

An Extensive Online Examination System With Automatic Assessment Technique

Sumaiya Kabir, Md. Parvez Hossain, Kaushik Mallik, Mansura Rahman, Md. Jahidul Islam, Ayesha Khatun

Abstract— An online examination system is a software solution, which allows any industry or institute to arrange, conduct, and manage examinations via an online environment. Online Examination is an essential ingredient in electronic and inter-active learning; both teachers and students are benefited from this. It's very much useful during the current situation of the global pandemic Novel Corona Virus (COVID-19). In this paper, we proposed a system with automatic assessment technique is generated. The algorithms for calculations word frequency, matching keywords, analyzing linguistics, generating grades are proposed in this system. The system is implemented by using Php Strom and My SQL. The performances of the system is evaluated with a large number of students and questions as well as answers, and we found the absolute (about 0.3%) and relative error (about 3.57%) which is quite satisfactory.

Index Terms— Examination System, Answer Script, Automatic Assessment, Script Assessment.

I. INTRODUCTION

ONLINE examination refers to an assessment system that relies on Internet-based software system for grading student performances. It allows anyone to attend an exam from home or anywhere through the Internet. In online examination, students can attend the exam online at their own time, and using their own devices, regardless of where they live. Students just need a browser and an Internet connection. We need a more time saving and more accurate examination system as the number of students are increasing day by day. The online Examination System is free for all and very user-friendly.

This paper was received on 20 May 2020, revised on 5 October 2020 and accepted on 13 October 2020. This work was supported financially by GUB.

S. Kabir is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: sumaiya@cse.green.edu.bd.

M. P. Hossain is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: parvez@cse.green.edu.bd.

K. Mallik is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: kaushik.gub@gmail.com.

M. Rahman is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: mansurarahman5751@gmail.com.

M. J. Islam is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: jahid@cse.green.edu.bd.

A. Khatun is with the Department of Computer Science and Engineering, Green University of Bangladesh, Dhaka, Bangladesh. E-mail: ayesha@cse.green.edu.bd.

The online examination system is very effective in time management. It is powerful and quick enough to decrease the usage of vast amounts of energy. The primary aim of this online exam system is to minimize the work of conducting the exam and allow anyone from anywhere to attend the exam. The online examination system is very important in urban areas like Dhaka, Chittagong, Rajshahi, Sylhet, etc. Dhaka, the capital of Bangladesh, is the world's most populous city. Dhaka City is home to more than twelve million residents. The number is rising day by day, and much of Dhaka is badly affected by massive traffic jams. Sometimes for the huge traffic jam students are unable to attend the examination in time. They stuck on the road for hours. In our country the political situation is unstable. Sometimes we face major problems for our political issues and cannot move from home for days because the public transportation is not so available and also it's not safe for students to move anywhere from their house. Also in any specific circumstance assessment procedure can be done online. Especially, when you can't ever imagine physical test/examination. We can take the current situation of the global epidemic-Novel Corona Virus (COVID-19) as an example. In this situation, the online examination system can help the students to attend their examination in time. In the village areas, students do not have many facilities. Sometimes they have to stay at their home because of family activities and so many reasons and they are unable to take part in their examination. But in the online examination system, they can attend the examination through the Internet.

As compared to traditional or remote approaches, the online review system provides a high degree of transparency. Compromising test questions and tests is almost difficult since they may not be affected as well. Many online tests produce their results instantly and it is also possible for the examiner to automatically obtain data on his results. In an online examination system, an exam is placed online, it results in significant cost savings. The expenses of paper copying and distribution are reduced or eliminated. The elimination of paper expenses alone is extraordinary. Computers that help save time are used in online review systems. With the universal usability of computers and the Internet, this scheme is commonly accepted and endorsed. With the online examination system, the long formalities and procedures involved in producing question papers, registering candidates for tests, reviewing answer sheets,

and announcing results are absolutely eradicated. Each student is precisely timed and all outcomes are instantly produced. There exists different types of examination system. Variants of examination system are discussed below.

