmail.com	Django is a free and open source web application framework, written in Python	[django, free, open, source, web, application, framework]	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	4.0
1 nandu@gmail.com	Django is a python based framework	[django, python, framework]	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.5
2 mouni@gmail.com	Django is python	[django, python]	1.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0

Fig 3. Applied algorithm of the online descriptive answer assessment system on answers generated by three students.

Here, the Keywords taken from the correct answer in the database are compared one by one from the keywords taken by the responses from the candidates. Every match found on the keywords is given index as 1.0 which is taken as 0.5 while calculating the final score. Now, if two keywords are matching is the sum of the matched keywords would be 0.5 + 0.5 = 1.0.

### XIII. CONCLUSION

Thus, we have studied & implemented these paper, “Indrashis Das, Bharat Sharma, Siddharth S. Rautaray.”, “An Examination System Automation using NLP.”, IEEE 2019, and according to the implementation, the conclusion is that It can be seen that by administering tests using such an algorithm at regular intervals, one can determine the trend in the marks obtained by different students and provide them



with an analyzed report on the various subjects in which they are weak. We can also use the existing data to train a predictive machine learning model to predict the grades that students will receive in the future. Sometimes it is seen that student has given the correct answer but gets quite less marks since the student has used completely different words compare to that of the teachers answer Furthermore, answers are evaluated in real time, and the student can see the solutions and correct any mistakes or errors made while taking the exam. Since in the old approach students must write at a consistent tempo to complete the exam in the allotted time, the students may initially find it challenging to finish the test in time. Here, the students must pass the exam while typing at a same speed. Now, those with slow typing speeds but superior fundamental knowledge or expertise in a certain field might feel unjustifiable.

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