EDUEASY – SMART LEARNING ASSISTANT SYSTEM

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DECLARATION

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The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor Date

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(Dr. Anuradha Karunasena)

Abstract

The web application “EduEasy – Smart Learning Assistant System” for the CDAP module is a research project that aims to develop a creative IT solution with which self-learning university students can get a clear idea about their lectures and improving the students' self-learning skill level by investigating how students learn with using internets. Develop an E-learning application for students to effectively learn and revise lectures done at the university. Nowadays most of the students doing jobs and studying. Sometimes they couldn’t participate in lectures properly. So using this web application they can learn those lectures. “Question & Answer presenter” is one of the objectives regarding the EduEasy web application. Because of this component students can get more questions and answers using this system. Most of the students struggle near the exams. Because they couldn't found relevant questions and answers regarding their module. Using this application students can get relevant questions and answers using key phrases. This is an automatic Google search by using the “Question & Answer presenter” component.

A Natural Language Generation activity of critical importance for self-directed learning is question generation from the text. The question generator analyzes each sentence and generates wh-questions and gap-fill questions according to text.

Question Answering (QA) System is very useful as most of the deep learning, machine learning related problems can be modeled as a question answering system. Consequently, the field is one of today's most studied computer science fields. The last couple of years have seen major advances and changes in the state of the art, many of which can be traced to Deep Learning growing up. So, it is expected that the proposed QA system can present reasonable answers to questions about Python language.

ACKNOWLEDGEMENT

Working on this project on the “EduEasy - Smart Learning Assistant system” was a source of immense knowledge for us. We would like to express my thanks of gratitude to all those who provided me the possibility to complete this project. A special gratitude we give to Dr. Janaka Wijeykoon, the Lecture-in-charge of Comprehensive Design and Analysis Project, Dr. Anuradha Karunasena, our project supervisor & Ms. Pradeepa Bandara, our co-supervisor, whose contribution in stimulating suggestions and encouragement helped us to complete the research project.

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LIST OF ABBREVIATIONS

GUI - Graphical User Interface

LMS – Learning Management System

FAQ - Frequently Asked Questions

NLP - Natural Language Processing

NLTK - Natural Language Toolkit

API - Application Programming Interface

QG – Question Generator

QA – Question Answering

SDK – Software Development Kit

SDLC – Software Development Life Cycle

SRS – Software Requirement Specification

1. INTRODUCTION

1.1 Background

The popularity of mobile devices and laptops such as desktops has led to major changes in each field of society. These tools for enhancing the convenience of individuals have caused major changes in the field of education also. In particular, the introduction of smart equipment such as electronic blackboard and smart LMS (learning management system) provides a smart learning environment of education. With the spread of these smart devices, some researches attempt to improve the educational effects by applying these educational tools to the educational environment. Globally many countries have participated in projects focused on smart education. Any smart schools are targeted at supporting their country to support the 21st-century workforce by using and allowing leading-edge technology in classrooms. And the smart schools concentrate not only on increasing the students' thinking, creativity, and empathy but also on understanding the individual variations and learning styles among their learners. The method of gaining expertise and comprehension is conventionally known as learning. This results in a new desire to do anything, and an awareness of something that has not been experienced before. Competence is often defined in terms of having unique abilities, comprehension in terms of having common information. The 21st-century demands skills and competence from the student to function and live effectively at work and leisure time. Education must train workers for the demand. Thus, smart education aims to enable smart learners in the 21st century to meet the needs of work and life.

With rapid technical developments, anything could be instrumented, interconnected, and packed with intelligent design, as is education. Smart education has achieved attention in the last few years. Education programs with a focus on smart education have been rolled out internationally in recent years. (E.g. Chan 2002; Choi and Lee 20122; Hua72012; IBM820124; Kankaanranta and Mäkelä 2014). In 1997, Malaysia initially launched the Malaysian Smart School Implementation Project (Chan 2002), a smart education program. The goal of smart schools funded by the government is to

strengthen the education system to fulfill the National Vision of Education and to train staff for the demands of the 21st century. The project aims at promoting 21st-century learning with user-driven and motivational learning solutions (Kankaanranta and Mäkelä 2014). In 2012, the United Arab Emirates (UAE) started investing in a smart learning program called the Mohammed Bin Rashid Smart Learning System (MBRSLP), which aims to shape their national schools ' modern learning environment through the implementation of smart learning classes. Overall, smart education focus and developments have become a new trend in the global educational field.

In this emerging world of computers, smart devices almost all-manual systems have switched to automated systems and computerized systems. We are developing the "EduEasy – Smart Learning Assistant System" web application to model worldwide smart learning systems and add the more important feature which we want. This research investigates how computer technologies can be used to solve students' challenges and improve productivity and effectiveness. Besides, it allows students to get more specific questions and use these processes by using a special algorithm that automatically scans Google and finds the most acceptable answers to the question combinations, as well as the students can create questions using this Question Presenter part. Due to those problems, this solution introduces a web application.

Today, education is the most important and valuable way of achieving success. Proper examinations and smart learning systems help students to improve their quality. So, having proper questions is very necessary. The traditional way of generating questions have been manual. Here proposing an Automatic Question Generator System. Every task performed by this system is automated so that storage space, bias, and security is not a concern anymore. The proposed system can be helpful to many educational institutes in Sri Lanka and the world.

Question generation can help a person or student to generate questions from the given text or paragraph automatically. It is a process in which given an input text to the proposed system it will create reasonable questions from the input as output. The potential advantages of using automatic question-generating systems help reduce student's reliance on the production of questions and other needs associated with

systems that communicate with natural languages. The generation of questions can be extended in many areas, such as intelligent tutoring programs, generation of MCQ, generation of FAQs, etc. The automatic question generation system is an important research area that is potentially useful systems, dialogue systems, educational technologies, instructional games, etc. Since the last few years, Automatic Question Generator from text and paragraphs has caught the attention of the NLP community through the question generation workshops and the shared task in 2010 (QGSTEC, 2010).

The Question Presenter component will take a paragraph as input and generate important questions from the important sentences extracted from the paragraph. It will generate different WH type of questions from those selected texts and sentences. The questions will be generated from both the complex and the simple sentences by analyzing each sentence. It will consider only those complex sentences which consist of the following discourse connective: because, and, since, when, as a result, for example, for instance.

Question Answering systems are mostly divided into two parts. Those are closed and open domain. Closed domain systems answer questions within a specific knowledge domain area or to only various types of questions. They target precision, rather than coverage. Dealing with a limited knowledge reach enables QA systems to return to smaller volumes of detail, generally organized data such as ontologies. To be as precise as possible in their responses, programs aim to take full advantage of natural language processing techniques for such minimal, formalized, and organized data. Open-domain systems answer questions about almost everything on the internet. These systems rely on far greater volumes of data, using more unstructured data and general ontology, than closed-domain QA systems. Their primary aim is to provide de factoid answers to world information issues.

And also recently, there are so many search engines available in the world. Many of these search engines have tremendous popularity and impressive functionality, but the key issues with these search engines are that instead of giving a direct, correct, and reliable response to the user's query they typically have a list of website-related

documents that could provide the answer to that question. Although there is a lot of information about the search subject in the list of documents that are collected by the search engine, often it does not include the correct information that the user is searching for. The key goal of the Question-Answer method is to provide a concise answer to a user's query instead of digging for a search-related database list. Users just have to ask the question and the system will retrieve the most appropriate and correct answer for that question and it will give to the user.

The problem of making a fully functional QA system is one problem that has been quite popular among researchers around the world. A QA presenter implementation usually a Google search and display correct short answers for the users. For implementing the Question Answering system, most of the researchers working in various domains such as Web Mining, NLP, Information retrieval, and information extraction and so far focused on open-domain QA and close domain QA systems. Systems can be divided into two types based on the domain; closed domain question answering system refers to specific domain related questions. The open-domain question answering system deals with the questions which are related to every domain.

"Question & Answer presenter" is one of the most important things in this project. By using these components find exact important questions and find answers online relevant to different parts of the lectures. Using this application students can get relevant questions and answers using key phrases. This is an automatic Google search by using the "Question presenter" component. The rapid growth of information technology is a huge experience at this time. Then the university students are the most valuable thing in the world. One day they can change the world. So lecturers always trying to give the best knowledge. Every human's brain capacity is deciding on during childhood and teenage. Because of this, all the students can't understand everything in the lecture hall. So they want to self-study. And also if they want a question regarding their lecture topics, it can be solved using "Question presenter".

And also in the existing smart learning assistant systems do not cover all the things. Therefore most of the time students have to wait for a find suitable question regarding their modules. This is a waste of student learning time. This is a waste of student's time, effort, and also for the find question process manpower required. And also a lot of Google search. By developing our web application we can overcome these limitations and students will allow finding the relevant questions using automatically Google search online with many more facilities. Therefore this system will save time, effort and it will be ease in studying. Then the dived stage according to the learning skill level of students and help to develop the students answer the question correctly.

1.2 Literature Survey

The team sought and studied various patents, research papers, documents, and newspaper and magazine articles from different scenes in the literature review of this project. Smart learning is a modern instructional model, focused on smart devices and smart technology (Lee et al. 2014; Kim et al. 2011). As identified and heavily studied over the last decennia, technology can be implemented and utilized in helping learners learn. This is described as technology-enhanced learning. Technology-enhanced learning is used to provide flexibility in the mode of learning and education.

The Question & Answer (QA) system finds exact important questions online relevant to different parts of the lectures and whole lecture. Using this application students can get relevant WH questions according to summarized note. Automatic Question Generation Using Natural Language Processing [4] developed a system in which take input in form of the text file or paragraph from the user which contains the text upon which the user desires to fetch questions; the output is produced in form of a text file or paragraph containing questions based on Bloom's taxonomy. This program takes a text file as an input and generates questions by analyzing each sentence and each paragraph. The importance of generating questions based on Bloom's taxonomy helps students to produce questions that help to test their learning abilities. By deploying agents, the suggested system allows us to create questions, agents perform different

operations such as paper preparation, detection of information, and generation of queries. So the system may also be called a multi-agent system. The tree tagger method and stemming method is used in Paper Preparation to remove the human method. Knowledge classification takes a list of Data Processing produced keywords and seeks the group of such terms in Bloom by finding the relevant action verb in the repository that matches the given keyword. The question generation module takes the result of classifying knowledge as data to produce queries. A method is a prototype-based approach, which matches the specified keywords according to the degree of Bloom in the question prototype. A paragraph will be taken as input by the Question Presenter and will produce relevant questions from the key sentences derived from the paragraph. It will generate different types of WH questions from those selected sentences and paragraphs. The questions will be generated from both simple and complex sentences according to the given text. Significant information about the content of a text is presented by key phrases. Two techniques have been tested for the automated retrieval of key phrases. To train the machine, supervised strategies require labeled data that appear to be more precise but also more limited. Unsupervised approaches do not require training sets and tend to be applied to broader areas of expertise, but they are also less essential.

A new method for keyphrase extraction called GenEx was also developed by Turney [13], which is based on a series of parameterized heuristic rules tailored to a genetic algorithm. Frank et al. [14] applied a keyphrase extraction classifier for Naive Bayes on the same data Turney used which improved the results. Examples of supervised approaches to keyphrase extraction include both GenEx and the Naive Bayes classifier. Supervised methods usually require an annotated training set which is often not feasible.

