

STUDENT ENGAGEMENT LEVEL ANALYSIS IN ADAPTIVE LEARNING SYSTEMS USING FUZZY SET APPROACH IN MULTIMODAL DATA

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ABSTRACT

India is considered as one of the largest networks of educational institution. Although several constraints have been associated with our learning system, we try to provide the same content of teaching to all the students with different knowledge capacity and interpersonal skills. The important factor is the lack of student motivation towards a subject, course, etc. Adaptive learning is an educational method that utilizes computers as interactive system. In existing most educational agents do not monitor engagement of students, but rather assume engagement and adapt their interaction based on the student's responses through questionnaire.

Thus, dynamic student behavior analysis is the first step to a virtual learning environment. In this, we propose a hybrid architecture system that uses multimodal to provide adaptively in the educational content and track the student engagement level using webcam and response time. This system provides an Adaptive-Learning platform for students to ease the courses. Adaptive learning

environments help learners initiate self-regulated learning processes in order to align with their own goal-orientation. The entire system uses a fuzzy set logic approach (FsQCA) that combines all the datasets together and thereby provides the accurate end results.

Keywords - Adaptive Learning, Engagement, FsQCA, Multimodal data, multimodal learning analytics, performance.

1. INTRODUCTION

A virtual learning environment, learners can lose motivation and concentration easily, especially in a platform that is not tailored to their needs. Moreover, due to standard learning patterns i.e. standard portions to everyone leads to lack of understanding the portions in deep and results in loss of engagement in learning.

Our research is based on studying the knowledge capacity of the students on an online learning platform to create a system able to clustering learners based on the behavior and knowledge and adapting educational content to their needs. As the cost of education raised the sky over the past few decades and prolonged

graduation time has become a crucial contributing factor to every growing student graduation. Infact, the recent study shows that due the pandemic situation virtual or self-paced learning has become a platform for education. Through virtual learning students are not interested in learning and there is a huge lack of engagement in learning.

It is difficult for the students to adapt themselves virtually, to the new learning environment. To make students more engaged and interested in web- based learning platform an adaptive automated system is needed. A critical step towards effective intervention is to build a system that provides adaptive educational content and continuously keep track of the student's attention level and accurately predict the results. Through this system, the students are highly motivated and encouraged. This cultivates an educational interest in the students and makes them engaged throughout the learning process.

2. RELATED WORK

This study is founded on three pillars: (a) the complex construct of learning engagement; (b) the utilized multimodal data to capture its complexity; and (c) the data configurations, using appropriate analysis methods, and in particular fsQCA. Accordingly, this section (a) elaborates on the gaps in related work on learning engagement (Sections II.A

and II.B), and (b) provides the background for understanding the capacity of multimodal data to address the existing gaps (Section II.C) and the appropriateness of the data analysis method to identify the interrelationships in the data (Section II.D).

3. OBJECTIVE

Owing to the rapid growth of e-learning system and lack of assisted authoring tools for web-based learning performance assessment, learners attention level monitoring using learning portfolios is essential in web-based learning field. The traditional summative evaluation by performing examinations or feedback forms can be made more effective when using automated feedback tools and incorporating adaptively in the learning system will be an added advantage. However, summative evaluation only considers final learning outcomes without considering the learning processes of the learners. This means that the interactively controlled learning based on the dynamic feedback is crucial.

Our aim and object in this project is to provide adaptive portions to the students and detect student activation level by monitoring the facial expression and the response time. Here, we are going to use dlib package. It's a landmark's facial detector with pre-trained models, the dlib is used to estimate the location of 68 coordinates (x, y) that map the facial

points on a person's face. This system incorporates fuzzy logic approach to handle multiple datasets. The multimodal data provides the complete dataset for the system which is combined by the fuzzy set logic. Thus, system attains high point of accuracy in providing the results and acknowledges the engagement level of the student.

4. PROBLEM DEFINITION

Multimedia-based electronic learning (e-learning) is an effective method of knowledge transfer. It provides the opportunity that students can use the videos or other materials at any time after they are delivered. Multimedia application provides convenience, but there also exists challenges. Online of the challenge is to measure and assess student's attention when they are studying online.

This paper provides the framework based on machine learning methods for the measurement of student's attention level and incorporates fuzzy logic in multimodal data to provide adaptive educational content. Our proposal is based on automation mode.

This study demonstrated a consolidated analysis of multimodal data collected during an adaptive self-assessment activity, utilizing fsQCA for deeper understanding engagement in this setting. When the learning tasks facilitate one's own learning needs (motivation), it is likely that one will be deeper and more

substantially involved with those tasks, yet thorough analysis showcased that multimodal data can provide more than one engagement patterns to facilitate.