A. Types of Exam

1) *Traditional Examination System*: Traditional examination system is the leading examination system all over the world. Student gather in a place to participate at the examination. They attend the exam with pen, paper and brain. [1]

2) *Open Book Exam*: It is not popular in our country. Sometimes quiz or programming based exam are held on open book exam. Students are granted to bring book with them during the exam and they are able to use book during answering. [2]

3) *Online Examination*: It is the new concept all over the world. In this system, students are able to attend the exam from home or anywhere. By using Internet they can participate at the examination. [3]

The rest of this paper is oriented as follows. Some related work has been described in section II. The details of our implementation are described in section III. In section IV, we have described our performance evaluation with impact of result analysis. And finally, we have turned out our conclusion with the direction of future works in section VI.

II. LITERATURE REVIEW

In Online Examination System, researchers are trying to change the traditional manual examination in the educational institution. It may help the said institution to nurture up and elevate the functionality of the institute. After surfing several educational web pages at home and abroad, we found countable number of online examination system. After going through several global online examination system, we found the following works worth notable.

Khan academy is founded by Salman Khan, an American citizen of Bangladeshi origin. Salman Khan was honored at Common Sense Awards gala. He is the year's Educator of 2020. In Khan Academy, they have many teachers to teach students. Their motto is to provide education for anyone, anywhere [4]. 10-minute school is founded by Ayman Sadiq. It is created on Bangladeshi schooling system. 10-minute school is online based educational platform and organization. It helps students for their university admission test and also board exams. 10-minute school also has some other videos for IELTS, G-MAT, G-RE. 10-minute school is such a great online educational platform for Bangladeshi students [5]. Independent learning center is a high distance education. In Independent learning center you can learn from anywhere and any time. There are no boundaries. The Independent learning center is founded in Ontario, a Canadian province [6]. Florida Virtual School is online platform-based school. They provided personalized learning. They have three categories and they are elementary school, middle school and high school. Florida Virtual School gives certification to their students [7]. BC online school is a Christian virtual school under the British Columbia ministry of education. They offer free courses.

Here students are able to take university degree based on religion courses [8]. Bangla language is spoken by 205 million native speakers in 2010 and is the seventh most spoken native language by population in the world [9].

If we consider various techniques to assess answer scripts automatically then, authors of paper [10] proposed some algorithms to assess the broad question answer scripts. They used a keyword matching technique to do it. Their work no comparison is provided for their result analysis. Authors of this paper worked with Bangla Language [11]. Another paper [12] also proposed algorithms to evaluate only Bangla answer scripts automatically.

Zhenming *et al.* developed a new online evaluation system based on a browser / server framework [13] that discusses and auto-grades critical questions and operational issues such as programming, Microsoft Windows service, Microsoft Word editing, Excel and PowerPoint editing, etc.

Aye *et al.* developed a system, which provides the framework for conducting computer-based exams that can be distributed through the candidates in large areas [14]. The system aims to map the real-world examination system and concentrate the entire examination phase from question-setting to answer assessment.

Yağci *et al.* provides for the design and implementation of the adaptive online assessment system [15]. And Trivedi *et al.* are proposing a new online examination method that will address almost all the disadvantages found in conventional online examination techniques [16]. The exam model offers a valid question presentation scheme and tackles all of the major problems faced by online examination systems. Authors of paper [17] proposed a soft keyboard for Bengali language and a noble text entry system for physically disabled people who have no hands. Authors of [18] proposed a rule based approach to translate Bangla idioms to English.

Jun *et al.* forward an online examination system based on web service and COM components [19]. Islam *et al.* develop an online review system appropriate for both academic and non-academic examinations [20]. In order to make the newly developed system more scalable and user-friendly in the context of Bangladesh, three online examination systems were examined before starting system design and development. Authors of [21] mentioned about Blockchain ledger which can be implemented for security and online exam management system.

Kotwal *et al.* developed an online examining system as a software solution that allows any industry or institution to plan, administer and manage exams in an online environment [22].

III. METHODOLOGY

Our developed system is able to assess the answer of descriptive question. The whole process will be done via online. Allocation of marks depending on the percentage of the accuracy exist in the answer.