The main phrases are sentences (sometimes single words) that are the best goals for question generation (by any measure). Various methods for defining these main words have been introduced. Until delving into query generation at the sentence level, one method borrows techniques from automated summarization to define all the primary phrases from an entire document[8]. Another way is to accept main phrases as the

subject, item, and prepositional phrases comprising a named entity[9]. Other words, such as adverbials, have also been expanded to use the latter approach[10].

Automatic question generation focused on discourse connectives[15], question generation framework divided into two modules collection of content and forming of questions. The content collection consists of identifying the appropriate element of the question from the text to the frame, while question creation includes the disambiguation of the relations of the argument, the recognition of the sort of question, and the introduction of syntactic changes to the material. The researcher focuses on seven connective discourses like since, as a result, for example, and on that basis, question form can be determined as if sentence consists because then question type will be "Why." The method was tested by two assessors for the semantic and syntactic soundness of the question.

For self-directed learning, the textual query generator is of critical importance. It has been demonstrated[11] that interviewing is an efficient way to make learners understand more. Unfortunately, multiple studies have shown that students are mostly oblivious of their expertise, barely ask questions, and prefer to ask superficial questions[12]. From a broad range of channels, learners have access to learning materials, and these materials are not always accompanied by questions that help facilitate learning.

With no standardization, current tests of relational keyword search frameworks are ad hoc. Webber[7] describes the current search-effectiveness tests. While the criterion was created by Coffman and Weaver [5], their analysis did not provide any success appraisal. A. Baid[1] believes that many current keyword search strategies are behaving unpredictably due to unacceptable1response times or struggling to generate results even after exhausting memory. This argument is supported by the results, especially by the broad memory footprint of the systems. Several hierarchical keyword search frameworks beyond those used in this review have been released. L. Chang[4] and Kshirsagar and Sudarshan[3] all offered keyword search tutorials inside databases. X. Yu offers an outstanding description of the methods used in the reference keyword search.

One problem which has become very common among researchers is the problem of creating a completely functioning question answering method. An implementation of a

QA presenter usually scans Google and shows a correct short answer. Most of the researchers working in different domains such as Data Mining, NLP, Knowledge Recovery, and Information Extraction have been concentrating on open-domain QA and close-domain QA method for application of the QA method. Based on the topic, programs can be classified into two types; Closed-domain addressing questions applies to a unique topic relevant questions. Open-domain question-answering answers the questions associated with each domain. The work in [2] gives each of the sentences a score to obtain from the text all of the important sentences. Now, to solve the issue, they do similarity matching between the obtained sentences and user queries. This proves to be a reasonably good strategy, but to solve the question, the solutions are not necessarily framed properly. The AQUA system [6] divides the sentence into the subject, verb, propositional sentences, adjectives, and goals among its different steps for the processing of a question. Similar to QACID, it generates a semantic query representation that is used by search algorithms when attempting to locate a reaction in the knowledge base.

1.3 Research Gap

There are many solutions built for the Smart Learning Method, according to the research papers and tools available. So far, smart learning has not been an easy, coherent term. Multidisciplinary academics and educational experts are actively discussing the concept of smart learning. The environment for intelligent learning is usually fruitful, effective, and engaging. The learner is still seen as the center of the smart learning universe. And the smart learning ecosystem aims to offer self-learning, self-motivated, and customized resources that allow students to attend classes at their speed and access customized learning material based on their differences. Koper (2014) suggested identifying smart learning environments as physical environments enhanced with the interactive, context-aware, and adaptive Zhu et al. Apps for smart learning environments, which facilitate easier and quicker learning.

Nowadays in Sri Lanka also using Smart learning systems to study. But all these systems do not have any special functionalities. But the “EduEasy – Smart Learning Assistant System” web application which we are going to develop has many more functionalities other than the basic smart learning systems. As well as “Question Presenter Component” is one of the special function rather than others. Using this application students can get relevant questions using summarized notes. This is an automatic Google search by using the “Question presenter” component and give the correct answers for those questions. These things make this component unique. The students can select the summary note from the scheduled lectures and can get questions using this component. And also students can get short correct answers using this component. It gives us to correct answers by using the internet. It will be done by systems automatically. The method of gaining expertise and comprehension is conventionally known as learning. This results in a new desire to do anything, and an awareness of something that has not been experienced before. Competence is often defined in terms of having unique abilities, comprehension in terms of having common information. Our nation's economic fact is that most university students today compose of working students for a day. And also those students trying to do work schedules with their study. Such students are attempting to think about themselves. But students also face lots of problems close to the tests. Since they are unable to find sufficient questions and solutions for their lectures. Therefore, this factor has become increasingly important in Sri Lanka university students as well.

Many current smart learning applications now use the same tools to improve the expertise of the students, and these applications do not have any special features to find important questions using unique key phrases. But all of those smart learning applications effectively offer the students some questions. Not all of the students are successful. But students can get lots of answers to questions about their lecture topics using this component "Question Presenter." This is this component’s unique function. In our “Question Presenter,” component system is capable for increase answering the questions skill level. It’s very useful for students to study. These features that we described above have a specific effect on our system, and the questions we want from the systems are easily identified by learners.

2. RESEARCH PROBLEM

As described in the current smart learning framework, internet-based students manually search relevant questions and answers. That is why students have to spend a lot of time identifying the most suitable relevant questions about their lecture subjects. This is a waste of student time, commitment, and even of the manually executed searching process. Students were often unable to find relevant topics. As well as there's no way to quickly search Google for answers and get more specific replies. So when students manually seeking questions, they couldn't seek important questions about their lectures. Students will get more fitting questions and answers for their lectures by using this question presenter part.

And now students are bored with writing the answers to the questions because they couldn't find a good issue for their lectures. Thus students can quickly address certain questions using this "Issue Presenter." Since developing a system for all Sri Lankan students, the system that is being built would be targeted at Sri Lankan university students.

3. OBJECTIVES

3.1 Main Objectives

- Develop an E-Learning application for students to effectively learn and find relevant questions regarding the lectures done at the university.
- Get the summarize note and generate WH-questions analyzing each sentence and paragraphs.
- If the user wants can generate Gap-Fill questions according to summarize note.
- Develop the QA system. Here user can search their questions. It will automatically Google search and display answers.

3.2 Specific Objectives

- To identify any gap(s) exist with the features of existing smart learning systems.
- Design a high-level architecture of the expected system.
- Identify the best suitable machine learning algorithms to automatically Google search and get the correct output.
- Allocate work to each member.
- Development of each function.
- Testing and validation

4. METHODOLOGY

4.1 Methodology

The proposed "EduEasy – Smart Learning Assistant System" is a smart assistant system the has the capability of,

- Reference Finder

  Develop an algorithm to identify important keywords from the notes. To create a method to search for online references using those keywords. Develop a method to select the most suitable results.

- Note Taker.

  Develop a method to create a transcript of the voice recording. Create an algorithm to identify the important parts of the voice record. After that finally create a summarized lecture note by removing unnecessary parts.

- Slide Matcher

  Create an algorithm to identify unique keywords/phrases which are common to both lecture slides & the summarized note. Finally, create a method to match lecture slides with a particular area of the note. Develop web applications.

- Question Presenter.

  Develop a system to identify important keywords from the notes. After that create a method to search for online relatable things using those keywords. Those outputs will display is an automatic Google search by using the "Question presenter" component. To develop a method to generate questions regarding the summarized note and give the answers to those questions by using the internet. Those outputs will display is automatic.

In this implemented system, "Question Presenter," we will use the Hierarchical Keyword Search technique to render Sophisticated Information Retrieval System and produce questions using paragraphs. The current system in which many existing search techniques for practical retrieval tasks do not produce sufficient results. Memory management consists of several retrieval methods, in particular, programs. In previous assessments, we will illustrate the relationship between execution time and various variables; our analysis suggests that these variables have moderately little output dispute. In short, our study would affirm the previous argument that these strategies have unacceptable operating efficiency and point out the need for accuracy as represented by the NL region when we are going to analyze these recovery systems.

Students may want to send any questions and answers about the related section when referring to the summarized note. In search engines, students should then have to find sample questions by manually searching. Most students are unable to find the best answers to these questions. The student's time would then waste, and they will not find sample questions and responses at times. The EduEasy application has a method of specifically searching the questions and answers. Sample questions about the related lecture element are explicitly given by the Question & Answer presenter section. What's crucial is that the QA presenter gives the right short answers to the given questions.

The “Question Presenter” component can be divided into two main objectives. The main objectives of this component will be to Generate Questions based on the summarized note (Automatic question generation by using NLP). The next main objective of this component is to search online answers for relatable questions using keywords.

This component's main objective is to produce questions based on the summarized notice (Automatic generation of questions using NLP). A text file was forwarded to the program as an argument. By interpreting each sentence, this program takes a summary text file as an input and produces questions. This summarized note or paragraph file is read using a python package called text bolt. And also each paragraph is further broken down into sentences using the function **parse(string).** And also, each sentence is passed as a string to function **genQustion (line).**

These are the part-of-speech tags that are used in this system.

NNS	Noun, plural
JJ	Adjective
NNP	Proper noun, singular
VBG	Verb, gerund or present participle
VBN	Verb, past participle
VBZ	Verb, 3rd person singular present
VBD	Verb, past tense
IN	Preposition or subordinating conjunction
PRP	Personal pronoun
NN	Noun, singular or mass

With the use of condition statements, each sentence is parsed using English grammar rules. A dictionary named bucket is developed, and part-of-speech tags are attached to it. A query sentence is successfully produced by the sentence that gets parsed. The produced list of questions is printed as production. The input text and the query produced below are given.

----------INPUT TEXT----------

The flute is an Indian classical instrument. Akhil plays Flute and Guitar.
Polsambol is a Sri Lankan dish made of rice and tamarind.
Mahagamasekara writes books.

Osmosis is the movement of a solvent across a semipermeable membrane toward a higher concentration of solute. In biological systems, the solvent is typically water, but osmosis can occur in other liquids, supercritical liquids, and even gases.
When a cell is submerged in water, the water molecules pass through the cell membrane from an area of low solute concentration to high solute concentration. For example, if the cell is submerged in salt water, water molecules move out of the cell. If a cell is submerged in freshwater, water molecules move into the cell.

Raja-Yoga is divided into eight steps, the first is Yama -- non - killing, truthfulness, non - stealing, continence, and non - receiving of any gifts.
Next is Niyama -- cleanliness, contentment, austerity, study, and self - surrender to God.

----------INPUT END----------

Generated questions.

Question: What is the Flute?
Question: What does Akhil play?
Question: What is Polsambol?
Question: What does Mahagamasekara write?
Question: What is Osmosis?
Question: What is solvent?
Question: What is a cell?
Question: What is an example?
Question: What is a cell?
Question: What is Raja-Yoga?
Question: What is Niyama?

And also, the System can activate the verbose mode by -v argument to further understand the question generation process. Those results are given below.

Output: with the verbose option.

The flute is an Indian classical instrument.

TAGS: [(' Flute ', 'NNP'), ('is', 'VBZ'), ('an', 'DT'), ('Indian', 'JJ'), ('classical', 'JJ'), ('instrument', 'NN')]

{'NN': 5, 'JJ': 3, 'VBZ': 1, 'DT': 2, 'NNP': 0}

Question: What is the Flute?

