

Capstone Project Proposal

Submitted by:

101503208 Shivam Sharma, BE Third Year, COE-10

101503211 Shobhit Jain, BE Third Year, COE-10

101503213 Shreya Aggarwal, BE Third Year, COE-10

Capstone Team No.: CPG28

Under the Mentorship of

Dr. Maninder Kaur

&

Mr. Ashish Girdhar

Assistant Professor

Lecturer

Computer Science and Engineering Department

Thapar Institute of Engineering and Technology, Patiala

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Project Overview

Engineering design problems are generally open-ended. They have no single correct answer, rather a range of possible solutions. The yearlong Capstone project keeps the desirability of open-ended design problems, the limitations of students' knowledge and experience in check while helping us learn.

In the various laboratory classes in the college we have numerous viva(s) and quizzes. This task of conducting vivas and quizzes is quite cumbersome for the teachers as it takes a lot of preparation. Also, the checking process is quite redundant, time taking and tiring which leads to delayed results.

So, our team is trying to create a product "ViQu" which is a solution to the problem. A product based on Raspberry Pi 3 along with some sensors will be created, which will be able to conduct vivas, create quizzes and even check them hence, creating a digitized result sheet instantly.

Moreover, a database of MCQs and subjective viva-like questions will be created overtime by the teachers which will help in the future. This question bank will have ques of 3 difficulty levels.

Finally, the product ViQu will be able to conduct vivas, mark them, create quizzes, mark them and a fine database of questions will be created for the above.

Literature Survey

Technology of automatic text summarization plays an important role in information retrieval and text classification, and may provide a solution to the information overload problem. Text summarization is a process of reducing the size of a text while preserving its information content. This paper proposes a sentences clustering based summarization approach. The proposed approach consists of three steps: first clusters the sentences based on the semantic distance among sentences in the document, and then on each cluster calculates the accumulative sentence similarity based on the multi-features combination method, at last chooses the topic sentences by some extraction rules.^[1]

Text Summarization is the process of creating a condensed form of text document which maintains significant information and general meaning of source text. Automatic text summarization becomes an important way of finding relevant information precisely in large text in a short time with little efforts. Text summarization approaches are classified into two categories: extractive and abstractive. This paper presents the comprehensive survey of both the approaches in text summarization.^[2]

Hiring processes, when conducted by humans at least, have always been problematic because bias is so often unconscious. Personality and psychometric testing, blind auditions, webcam interviews and nameless CVs are on the rise, but in a face-to-face environment, anything from gender, race, clothing, education and accent can provide an unwitting platform for discrimination. Humans are inconsistent where robots are incapable of being anything but consistent.^[3]

OCR reading technology is benefited by the evolution of high-powered desktop computing allowing for the development of more powerful recognition software that can read a variety of common printed fonts and handwritten texts. But still it remains a highly challenging task to implement an OCR that works under all possible conditions and gives highly accurate results.^[4]

Need Analysis

- **Need to simplify the viva process:**

As the number of students is increasing every year the work load on teachers also keeps increasing. Viva(s) are an integral part of lab work but on the other are too tedious for the teachers. Hence, ViQu will take this responsibility off their shoulders.

- **Need for a question bank:**

Now a days the Quizzes need to be created by the teachers every time they are held. But with ViQu a large database of MCQs as well as subjective viva like questions will be created overtime which will help in the future.

- **Need for quicker and easier quiz checking process:**

As we see the process of checking quizzes is quite redundant, tedious and time taking hence, the results sometime get delayed. ViQu will simplify this process.

Objectives

In order to fulfill our capstone project, we intend to achieve the following objectives:

- **To simplify the viva process:**
 1. ViQu will ask the questions.
 2. ViQu will create a transcript of the answer given by the student by using text summarization.
 3. ViQu will do a probable marking and create a mark sheet.

- **To create a question bank:**
 1. When the teachers will make the quiz the questions will be added to their question bank and by the passage of time it will improve.
 2. ViQu will create quizzes and ask viva questions from these question banks.