A. Flow of the System

In Fig. 1 this system, examiner/examinee will be verified by user login module. In this process, examiner will set a question

also upload a model/standard answer of that question. After login an examinee will answer that question. Then the system will assess the answer of examinee by matching the keywords. It will also check the linguistic analysis. After the evaluation it will calculate the score according to the correctness of the answer. The whole process consists of 4 steps. These are :

- Keywords extraction
- Weighting keywords
- Feature matching
- Score generation

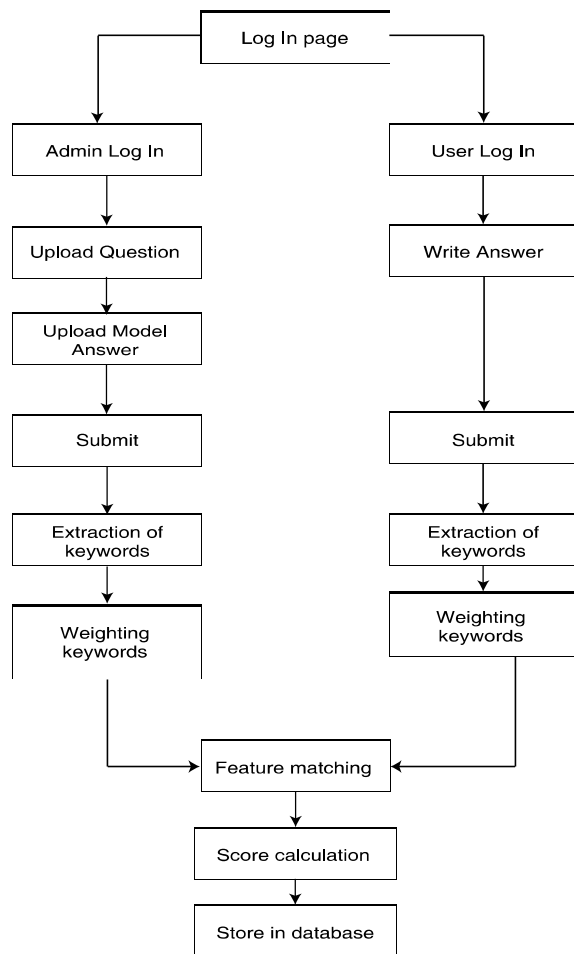


Fig. 1: Flow Diagram of Proposed Online Written Examination System

B. Login Module

Login module is design to verified the login for both admin/Examiner and user/examinee. After the authentication both admin and user can proceed this system individually.

1) *Admin login:* After the sign-up process, the admin is authenticated by using his/her user id and password. After the completion of authentication an admin can set question with a model answer which will not appear to user. Only the question will appear to the user and stored model answer will be used for comparison with the user’s answer for the same question.

2) *User login:* After the authentication of user, he/she can attempt the question if he/she full-fill all the criteria for the examination. The user will be provided the question a text-box for writing the answer of that question. After completing the answer user can submit the answer for assessment.

C. Feature Extraction Module

By this module system will extract the keywords from both the model answer and the answer submitted by user. It is an important process for the whole system. If the repetition of keywords is very often it will be given less value in the assessment process. If it doesn’t happen then it will allocate higher value for the assessment process. In this module keyword extraction is done by two steps:

1) *Preprocessing :* Answer from user may contain many unnecessary words and symbols such as: punctuation symbols, stop symbols, emotions symbols etc. These are considered as noise for the data which is going to be processed. In this step the system will remove the unnecessary words and symbols from data/answer. It also remove the articles, punctuation from data to simplify the data.

2) *Keyword frequency generation:* The system will do the keyword frequency generation after the preprocessing phase. It will classify all the keywords in this method and find the frequency ratio. He used the algorithm 1 for this operation. In this method, the array frequency set is initially null. Then it goes through the script of the entire answer and compares each word with the list. If it is not on the list, the word in the list is added as an index. The frequency of that word will increase if identified.