Akhil plays Flute and Guitar.

TAGS: [('Akhil', 'NNP'), ('plays', 'VBZ'), (' Flute ', 'NNP'), ('and', 'CC'), ('Guitar', 'NNP')]

{'CC': 3, 'VBZ': 1, 'NNP': 0}

Question: What does Akhil play?

Polsambol is a Sri Lankan dish made of rice and tamarind.

TAGS: [(' Polsambol ', 'NNP'), ('is', 'VBZ'), ('a', 'DT'), ('Sri', 'JJ'), ('Lankan', 'JJ'), ('dish', 'NN'), ('made', 'VBN'), ('of', 'IN'), ('rice', 'NN'), ('and', 'CC'), ('tamarind', 'NN')]

{'JJ': 3, 'IN': 7, 'NNP': 0, 'DT': 2, 'NN': 5, 'CC': 9, 'VBZ': 1, 'VBN': 6}

Question: What is Polsambol?

Mahagamasekara writes books.

TAGS: [(' Mahagamasekara ', 'NNP'), ('writes', 'VBZ'), (' books ', 'NNS')]

{'VBZ': 1, 'NNS': 2, 'NNP': 0}

Question: What does Mahagamasekara write?

Osmosis is the movement of a solvent across a semipermeable membrane toward a higher concentration of solute.

TAGS: [('Osmosis', 'NN'), ('is', 'VBZ'), ('the', 'DT'), ('movement', 'NN'), ('of', 'IN'), ('a', 'DT'), ('solvent', 'JJ'), ('across', 'IN'), ('a', 'DT'), ('semipermeable', 'JJ'), ('membrane', 'NN'), ('toward', 'IN'), ('a', 'DT'), ('higher', 'JJR'), ('concentration', 'NN'), ('of', 'IN'), ('solute', 'NN')]

{'JJ': 6, 'IN': 4, 'DT': 2, 'NN': 0, 'VBZ': 1, 'JJR': 13}

Question: What is Osmosis?

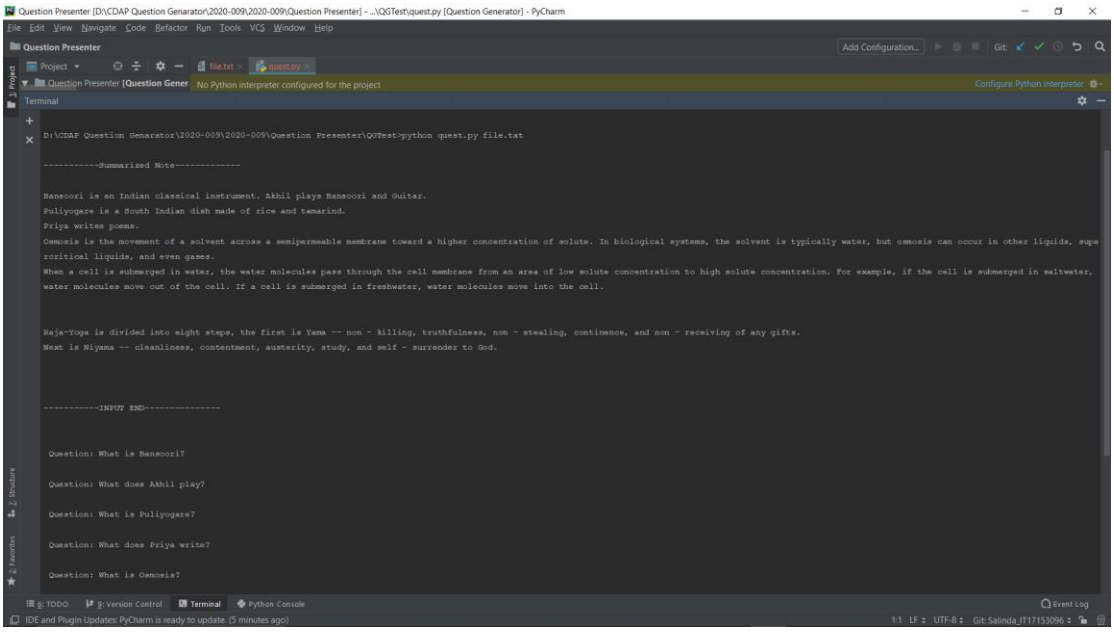

Figure 4.1 1 : Question Generator Output

The next step is to create questions filled-in-the-blank from the given document. The Natural Language Toolkit, or more often NLTK, is a suite of libraries and programs written in the Python programming language for symbolic and mathematical natural language processing for English. This system uses textblob, which is essentially a wrapper around NLTK. Separate the sentences using markers such as full-stop,

exclamatory mark, and question mark to trigger fill-in-the-blank questions from the text file. Enable the text file to shape the question as an input to pick a clear, logical sentence from the input document. Blank fill question on chosen descriptive sentences may be asked which is achieved using NLTK. Divide every single sentence using a full stop.), (Question mark?) (And Explanatory mark!). Apply the labeling for the POS and get the terms by form. In the case of the word, the sentence introduces the noun, pronoun, adverb, adjective, determiner, superlative degree. Carry out a similar sequence to get the word, pronoun, and superlative degree. If the sentence does not contain a subject, a pronoun, and a superlative degree than delete the sentence. The result of this diagram is given below.

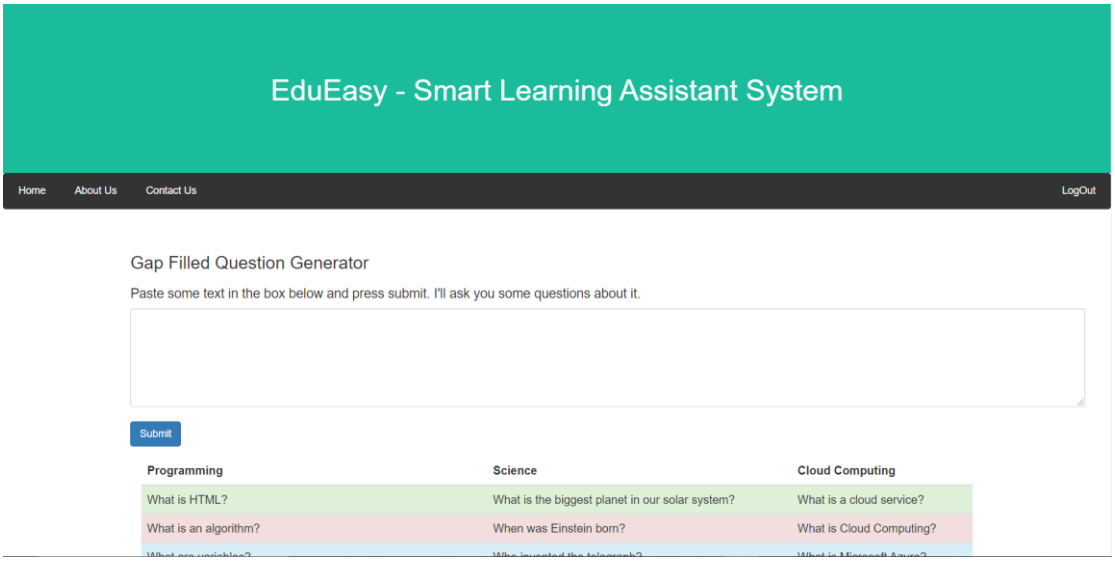

Figure 4.1 2 : Gap-Fill-Question Generator Text Input

After clicking the submit button system generate the gap-fill questions and display for the user. Then the user can fill those blank spaces. If the user can't find the answer, the user can reload the page. Then the system automatically displays the answer for the user. These component results are given below.

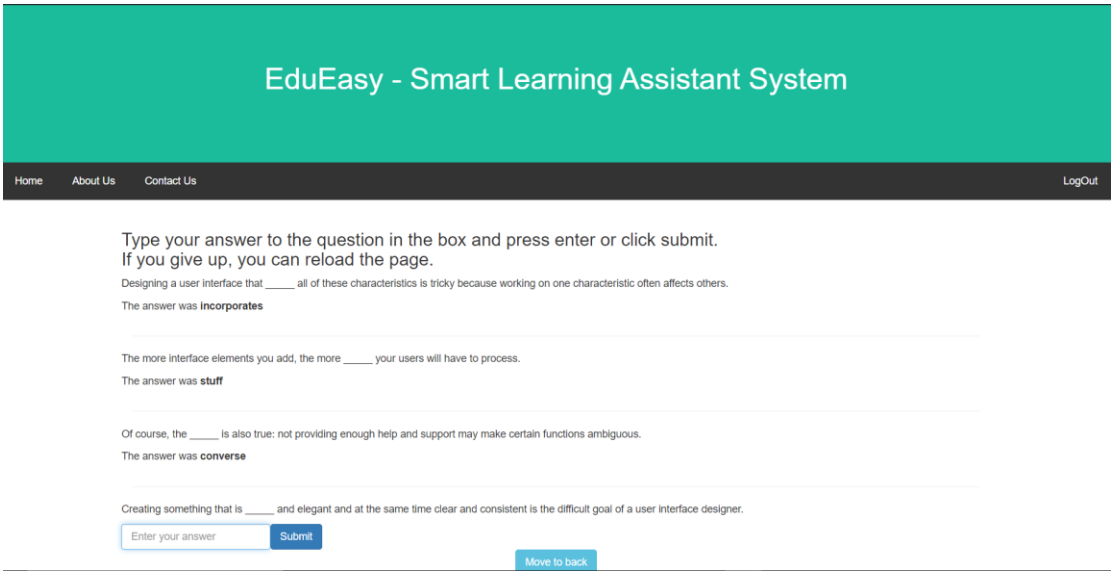

Figure 4.1 3 : Generated gap fill questions.

The next main goal of this part is to use keywords to check for online answers to similar questions. These outputs will be shown as an interactive search by Google. Question Answering Machine is a machine that addresses questions asked by humans automatically in a natural language query. Natural language (e.g. English) is the common way of sharing knowledge. In this program, the student has to select a summarize note from the cloud database which was stored previously. After that student can select the questions which are previously created regarding the summarized note. And check synchronism for keywords provided, too. Using machine learning algorithms, this is an advanced Google search. Finally, the student can select the most suitable answers for given questions. Using this application students can get relevant questions using summarized notes. The important thing is the student can get correct short answers to this question. This will be to generate questions based on the summarized note (automatic question generation by using NLP) and automatically Google search using the question presenter component. This is the block diagram of this system.

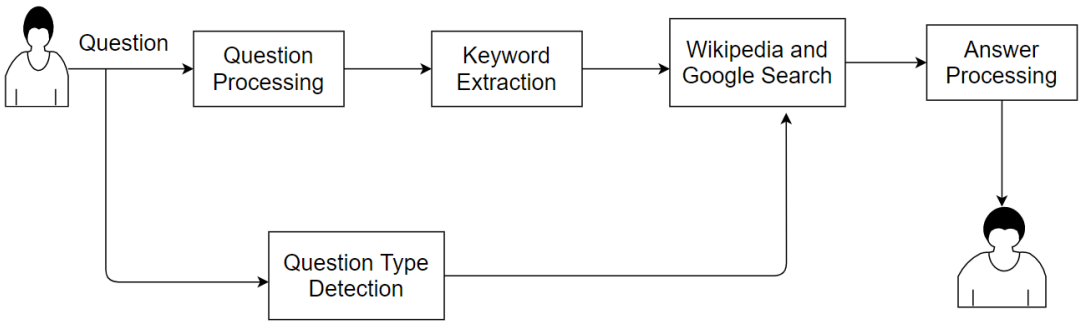

Figure 4.1 4 : Block diagram of the QA System

Question Answering Systems are mostly separated into two domains. Those are closed and open domain. Closed domain systems answer questions within a specific knowledge domain or to only a certain type of question. In this system used open-domain. Open-domain systems answer questions about almost everything. These systems rely on far greater volumes of data, using more unstructured data and general ontology, than closed-domain QA systems.