- **To simplify the quizzing process:**
 1. ViQu will generate the quiz based on the question bank.
 2. ViQu will apply image processing to check the answered quizzes.
 3. ViQu will evaluate these quizzes and will create a mark sheet.

- **To improve our skill set:**
 1. We want to have a project experience in a team.
 2. We would like to learn new technologies such as using Raspberry Pi, applying natural language processing.

Methodology

- We will be collecting the problems faced in the viva and quiz taking process and will also evaluate how the whole process is undertaken. Will properly analyze how the quizzes are set and how the marking schemes of viva and quizzes is set.
- Then we will be searching for the perfect solution through research about how these problems can be solved such as the use of Raspberry Pi, NLP, various APIs, etc. We will firstly try to test these individual modules on our own system before putting them to test on the actual product.
- Then we will go on with the proper hardware implementation and side by side create modules for various features.
- Now we will run certain tests and try to keep the scenario as real as possible. We will involve a few teachers in it who might help us in getting a small question database to be created.
- Finally, we will try to solve the errors which are seen in the previous stages and will further improvise/optimize the product as needed.
- Now we will put the product to real time testing and will also create a report on the same.

System Requirement

Hardware Requirement:

- Raspberry Pi 3
- Camera
- Mic
- Speakers
- Raspberry Pi box case
- Laptop

Software Requirement:

- Python 2.7
- Various Python Libraries such as openCV, pytesseract, etc.
- Raspbian OS for Raspberry Pi 3

Work Plan

S.No	Activity	Month	January		February			March			April				May	
		Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Identification of project															
2	Planning of project and feasibility study (technical – software and hardware and, economic)															
3	Module testing															
4	Hardware interfacing															
5	Software implementation															

S.No	Activity	Month	Jul y	August					September			October				November			Dece mber
		Week	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
5	Software implementation																		
6	Design optimization																		
7	Performing Modifications																		

8	Results Evaluation																	
9	Final Report																	

Project Outcomes

Our project named “ViQu” is an assistant for taking viva, creating quizzes and analyzing them and evaluate accordingly and some the main objectives are as follows:

- ViQu will be a box case in which raspberry pi will be embedded with speakers, camera and mic.
- ViQu will be able to take the viva of a student and evaluate it, so as to make the process of viva faster and easier for both student and faculty.
- ViQu will also record these vivas for any future discrepancies if there are any.
- ViQu will also be able to create quizzes (MCQ type) and evaluate them by feeding the answered quiz picture to the ViQu and will finally give an excel file of the mark sheet.

COURSE SUBJECTS

- Natural Language Processing – for summarizing text after speech recognition.
- Information Management System- for creating and maintaining our database and using SQL (structured query language)
- Image Processing- for recognizing MCQs based quiz sheets.
- Engineering Design- for implementation of Raspberry Pi (like Arduino)
- Python

References

[1] <http://ieeexplore.ieee.org/document/5234971/>

P. y. Zhang and C. h. Li, "Automatic text summarization based on sentences clustering and extraction," *2009 2nd IEEE International Conference on Computer Science and Information Technology*, Beijing, 2009, pp. 167-170.

doi: 10.1109/ICCSIT.2009.5234971

[2] <http://ieeexplore.ieee.org/document/7860024/>

N. Andhale and L. A. Bewoor, "An overview of Text Summarization techniques," *2016 International Conference on Computing Communication Control and automation (ICCUBEA)*, Pune, 2016, pp. 1-7. doi: 10.1109/ICCUBEA.2016.7860024

[3] <https://www.theguardian.com/careers/2016/dec/14/soon-robots-could-be-taking-your-job-interview>

[4] <http://ieeexplore.ieee.org/document/5328096/>

M. A. Rahiman and M. S. Rajasree, "A Detailed Study and Analysis of OCR Research in South Indian Scripts," *2009 International Conference on Advances in Recent Technologies in Communication and Computing*, Kottayam, Kerala, 2009, pp. 31-38. doi: 10.1109/ARTCom.2009.45