Algorithm 1: Algorithm for Calculating Word Frequency

```

1 Answer = Total answer after preprocessing;
2 Array frequency = null;
3 for Every words in answer do
4   if Word is not in the Array then
5     Add the word as index in the Array;
6     frequency[word] = 1;
7   else
8     frequency[word] = frequency[word] + 1;
9   end
10 end
  
```

D. Weighting Module

1) *Keyword:* We used the algorithm 2 for the keyword comparison to test the answer script after calculating the keyword frequencies from both the model response and the user’s answer. The following algorithm primarily follows three criteria in this process. If more keywords are detected than model answer, then the marks are reduced. It also does the same thing in the answer script if it finds very less keywords than model answer. With an adequate number of keywords that are similar to the model answer, students will get a good score.

Algorithm 2: Keyword Matching Algorithm [10]

```

1 SWFrequency =
  FrequencyResultOfStudentAnswer;
2 RWFrequency =
  FrequencyResultOfParsedAnswer;
3 Initial AAScore = 0;
4 Initial lengthSWF = Length of SWFrequency;
5 Initial lengthRWF
  =  $\sum$  AllValuesOfRWFrequency;
6 Initial WeightRWF = Empty Array;
7 for Every words in RWFrequency do
8   Add 'word' as index in WeightRWF;
9    $WeightRWF[word] = \frac{RWFrequency[word]}{lengthRWF} * 100;$ 
10 end
11 Initial lengthWRWF = Length of WeightRWF;
12 for Every words in SWFrequency do
13   if word is in WeightRWF then
14      $AAScore = AAScore + \frac{WeightRWF[word]}{lengthWRWF};$ 
15   else
16     Do nothing and Continue;
17   end
18 end
19 for Every words in SWFrequency do
20   if word is in RWFrequency then
21      $AAScore = AAScore + \frac{SWFrequency[word]}{RWFrequency[word]} * 100 + \frac{SWFrequency[word]}{lengthSWF};$ 
22      $RWFrequency[word] = 0;$ 
23   else
24     Do nothing and Continue;
25   end
26 end
27 for Every words in RWFrequency do
28   if RWFrequency[word] is not 0 then
29      $AAScore = AAScore - \frac{RWFrequency[word]}{lengthSWF} * 100;$ 
30      $RWFrequency[word] = 0;$ 
31   else
32     Do nothing and Continue;
33   end
34 end

```

TABLE I: Scoring scheme based on keywords and grammar

Keywords matching percentage	Obtained marks for keywords and grammar
80-100	100%
60-80	90%
40-60	80%
20-40	50%
5-20	30%
1-5	10%
0	0%

2) *Grammar and Spelling*: Finding the correctness of grammar and spelling is one of the main issues for assessing the answer script. We have used the algorithm 3 for the method of linguistic research. It initially puts the linguistic analysis score at zero in this process. Then, in the answer document, it measures the number of spelling errors, grammatical errors, the total number of words, and sentences. The number of spelling errors is then divided by the total number of terms and multiplied by 100. Similarly it divides the number of grammatical mistakes by the total number of sentences and multiply by 100 and add both the values.

Algorithm 3: Linguistic Analysis Algorithm

```

1 String answer = Total answer of the student;
2 Initial LAScore = 0;
3 Initial SMistake = Number of spelling mistakes;
4 Initial GMistake = Number of grammatical mistakes;
5 Initial TWord = Number of Words in answer;
6 Initial TSentence = Number of Sentence in answer;
7  $LAScore = \frac{SMistake}{TWord} * 100 + \frac{GMistake}{TSentence} * 100$ 

```

3) *Score generation*: After performing the frequency calculation of the keyword and generating linguistic score algorithms, the algorithm 4 will be used to calculate the final score. Where the actual mark determined from keyword matching is considered by 80% of full marks and the linguistic analysis score is obtained by 20% of full marks. Our main concern is to assess students in terms of their learning that's why our main focus on keywords from corresponding topics and less focus on spelling and grammatical mistakes. For this calculation we have followed the criteria shown in Table I and Table II.