There are lots of search engines available lately. Many of these search engines have tremendous popularity and impressive functionality, but the key issues with these search engines are that instead of providing a clear, correct, and reliable response to the user's query they typically have a list of website-related documents that could provide the answer to that question. Although there is a lot of information about the search subject in the list of documents that are collected by the search engine, often it does not include the correct information that the user is searching for. In this method users only have to ask the question and the method will get the most fitting and right answer to that question and send it to the client.

The key goal of the Question-Answer method is to provide a concise answer to a user's query instead of digging for a search-related database list. Users only have to ask the question and the device will find the most fitting and right answer for that question and give it to the client. Those answers questions focused on open-domain truth. The Wikipedia and Google search pages are used here to obtain succinct replies.

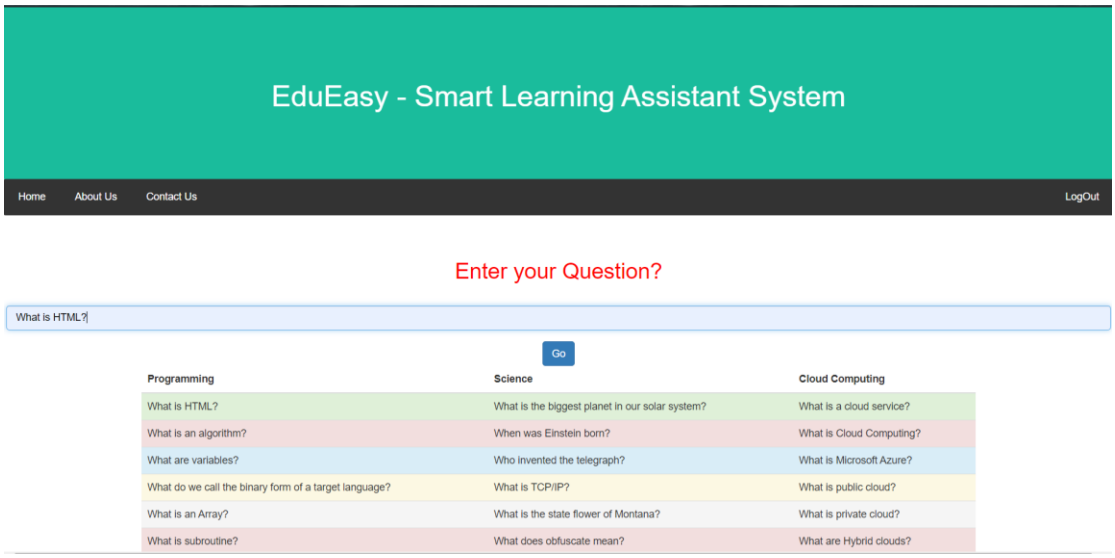

Figure 4.1 5 : QA System (Enter your question)

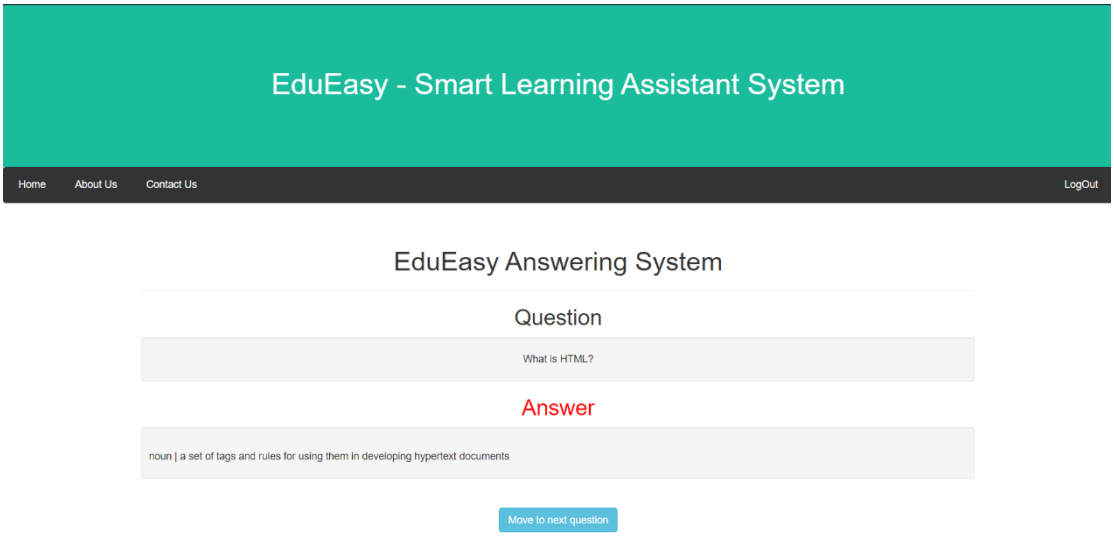

Figure 4.1 6 : Output Answer for your question

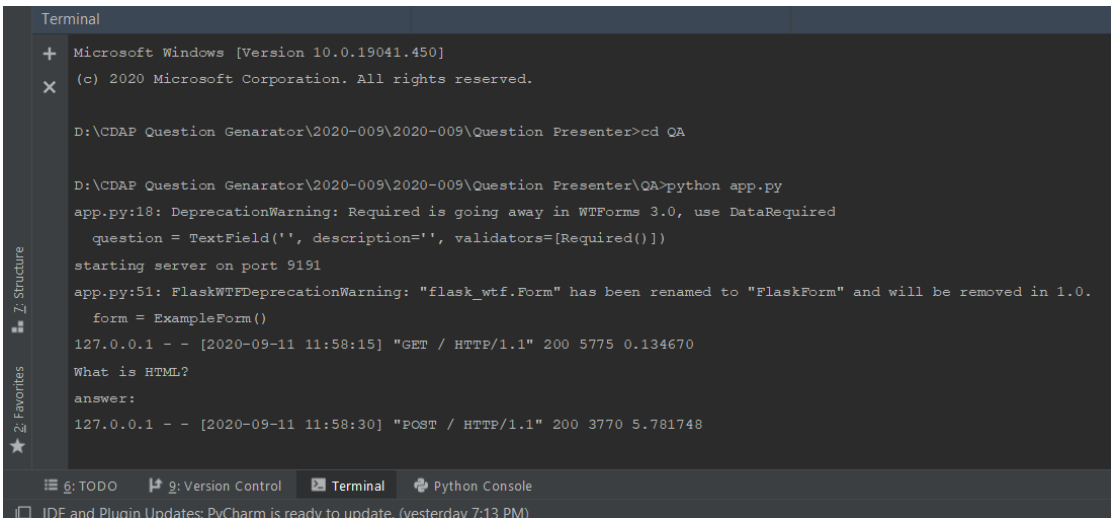

Figure 4.1 7 : QA System running terminal

4.1.1 Question Presenter System Architecture.

In this “Question Presenter” implemented system, we developed to Advanced Information Retrieval System using the Relational Keyword Search technique and generate questions using paragraphs. This component is to generate questions based on the summarized note or lecture note (Automatic question generation by using NLP). This program takes a summarized text file of the lecture slide as an input and generates questions by analyzing each sentence and each paragraph. And also this program takes a summarized text file as an input and generates gap-fill-questions also. If the user couldn’t give the answers for given gap-fill-questions, System automatically gives the answers. After that, this component is to search online answers for relatable questions using keywords. Those outputs will display as an automatic Google search.

In this program, the student has to select a summarize note from the cloud database which was stored previously. After that student can select the questions which are previously created regarding the summarized note. And also check synchronism for given keywords. This is an automatic Google search using machine learning algorithms. Finally, the student can select the most suitable answers for given questions. Using this application students can get relevant questions using summarized notes. The important thing is a student can get correct short answers to this question. This will be to generate questions based on the summarized note (automatic question generation by using NLP) and automatically Google search using the question presenter component.

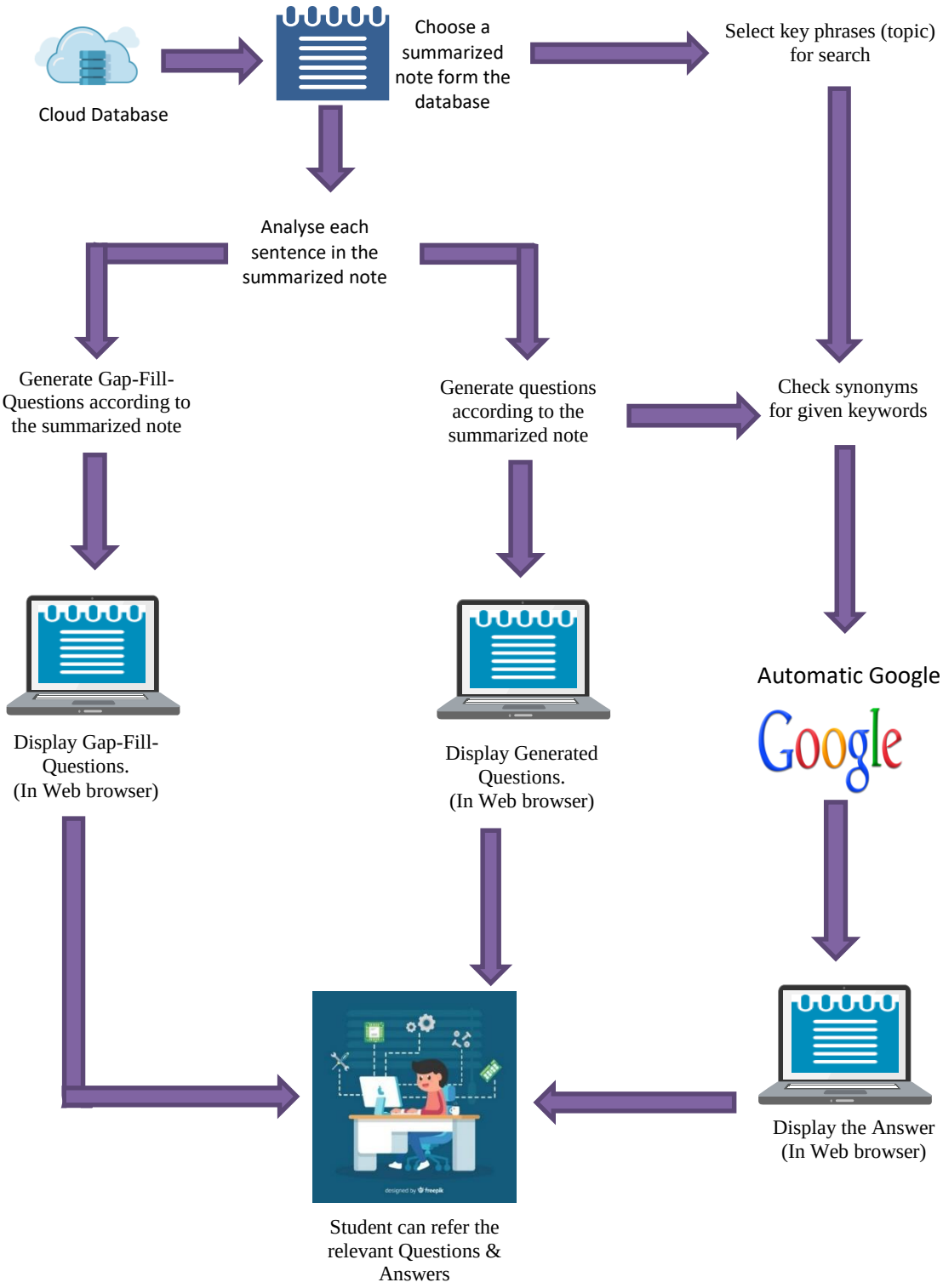

Figure 4.1 8 : System Architecture

4.1.2 Project Management

Project management is a fundamental concept that can be put into effect with every project undertaken. This concept is more important to broader tasks carried out by teams and can contribute to project performance by adding project management guidelines to a project. When designing the web application "EduEasy – Smart Learning Assistant System," some of the concepts of project management were implemented in this project to achieve a consistent direction that could be traced from the beginning of the project to the end so that the created application fulfills the predefined goals and objectives. SOFTWARE DEVELOPMENT LIFECYCLE (SDLC) is a structured software construction mechanism that guarantees the consistency and correctness of the developed apps. The goal of the SDLC process is to deliver high-quality software that meets the customers ' expectations. In the present time frame and cost the system implementation should be complete. SDLC consists of a comprehensive strategy that describes how to develop, create, and manage complex applications. This phase of the SDLC's life cycle has its mechanism and deliverables that feed into the next phase. SDLC stands for software development.

Figure 4.1 9 : Development Life Cycle

Identification and Initiation - The complexity of the project was closely analyzed during the project implementation process to identify whether the project could be reasonably completed within the given period. In dealing with the exact project scale, time constraints became a big concern. Depending on the utility to the customers and depending on the time limit, the features of the programs had to be chosen. Besides, before beginning to prepare the scheme, the feasibility aspect was also considered at this initial stage. To determine the best practices available from the current implementations, numerous research has been performed.

Definition and Planning - All the required tasks had to be arranged according to a clear timeline during the project planning period to meet the requirements of the project within the specified timeframe. Even the necessary tools for the project were analyzed during the planning period. Since the project was designed to be carried out as a web application, before beginning the production process, the necessary technology and languages had to be researched and taught. The most suitable tools and software were chosen after a review of different tools, considering the appropriateness of such tools and software to the project.

After reviewing many projects and strategies that were pursued within them, it was found that most of the projects that were performed in compliance with a 10 predefined schedule and a time frame were able to effectively complete the project without any difficulties Getting a clear plan often decreased project costs when evaluating commercial projects that are performed by multiple teams. The functional requirements of the project were to be based mainly on the specified period for implementation. All the roles that had to be created were split down into subtasks with set deadlines for this reason.

Development and Launch - During this deployment process, the planned functions and the pre-considered technology were combined to arrive at a final deliverable. The "EduEasy-Smart Learning Assistant Software" was difficult to create with time limits, and due to the implementation of new technologies not seen in previous programs.

For the implementation scenario, an approach such as a waterfall or iterative waterfall was not feasible. Therefore agile approach considering multiple variables was adopted. The agile method has become more practical to use than the waterfall or iterative method because checking can be done by using the agile method after each subtask of the software has been developed. With the production process, training can be carried out that helps the team to be versatile during training in modifying multiple parts, making it easier for the team. Using the agile approach also helps the team to look ahead of the other activities to be developed and planned for the implementation process while planning is being carried out and software is being carried out for the project.

In developing the "EduEasy-Smart Learning Assistant System", test-driven development was the best approach to be used due to the flexibility it provided while developing to meet the exact requirement within the given time constraint. As one subtask could be fully designed, evaluated, iterated until the testing passed and then transferred to the next subtask, the implementation process was more feasible.

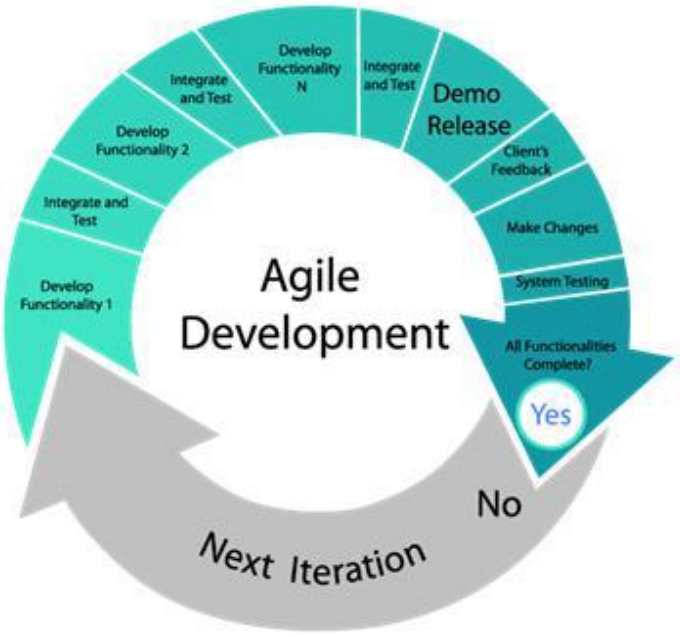

Figure 4.1 10 : Agile Development Structure

Closeout - This process is largely about launching the final deliverable. The performance of the method may be defined in this stage according to the input provided

by the application's users. To assess the lessons learned from the production of the application and the possible improvements that are to be implemented to increase the product quality, this stage is so important.

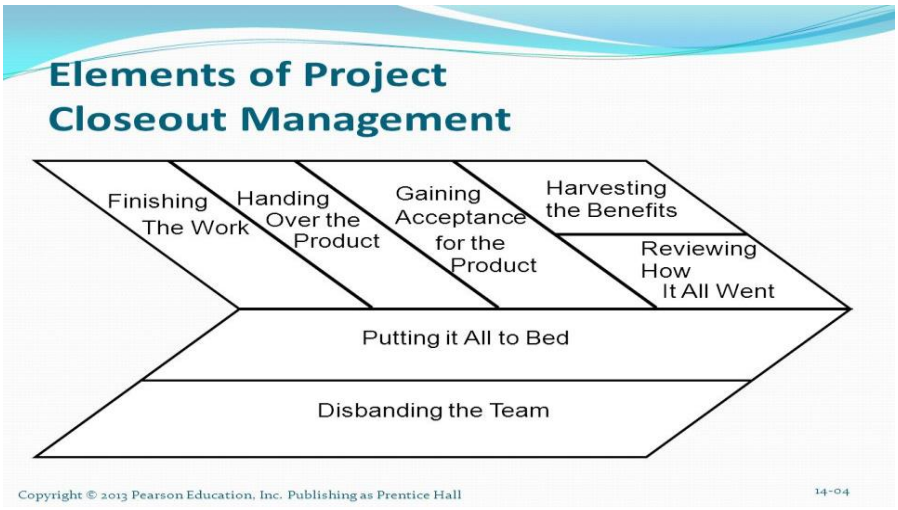

Figure 4.1 11 : Closeout Management

4.1.3 Development

Choosing the necessary resources for system development plays a significant role in the performance of a web application. It was agreed to use the PyCharm IDE, which has been designated as one of the official IDEs for python developers since this web application was developed for students. PyCharm is a Python programming IDE created by the Czech company JetBrains, and as the name implies, even if it is a heavyweight app, it functions like a Charm. When compared with other IDEs it can take time to make plots, etc.

If you've never used JetBrains for other IDEs like Java IDE, IntelliJ Concept, and then run the first code successfully, you can take up a little bit of the time. Such as the interpreter configuration. However, PyCharm is extremely useful if you have several scripts that communicate with each other.

PyCharm comes with pre-installed smart python-support that offers a range of features such as smart code completion, code verification, on-the-fly error highlighting, and fast fixes, along with automatic code refactoring and a multitude of navigation functionality.

It not only lets you code in Python but also has robust support for web development platforms such as Django, Flask, HTML / CSS, Node.js, Pyramid, web2py, etc.

The positive thing about PyCharm is that it supports Anaconda and, as a result, all packages that come under Anaconda are provided by PyCharm such as NumPy, SciPy, MatPlotlib, and so on.

4.1.4 Software System Attributes

Usability - This would be a strong sign of incorrect goals. The first goal of usability is performance and efficacy, while esthetic meaning comes after the commodity has been proved to be functional. Usability is human-centered, capturing, and knowing the entire range of consumer desires is easier than only a collection of diverse data. End-users are the greatest source of details, but the more nuanced products and websites have many user classes, so it is much more important to get all the details, around the board, not just desires but wants and expectations, the complete range of details allows to maintain continuity and authenticity before finalizing the course of usability. Usability innovation can be used to define the needs of consumers for customer retention and performance. To meet the needs of the targeted clients according to their criteria, measures must be taken to address the needs of the clients and to define their key objectives.

Reliability - For an application to be accurate, it should always run without any faults or errors in the stated environment for a given period. Tech Stability implies operational efficiency. It is defined as the ability of a device or part to perform its necessary functions under static conditions for a specified period. Software Reliability is a core component of software quality, consisting of features, accessibility, consistency, serviceability, ability to update, maintainability, and documentation.

Scalability - Software scalability is the feature of a method or device to expand its capability and flexibility depending on the demand of its users. Scalable applications will stay robust when adapting to updates, improvements, modifications, and resource reduction. In a fast-moving market, you need to develop your products with development in mind. Software scalability is important for the survival of your enterprise. Read on to see if you can make the apps scalable. This is where the scalability of software comes in. Your commodity should be able to fulfill its purpose from now on and can also be modified based on consumer demand. In short, with development in mind, you need to develop your product.

Maintainability - Technology will still require additional functionality or bug fixes. Maintainable software is easy to expand and repair, which enables the uptake and use of the software. We will guide you on the design and production of sustainable applications that can help both you and your users. It would be better practice to provide specific names and descriptions in the forms, which would make it simpler later if any improvements were required. As a method for the success of this application, agile principles have been followed. When beginning a project with simple architecture, it will be easier to extend later without making it more difficult to lead developers in trouble by adding additional features.

There are a variety of explanations for retaining the program after you have delivered it to the customer:

- Bug fixing - It requires looking for and fixing errors to enable the program to run smoothly
- Capability enhancement - Enhancement of software to include the latest features needed by customers
- Replacement -replace unnecessary functionality to increase addictiveness and efficiency
- Security Issues - Fix security vulnerabilities found in your proprietary code or third party code, particularly open source components.

4.1.5 Operations

“EduEasy-Smart Learning Assistant System” web application allows users to do the following operations. Those operations are based on the “Question Presenter” component.