Algorithm 4: Grading Algorithm to Assign Mark [12]

```

1 StudentMark = 0;
2 FullMark = N;
3 ActualMark = 0.8 * N;
4 GSMark = 0.2 * N;
5 for Words in WeightSA do
6   if WeightSA[word] is positive then
7      $ActualMark = (N * WeightSA[word]) + ActualMark;$ 
8   else
9      $ActualMark = \frac{WeightSA[word]}{NeededWord + UnnecessaryWord} + ActualMark;$ 
10  end
11 end
12  $GSMark = TGSMscore * GSMark;$ 
13 FullMark = ActualMark + GSMark;

```

IV. PERFORMANCE EVALUATION

A. Environmental Setup

We evaluate the developed tool under the following environment:

- **Operating System:** Windows 10 64bit

TABLE II: Score Generation Criteria

Criteria	Percentage of Marks Distribution
Keyword	70
Grammar	30=15+15
i) Spelling	15
ii) Sentence Formation	15

TABLE III: Absolute and Relative Errors for proposed system

Number of Teachers	Average Score given by Teachers	Score given by the system	Absolute Error	Relative Error
5	8.56	8.10	0.46	5.37%
10	8.25	8.40	0.15	1.81%
15	8.40	8.70	0.30	3.57%

- **Processor:** Intel Core i7-2.00 GHz
- **RAM:** 16 GBytes
- **IDE:** PhpStrom
- **Database:** MySQL
- **Server:** XAMPP

B. Minimum Hardware Requirements for OES

We found the online examination system is available in online using many platforms from Node.js to PHP and most of them are quite impressive too. The following hardware requirements is necessary for our system:

- Processor : Core i3 processor
- RAM : 4 GB
- Hard Disk : 50 GB or more
- Monitor : Standard color monitor
- Keyboard : Standard keyboard

C. Results and Performance

To experiment with our system we gave 10 students 20 questions to answer. Each student answered two questions and each answer contains 300-350 words in English/Bangla. Our volunteers/teachers review each of the response scripts and give each answer a score. Every issue was a mark of 10. We also use our proposed system to test the response scripts. We measured the Absolute and Relative Errors dependent upon the results, and found Table III.

Using formula 1 and 2, we can calculate the relative error and absolute error respectively.

$$AbsoluteError = ActualValue - MeasuredValue \dots(1)$$

$$RelativeError = \frac{AbsoluteError}{ActualValue} \times 100 \dots(2)$$

Where in formula 1 the actual value is the teacher’s score and the calculated value is the system’s score. We also see in Fig. 2, which is the graph of Questions Vs Relative error, the relative error of response script of each or the questions are given.

As resources are difficult to find in Bangla and English Language and there is no such kind of work found in the past, our work is merely an initiative. But the relative error that is observed in our system can be accepted as it is only

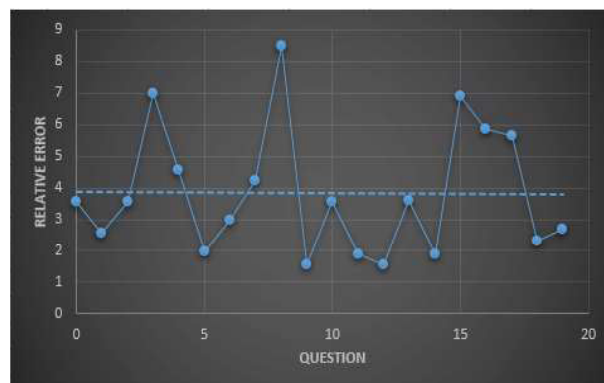


Fig. 2: Questions Vs Relative error

the start. We hope our research will improve in the future. The whole idea will need to be applied in the future, to make it simpler and quicker. To make the system more robust, new parameters can be introduced, and synonyms of terms can be verified. Machine Learning algorithms can be used to make the system more efficient. For different types of sentences our proposed method should be implemented. Details from handwritten answering scripts should be taken to make it more realistic in the real word.