- Users can register on the website. Mainly it will be done by the institute.
- Users can be logging to the website using user credentials.
- Users can view summarize notes and lectures.
- Users can select the summary note.
- Users can automatically generate questions or gap-fill questions according to the selected note.
- Users can get answers to these questions using the question-answering part. In here system automatically Google search and give the most suitable answers for the user.

4.1.6 User Characteristics

“EduEasy-Smart Learning Assistant System” web application mainly target for university students. As well as university lecturers and teachers can use it to generate good questions and get suitable answers for the questions.

And also students can most suitable answers using a question answering system. Recently, there are several search engines available. Both of these search engines are very effective and have impressive functionality, but the key issues with these search engines are that, instead of delivering a straightforward, reliable, and correct response to the user's query, they typically offer a list of documents linked to websites that may provide the answer to that question. While the list of documents collected by the search engine has a lot of information about the search subject, often it does not include the specific material that the user is searching for. The key purpose of the Question-Answer method is to include a quick answer to the user query instead of looking for a list of

documentation relevant to the search subject. Users also have to ask a question, and the device will find the most suitable and accurate answer to that question and send it to the user.

4.2 Commercialization aspects of the product

"EduEasy" is a concept that is much more suitable for universities or Institutes. Globally many countries have participated in projects focused on smart education. Today, education is the most important and valuable way of achieving success. Proper examinations and smart learning systems help students to improve their quality. We are developing the "EduEasy – Smart Learning Assistant System" web application to model worldwide smart learning systems and add the more important feature which we want.

"EduEasy – Smart Learning Assistant System" is a fully functional website. So this application divided the main two packages. Those are,

- Paid Version
- Free version – One month free trial for all users.

And also, the paid version has tree packages according to features. Those packages are

- Silver Package
- Gold Package
- Platinum package

The platinum package is fully functional. Other packages have few features. But other packages also very useful for students.

We are planning to directly deal with the Sri Lanka Ministry of Education to promote the product among government and private universities and institutes. So this is our market place. So our market segment is university students and lectures.

5. TESTING & IMPLEMENTATION RESULTS & DISCUSSION

The software testing process lets the developer find and correct bugs before the program becomes usable, which decreases the chance of failure of the program. Many techs typically don't work on their own.

When research is completed, the end-user can still have an eye on the potential situations that the end-user could experience. Accuracy and reliability are also properly observed, which means that the end consumer will be able to operate it productively.

Test Execution is a tool for creating and prioritizing test processes, generating test data, and, optionally, organizing test harnesses and writing automated test scripts. This is where tests are planned and prioritized and when test designs, such as test scenarios, test protocols, and test results, are applied.

The implementation process is perhaps the most important phase of the initiative because it takes a significant undertaking in terms of staffing and financial capital and can be very detrimental to the day-to-day activity of the organization.

5.1 Results

This segment explains the findings of the research experiment. A web application is developed to help students improve their skills and learn effectively. And students should also develop their ability to answer questions. All the features included in the "Question Presenter" component help to evaluate the student's ability to answer the issue.

First of all, students should select the summarized note and insert it into the question generator system. After that students can select two choices, those are generated wh-type questions and Gap-Fill questions according to the summarize note. After that system automatically generates questions. So the student can refer to those questions

and try to find answers. When the student couldn't answer the gap-fill questions, the system automatically generates the correct answer and display for the students.

Recently, students are always trying to find answers to Google searching. But most of the students can't find exactly the correct answers. When we Google search, all the details are popup. It's time-wasting. So using this Question Answering system users can get the answers within a second. It will display a short answer for the user. Those features that are included in the "EduEasy – Smart Learning Assistant System". In this "Question Presenter" component including this main system. So this web application user friendly and all of the students can handle this application without any issue.

5.2 Testing

Testing is the method of evaluating a system or component(s) to decide whether or not it meets the specifications defined. Simply put, testing is conducting a method to find any holes, defects, or incomplete specifications as opposed to the actual specifications.

And like this, testers too will begin testing. The cost and time to rework and create error-free software that is delivered to the customer are minimized by an early start to testing. However, testing will start from the Requirements Gathering stage in the Software Development Life Cycle (SDLC) and continue until the software is deployed.

When to stop testing is difficult to decide, since testing is a never-ending process and no one can say that a program is 100% tested. To stop the research process, the following factors must be taken into the process.

- Testing Deadlines
- Completion of test case execution
- Completion of functional and code coverage to a certain point
- Bug rate falls below a certain level and no high-priority bugs are identified
- Management decision

During the process of testing, there are various stages. A short overview of these stages is given here. Test thresholds provide various methodologies that can be used during software development. The key software testing levels are

- Functional Testing
- Non-functional Testing

Functional Testing - This is a method of black-box testing that is focused on the program requirements that are to be evaluated. The program is checked by supplying input, and the results that need to adhere to the features for which it was intended are then analyzed. Functional program testing is carried out on a complete, integrated system to assess the conformity of the system with the defined specifications. Functional testing is a much-needed testing technique for any application as it ensures that the functionality in the application has been developed in 21 under the functions that have been specified. In the "EduEasy-Smart Learning Assistant System" web application, acceptance testing was carried out to test for functionality.

Non-functional Testing - Checking an application from its non-functional attributes is based on this section. Non-functional testing includes evaluating applications based on requirements that are non-functional but essential, such as performance, security, user interface, etc.

Unit Testing - Each unit of the system will test by the group member who is developing that particular unit and will produce a defects free unit of coding.

Component Testing - Several bug-free units will have combined and tested. Each member will combine their tested units and will test them.

Integration Testing - In this testing level users are responsible to test whether the relationships and communication between tested components are working as expected.

System testing - All the components from each group member will combine and test the whole system to verify the functionality and the performance of it.

Usability Testing – Usability testing can be introduced like this, Usability testing is a black-box methodology that is used by monitoring the users through their usage that service to detect any errors and changes in the app. Usability testing refers to comparing a product or service for real customers by assessing it. Usually, subjects will attempt to perform traditional activities during a test as researchers are observing, listening, and taking notes. The aim is to detect any issues with usability, gather qualitative and quantitative data, and assess the satisfaction of the participant with the product. After considering all the factors, it was decided to test deeply into the usability factor as usability is the most expected nonfunctional requirement when it comes to a mobile application. With the use of usability testing, the developer will be able to discover potential bugs that are generally not visible to developers and which may also escape any other types of testing done. Planning the usability testing can help in fixing all the problems that a user may experience even before the system is finally released to the user which may result in better performance and standard system.

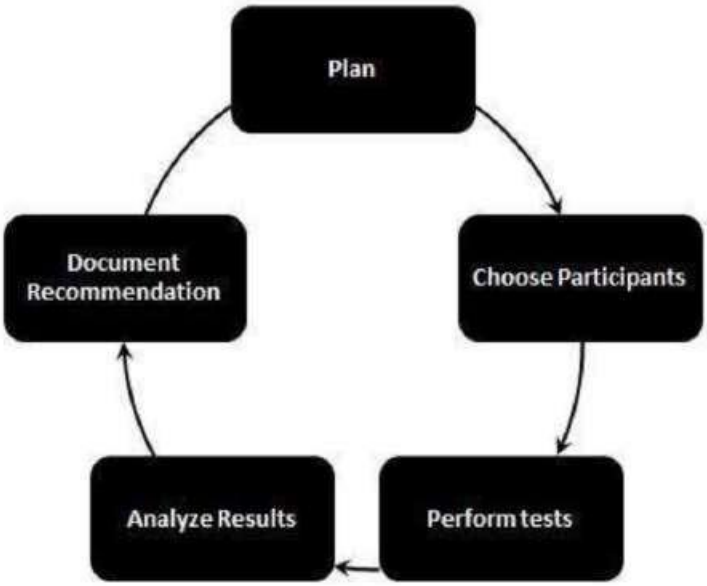

Figure 5.2 12 : Testing Process

Usability testing is an area that needs fairly a higher level of understanding with creativity. Testers who are involved in usability testing requires to have skills like patience, openness to welcome ideas, ability to listen to any suggestions given, and observation skills to figure out the problems and fix them.

When carrying out the usability testing process, the developed "EduEasy – Smart learning Assistant System" application was given to a selected group of 20 students. They were asked to use the application and to rate the application according to their satisfaction level to a questionnaire given to them.

The following table has been created on usability testing with the feedback that was given by the participants for the questionnaire provided.

Usability Testing

Question	Satisfaction	Userfriendli-ness	Performance	Color Scheme	Fonts	Results	User Interface	Runtime Crashing
Strongly Satisfied	40%	20%	5%	30%	90%	45%	19%	48%
Satisfied	30%	55%	50%	65%	5%	40%	40%	36%
Undecided	25%	20%	25%	5%	0%	10%	18%	16%
Unsatisfied	5%	4%	20%	0%	5%	4%	22%	0%
Strongly Unsatisfied	0%	1%	0%	0%	0%	1%	1%	0%

Figure 5.2 13 : The group of people usability testing Result

“Question presenter” component test results are shown below (Test Cases).

Test Case ID: 01

Test Case Title: Insert the Text or Paragraphs

Test Status: Pass

Table 1 : Test Case 01

Process	Expected Result	Preconditions	Input	Output
Insert the text of paragraphs in the given text field.	Successfully insert the given text fields.	Users should login to the application.	Text field or paragraphs	Inserted the text field

Test Case ID: 02

Test Case Title: Generate WH Questions.

Test Status: Pass

Table 2 : Test Case 02

Process	Expected Result	Preconditions	Input	Output
Insert the text of paragraphs in the given text field and click the submit button.	Successfully generated the WH questions.	Users should insert the text or suitable paragraphs into the text field.	Text field or paragraphs	Generated the WH questions.

Test Case ID: 03

Test Case Title: Generate Gap-Fill questions

Test Status: Pass

Table 3 : Test Case 03

Process	Expected Result	Preconditions	Input	Output
Insert the text of paragraphs in the given text field and click the submit button.	Successfully generated the Gap-Fill questions.	Users should insert the text or suitable paragraphs into the text filed.	Text field or paragraphs	Generated the Gap-Fill questions.

Test Case ID: 04

Test Case Title: Display QA System answers

Test Status: Pass

Table 4 : Test Case 04

Process	Expected Result	Preconditions	Input	Output
Insert the question and click the submit button.	Successfully display the answers.	User should connect to the internet	_	Display the correct short answer using Google search.

Test Case ID: 05

Test Case Title: Display the answers for the Gap-Fill questions

Test Status: Pass

Table 5 : Test Case 05

Process	Expected Result	Preconditions	Input	Output
Answer and click the submit button.	When the user gives the correct answer, the system will display the answer. If the answer was incorrect, the system displays an incorrect answer.	Users should submit the answer for a given gap-fill.	Text field answer.	Display the status of your given answer.
If the user couldn't answer, refresh the website.	When the user refresh the page, the system will display the correct answer.	Refresh the system.	_	Display the correct answer.

5.3 User Interfaces Implementation

Web application architecture is a significant stage in the development of a web application. It is based on the web application's look and sound.

The design stage includes numerous areas including user interface design (UI), usability (UX), content creation, and graphic design.

The user interface architecture plays a major role over all other components in the whole process since it is the only aspect with which the user can interact. As a result, the staff forced the general point of view to look a few steps forward for better customer loyalty.

When contemplating the architecture of the network application interface, the specifications are substantially different from those of mobile devices and apps. So when the size of the display of the web browser is modified and the resolution of the screen modified must be done to ensure readability, accuracy, and usability. Because of all these issues, it was necessary to analyze and research the design and development methods of the user interface to compare the interfaces of various mobile applications that are used more frequently. Considering the various core factors present in some of the best practices, UI designs have been established.

The architecture, color schemes, and designs of the contents and commands of the web application should be similar to those of the operating system. It allows the user to continue using the user interface quite quickly since the software is familiar with the operating system and resolutions.

Before we start developing a user interface for our app, it's important to understand what makes a good user interface. What are the qualities that we should be looking for? All great interfaces share eight characteristics or qualities:

1. **Clarity** - By making it understandable by language, flow, hierarchy, and metaphors for visual components, the interface prevents ambiguity. Simple interfaces don't require manuals. When using them, they also ensure that consumers make fewer errors.

2. **Concision** - By over-clarifying and naming everything, it is possible to make the code understandable, but this leads to code bloat, where there is simply so much stuff on the screen at the same time. If there are so many things on the computer, it's impossible to find what you're searching for and then the interface becomes boring to use. The real challenge in designing a perfect design is to make it simple and straightforward at the same time.

3. **Familiarity** - When you remember a previous experience you had with it everything feels familiar. And if someone is first using an interface, those features can already be common. To connect implying you can use real-life metaphors; for example, folder-style tabs are also used to navigate on websites and in applications. They are known by people as navigation objects because of the folder metaphor is familiar to them.

4. **Responsiveness** - It means a few things. Next, responsiveness means speed: you do not feel slow about a good GUI. Second, the interface should provide the user with positive feedback on what's going on and whether the user's data is being handled successfully.

5. **Consistency** - It is important to keep the interface consistent across the framework because it helps users to identify usability patterns. Upon understanding how many aspects of the interface operate, the users can extend this information to new areas and functions because the user interface is compatible with what they already know.

6. **Aesthetics** - Although you don't have to make an interface beautiful for it to do its job, making things look good would make it more interesting for your users to spend time with your application; and happy users will only be good.

7. **Efficiency** - Time is capital, it means money and by shortcuts and good design, a better interface can make the user more efficient. This is one of the key advantages of technology, after all: it helps us to conduct activities with less time and effort while performing much of the job (work) for us.

8. **Forgiveness** - Everyone makes errors, and a measure of its ultimate success would be how the application treats those errors. Are acts possible to undo? Is it possible for lost files to be recovered? A good GUI does not blame users for their failures but should include the means to fix them instead.

User Interfaces - The user interfaces that have been designed for the "EduEasy – Smart Learning Assistant System" web application are shown in the following diagrams.

Question generator from text Interfaces

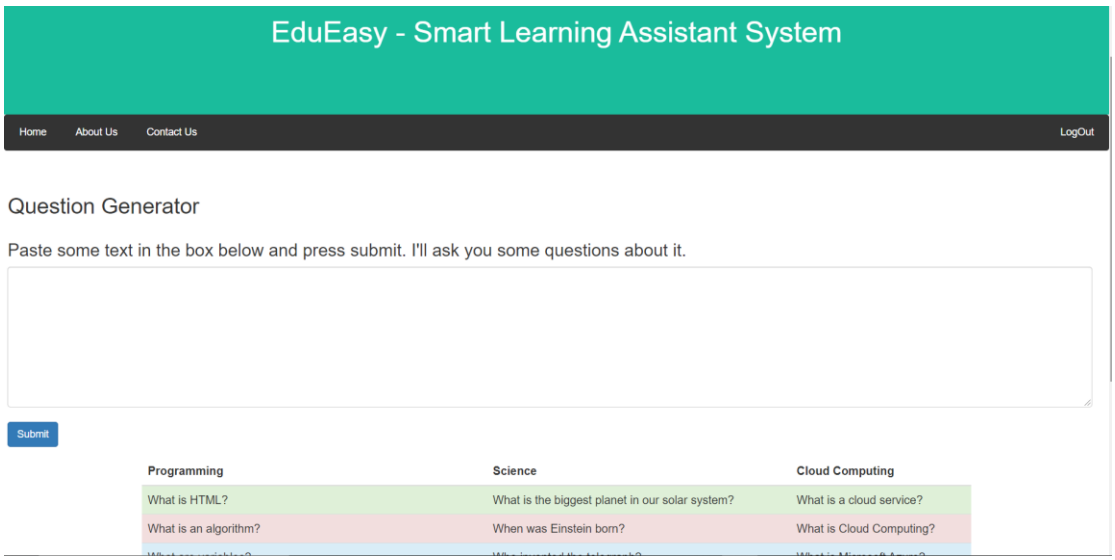

Figure 5.3 14 : Question Generator input text

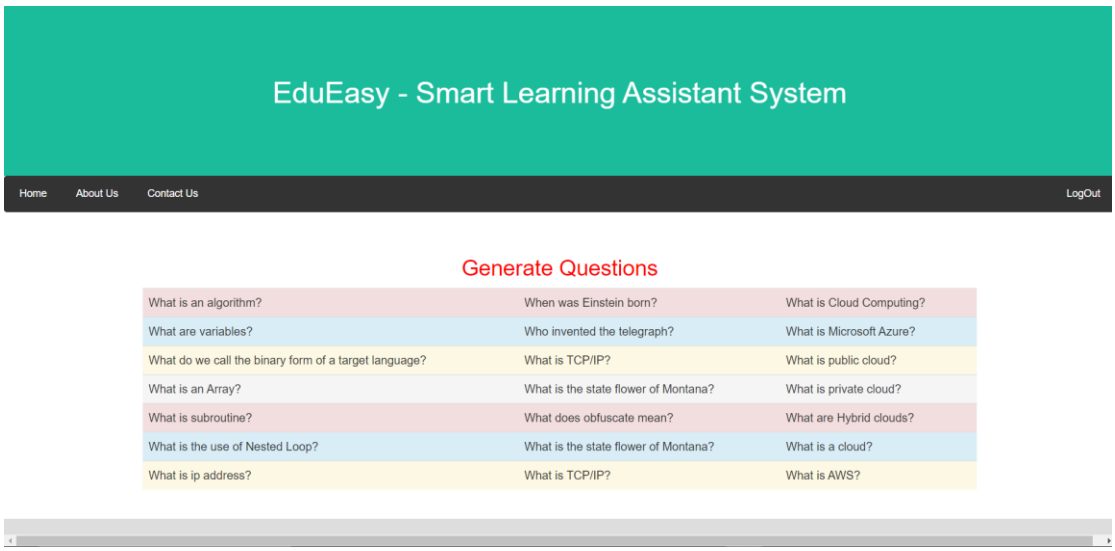

Figure 5.3 15 : Generated Questions

Question Answering System Interfaces

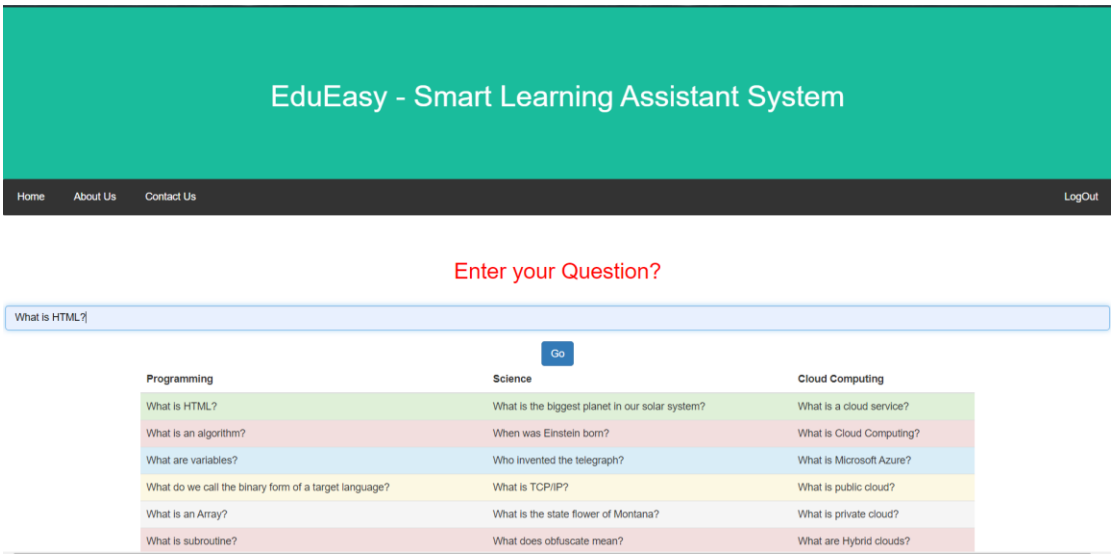

Figure 5.3 16 : Enter your question interface

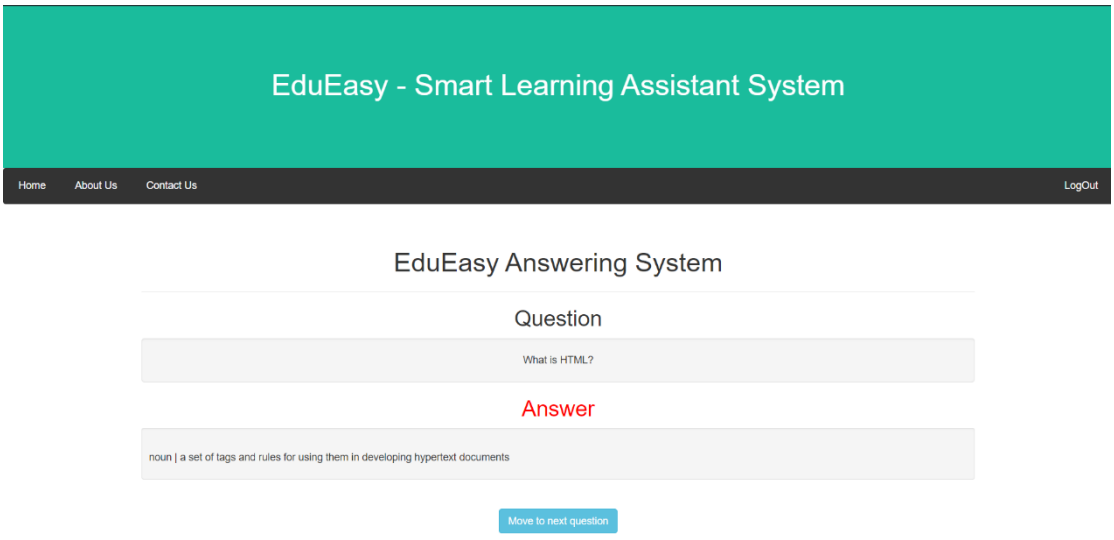

Figure 5.3 17 : QA System (Answers interface)