V. CONCLUSION

The form of examination is changing day by day. In today’s world, most of the competitive exams are conducted online. The online examination system is attaining popularity every day. Because they are time-efficient, cost-efficient, and secure. Although having enough time and facilities to overcome any limitations to build competitive software which is proposed, a few gaps couldn’t be overcome. This work can be redefined or renovated through an architect’s captivities and time stability and also sponsorship matters. In any specific circumstance, an assessment procedure can be done through this platform. Especially, when you can’t ever imagine physical test/examination. The current situation of the global epidemic-Novel Corona Virus (COVID-19) can be considered as an example. Besides, the functionality of the video system during the examination, image processing to find the real student, the addition of more classifier algorithms, and the implementation of an android app can be added for examination to make the proposed system more efficient.

REFERENCES

- [1] T. E. System. Traditional exam system. [Online]. Available: http://en.banglapedia.org/index.php/?title=Public_Examination_System
- [2] O. B. Exam. Open book exam. [Online]. Available: <https://www.merriam-webster.com/dictionary/open-book20examination>
- [3] O. Examination. Online examination. [Online]. Available: <https://www.onlineexambuilder.com/knowledge-center/exam-knowledge-center/how-online-examination-system-works/item10244>
- [4] K. Academy. (2007) khanacademy. [Online]. Available: <https://www.khanacademy.org/>

- [5] . M. School. (2015) 10minutesschool. [Online]. Available: <http://10minuteschool.com/>
- [6] I. L. Center. (2010) ilc. [Online]. Available: <https://www.ilc.org/>
- [7] F. V. School. (1997) fvs. [Online]. Available: <https://fvs.net/>
- [8] B. O. School. (2006) Bc. [Online]. Available: <https://bconlineschool.ca/>
- [9] M. G. Hussain, T. Al Mahmud, and W. Akthar, "An approach to detect abusive bangla text," in *2018 International Conference on Innovation in Engineering and Technology (ICIET)*. IEEE, 2018, pp. 1–5.
- [10] T. Al Mahmud, M. G. Hussain, S. Kabir, H. Ahmad, and M. Sobhan, "A keyword based technique to evaluate broad question answer script," in *9th International Conference on Software and Computer Applications (ICSCA 2020)*, ser. ICSCA 2020. New York, NY, USA: Association for Computing Machinery, 2020, p. 167–171. [Online]. Available: <https://doi.org/10.1145/3384544.3384604>
- [11] M. G. Hussain, M. Rashidul Hasan, M. Rahman, J. Protim, and S. Al Hasan, "Detection of bangla fake news using mnb and svm classifier," in *2020 International Conference on Computing, Electronics Communications Engineering (iCCECE)*, 2020, pp. 81–85.
- [12] M. G. Hussain, S. Kabir, T. Al Mahmud, A. Khatun, and M. J. Islam, "Assessment of bangla descriptive answer script digitally," in *2019 International Conference on Bangla Speech and Language Processing (ICBSLP)*. IEEE, 2019, pp. 1–4.
- [13] Y. Zhenming, Z. Liang, and Z. Guohua, "A novel web-based online examination system for computer science education," in *33rd ASEE/IEEE Frontiers in Education Conference*, 2003, pp. 5–8.
- [14] M. M. Aye and M. M. T. Thwin, "Mobile agent based online examination system," in *2008 5th International Conference on Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology*, vol. 1. IEEE, 2008, pp. 193–196.
- [15] M. Yağci and M. Ünal, "Designing and implementing an adaptive online examination system," *Procedia-Social and Behavioral Sciences*, vol. 116, pp. 3079–3083, 2014.
- [16] A. Trivedi, "A relevant online examination system," in *2010 International Conference on Technology for Education*. IEEE, 2010, pp. 32–35.
- [17] A. I. Pritom, M. G. Hussain, M. Z. Chowdhury, and J. Protim, "A combined linguistic-movement model based bengali text entry method for physically handicapped people," in *2020 IEEE Region 10 Symposium (TENSYP) 5-7 June 2020, Dhaka, Bangladesh*, 2020.
- [18] A. Khatun, M. G. Hussain, M. J. Islam, S. Kabir, and M. Mahin, "An empirical framework of idioms translator from bengali to english: Rule based approach," in *2020 IEEE Region 10 Symposium (TENSYP) 5-7 June 2020, Dhaka, Bangladesh*, 2020.
- [19] L. Jun, "Design of online examination system based on web service and com," in *2009 First International Conference on Information Science and Engineering*. IEEE, 2009, pp. 3276–3279.
- [20] M. Z. Islam, M. M. Rahman, and M. K. Islam, "Online examination system in bangladesh context," *International Journal of Science, Environment and Technology (IJSET)*, vol. 2, no. 3, pp. 351–359, 2013.
- [21] M. P. Hossain, M. Khaled, S. A. Sajju, S. Roy, M. Biswas, and M. A. Rahaman, "Vehicle registration and information management using blockchain based distributed ledger from bangladesh perspective," in *2020 IEEE Region 10 Symposium (TENSYP) 5-7 June 2020, Dhaka, Bangladesh*, 2020.
- [22] D. V. Kotwal, S. R. Bhadke, A. S. Gunjal, and P. Biswas, "Online examination system," *international research Journal of Engineering and Technology*, vol. 3, no. 1, pp. 115–117, 2016.