Gap-Fill-Question Generator from text Interfaces

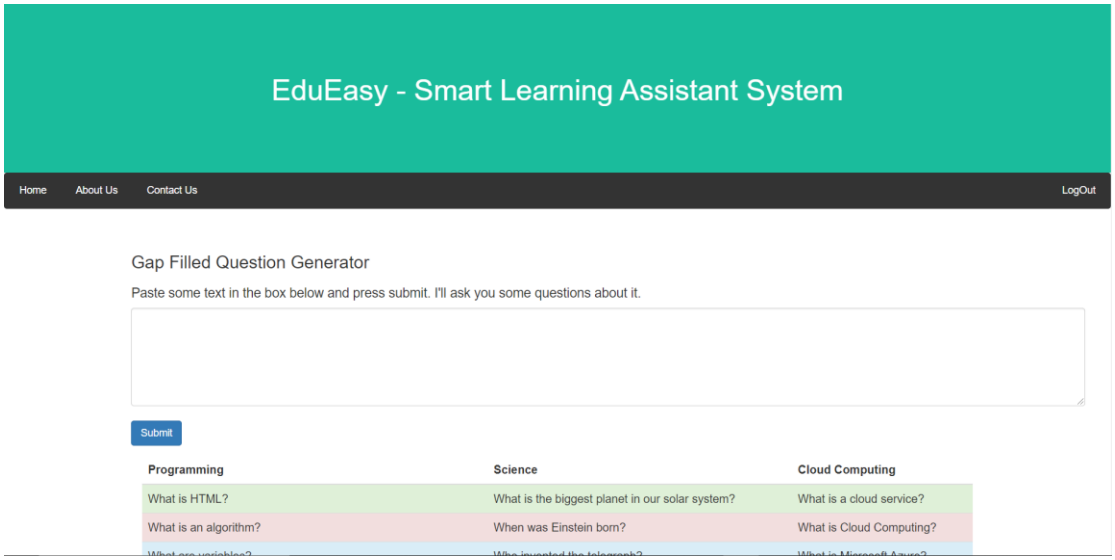

Figure 5.3 19 : Gap-Fill-Question Generator input text Interface

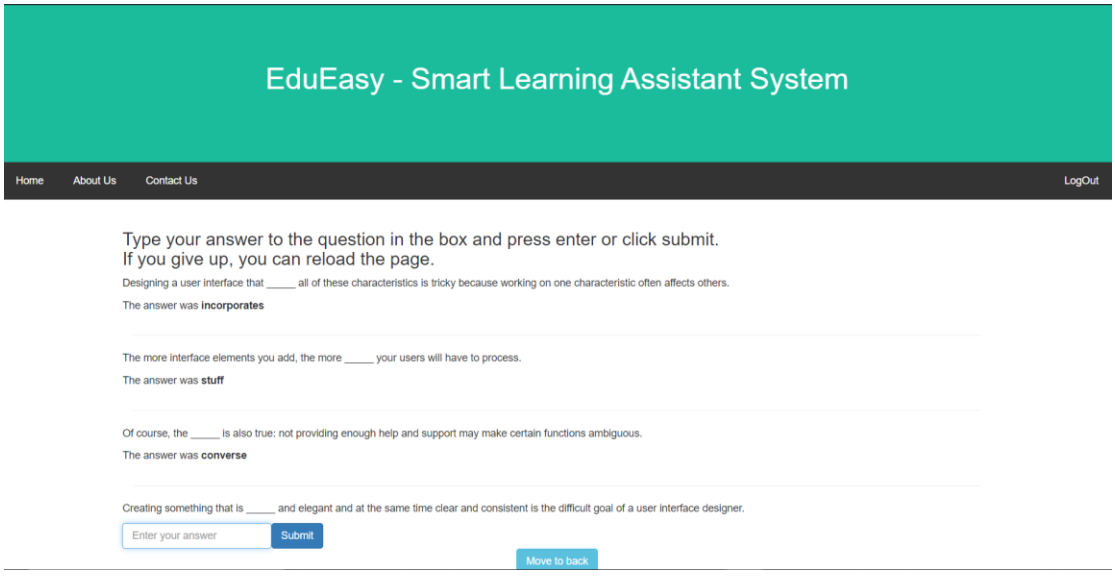

Figure 5.3 18 : Generated Gap-Fill Questions Interface

5.4 Research Findings

The main outcome of this “Question Presenter” component is to build and web application that helps students to get suitable questions and answers according to lecture slides. Therefore, lectures can easily teach their students.

In this research, I have learned too many things to my knowledge. Like how to work with python and how to works machine learning algorithms. And the most valuable thing is our outcome is successfully generate wh-questions, gap-fill questions according to the summarize note, and give the answers for the questions using Google search. So this QA part fully functional part.

5.5 Discussion

I have to challenge to generate a meaningful wh-question generator and gap-fill generator. Here I used a summarized note which note Taker previously created. So I have to read so many research papers and regarding the NLP researchers. And finally, I completed my wh-question generator and gap-fill generator.

The next big challenge is I have to create an automatic google searcher using keywords. Here I have to read so many research papers. I have created open-domain questions answering system. So here I have to face so many challenges. It means some keywords have not identified the system. Finally, I have usefully created the Question Answering system.

6. CONCLUSION

This thesis has presented automatic generating questions from text or paragraphs that combines the deep semantics of question generator with the flexibility of question. This system evaluation approach is based on assessing questions from an educational perspective. In this system, we carried out a pedagogically-motivated evaluation that identified questions that were not only free from apparent shortcomings but had real

pedagogical utility. So this system introduced an approach to automatically generate wh-questions and automatically generate gap-fill questions given a paragraph or text. We have used human effort to evaluate this “Question Presenter” component. We extract basic and complex sentences from the paragraph/text and generate wh-question or gap-fill questions based on subject-verb-object and prepositions present in the sentence by mapping it to some predefined rules.

Question generation is a challenging task in the educational world that has become one of the most common study problems in recent times. The “Question Presenter” component is a solution to the question generation process based on a powerful statistical open-source parser call OpenNLP. The system implemented is scalable, ready to use, quick to understand, and accessible to all types of educational environments and organizations. The system implemented is ready on a wide scale with the potential to learn more and more about the various types of topics and fields.

The Question Answering Method using NLP techniques is more complex than the other forms of Information Retrieval System. Open-domain QA Systems gives a more reliable response than a close domain QA system, but this system is limited to multiple domains only. The implemented Question Answering system for open-domain gives an accurate answer for the users' questions based on domain. SO here when we find the answers for the questions, this system will give the correct short answers for the user.

This implemented an Automatic Question Generating System and Automatic Question Answering system which is fast, streamlined, randomized, and secure. Every task performed by this system is automated so that storage space, bias, and security do not concern anymore. The implemented system is very helpful and useful for many educational institutes and all students. More innovative concepts will be discussed in the future to improve the efficiency of the project. Also, consider improving the current “Question Presenter” component through more advanced web applications such as image identification and so on. In the future, the system will be expanded to be self-learning and to be able to understand more intelligently new statements with auto recommendation without any need for user action.

7. REFERENCES

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8. APPENDICES

8.1 Appendix A

"EduEasy – Smart Learning Assistant System" project Comparison of existing product results are shown below.

Table 6 : Comparison and existing products.

	LiguaKit	SlidePlayer	CSUN	GoConar	CopyLeaks	Proposed Solution
Search in any place on the internet	✗	✗	✗	✗	✗	✓
Show user targeted recommendations	✗	✓	✓	✓	✗	✓
Search every type of reference materials	✗	✗	✗	✗	✗	✓
Search every type of questions(MCQ/Essay)	✗	✗	✗	✗	✗	✓
Can summarize audio transcripts	✗	✗	✗	✗	✗	✓
Can format the note under sub topics	✗	✗	✗	✗	✗	✓
Can generate synonyms for selected key phrases	✗	✗	✗	✗	✓	✓
Free of charge	✓	✓	✓	✓	✓	✓
Provide Web platform	✓	✓	✓	✓	✓	✓

8.2 Appendix B

Questionnaire for Usability Testing - During the usability testing process, we developed a scale and asked users to rate the program according to the rate of feedback they had.

1. How satisfied are you with the application?
    I. Strongly satisfied
    II. Satisfied
    III. Undecided
    IV. Dissatisfied
    V. Strongly Dissatisfied
2. Did you find the application user friendly?

I. Strongly satisfied
II. Satisfied
III. Undecided
IV. Dissatisfied
V. Strongly Dissatisfied

3. Is the performance of the application satisfactory?
   I. Strongly satisfied
   II. Satisfied
   III. Undecided
   IV. Dissatisfied
   V. Strongly Dissatisfied

4. Are you satisfied with the colors used for the User Interfaces?
   I. Strongly satisfied
   II. Satisfied
   III. Undecided
   IV. Dissatisfied
   V. Strongly Dissatisfied

5. Are you satisfied with the font and the font size of the interface? Did you have to zoom in to see the content?
   I. Strongly satisfied
   II. Satisfied
   III. Undecided
   IV. Dissatisfied
   V. Strongly Dissatisfied

6. How well are you satisfied with the results (QG System Results & QA System Results) given?

I. Strongly satisfied
II. Satisfied
III. Undecided
IV. Dissatisfied
V. Strongly Dissatisfied

7. How satisfied are you with the user interfaces of the application?
    I. Strongly satisfied
    II. Satisfied
    III. Undecided
    IV. Dissatisfied
    V. Strongly Dissatisfied

8. Did the application experience any crash time or downtime during your usage?
    I. Strongly satisfied
    II. Satisfied
    III. Undecided
    IV. Dissatisfied
    V. Strongly Dissatisfied

8.3 Appendix C

“EduEasy – Smart Learning Assistant System” project Business Value bellowed.

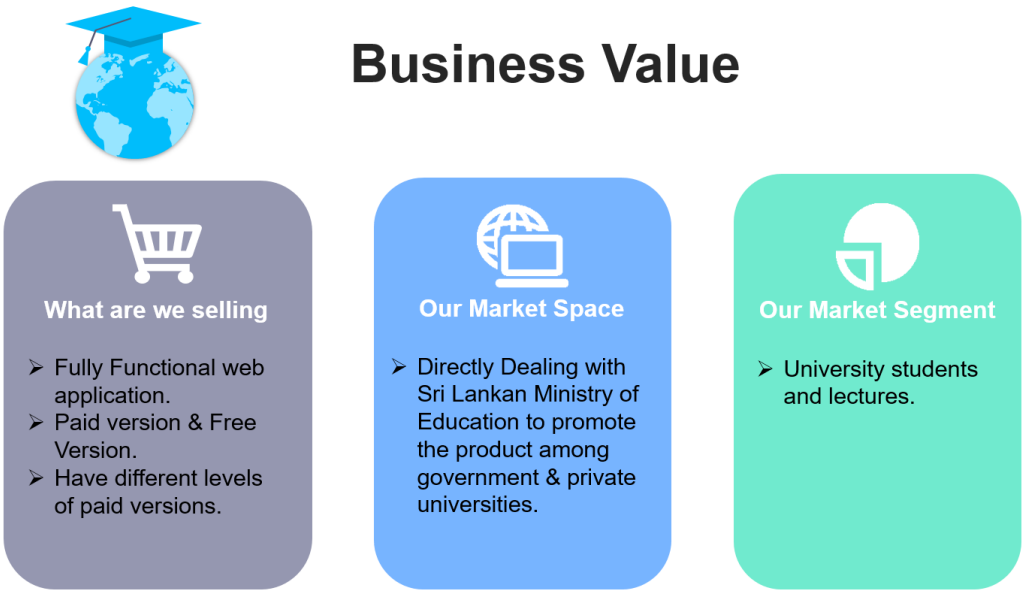

Figure 8 1 : Business Value