Ms. Sumaiya Kabir was born in Barisal, Bangladesh, in 1989. She received the B.Sc. in Computer Science and Engineering degree from Patuakhali Science and Technology University (PSTU) in 2012 and M.Sc. in CSE from East West University (EWU) in 2017. At present she is working as a senior lecturer & program coordinator (Day) of department of Computer Science and Engineering in Green University of Bangladesh (GUB) from 2013 to present. She is a member of Image Processing and Computer Vision and Software Engineering research groups. Her research interest includes semantic web, web 3.0 architecture, ontology designing and semantic knowledge engineering.



Md. Parvez Hossain was born in Cumilla, Bangladesh, in 1994. He received the B.Sc. in Computer Science and Engineering degree from Green University of Bangladesh (GUB) in 2019. At present he is working as a lecturer of department of Computer Science and Engineering in Green University of Bangladesh (GUB) from September 2019. His research interest includes image Processing, BlockChain, Computer Vision, Data Science and Machine Learning.



Kaushik Mallik was born in Gopalgong, Bangladesh, in 1995. He received the B.Sc. in Computer Science and Engineering degree from Green University of Bangladesh (GUB) in 2018. At present he is working as a software engineer at ProximaSoft from March 2019. His research interest includes image Processing, Big Data, Algorithms and Machine Learning.



Mansura Rahman was born in Sylhet, Bangladesh, in 1994. She received the B.Sc. in Computer Science and Engineering degree from Green University of Bangladesh (GUB) in 2018. Her research interest includes Computer Vision, Software Engineering and Machine Learning.



Md. Jahidul Islam was born in Sirajgonj, Bangladesh, in 1991. He received the B.Sc. and M.Sc. degrees in Computer Science and Engineering from Jagannath University (Jnu), Dhaka, in 2015 and 2017 respectively. Currently, he is working as a Lecturer and Program Coordinator (Day) at Computer Science and Engineering (CSE), Green University of Bangladesh (GUB), Dhaka, Bangladesh since May 2017 to present. He is a member of Computing and Communication and Human-Computer Interaction (HCI) research groups, CSE, GUB. His research interests include Internet of Things (IoT), Blockchain, Network Function Virtualization (NFV), Software Defined Networking (SDN), Digital Forensic Investigation (DFI), HCI, and Wireless Mesh Networking (WMN).



Ayesha Khatun was born in Dhaka, Bangladesh in 1994. She received the B. Sc. Degree in Computer Science & Engineering, Chittagong University of Engineering & Technology (CUET). At present she is working as a Lecturer and Program Coordinator (Day), Dept. of CSE, Green University of Bangladesh. She achieved scholarship for Higher Study, Wide space Bangladesh Limited, Merit scholarship every year, Department of CSE, CUET. She was also the 2nd Runners up in ICT National Android Application Development Training 2015, Ministry of Information and Communication Technology Division. Her research interests include application of Natural Language Processing, Bangla Language Processing, Data Mining, Artificial Intelligence, and Internet of Things.