We apply test patterns in entry level. Based on the students' performance, adaptive portions are given to the students using multimodal data incorporated in a fuzzy logic. The students are monitored in learning & learning status is tracked. The students learning response time .The end results are obtained by conducting final test and the students are evaluated.

ADVANTAGES

- Adapts to different abilities-In this way, learning is optimized because the adaptive learning program can change its approach on an individual level to make sure students are mastering concepts before moving on to more difficult material.

SYSTEM ARCHITECTURE

The Adaptive learning application provides the following set of modules:

Student

- Register
- Login
- Student entry level test
- Student learning the portion
- Final test

Admin

- Conducting test
- Upload notes
- Predict student learning level

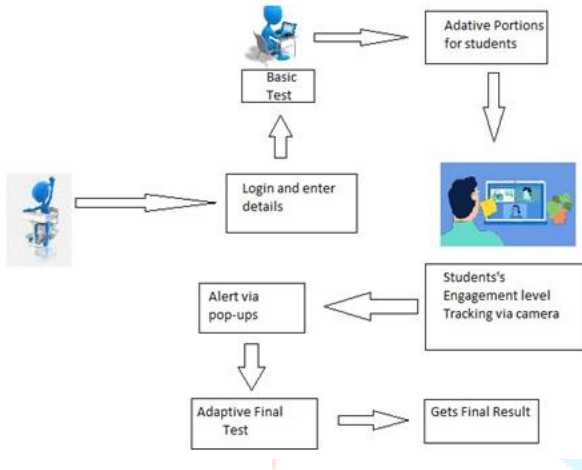


Fig 1.a: system architecture

Register

Students first register the website like name, username, password, email id, number etc.

Login

Student login with a valid username and password

Student's entry level test

First students will attend the entry level test. Totally 5 question in website. Once test over mark will show.

Student learning the portion

Once student gets portion, at that time camera will watch the student's activity. once

he used mobile phone or not & how much time takes finish the one-page etc. Once student gets not learning means some pop displayed

Final test

Students entered final test and get result. camera must monitoring the test.

Conducting test

First admin sets the question. Once student finished test. They find/decide student mental state after admin send portion to students day by day and finds status Finally sets final test & predict the students learning state.

Upload notes

The admin will be uploading the required learning in the website for the students use ignored to prepare for the exams.

4. RESULTS AND DISCUSSION

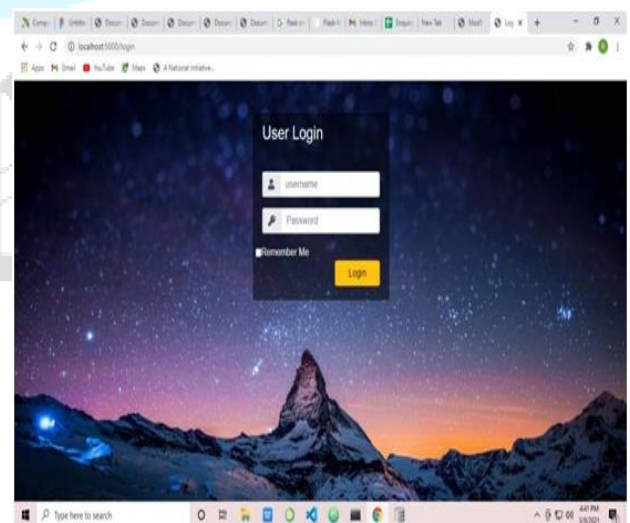


Fig 1.b: student login

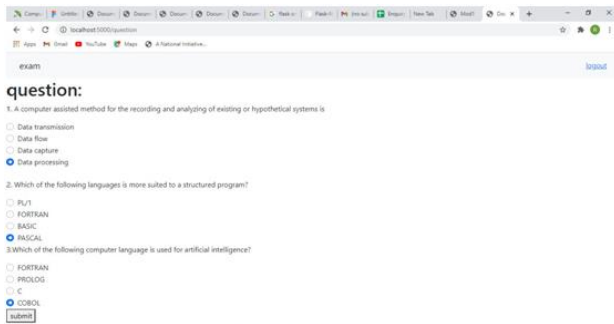


Fig 2:basic test

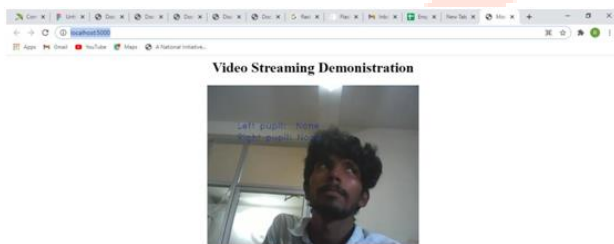


Fig 3:videostreaming Demonstration



Fig 4:tracking student activation level

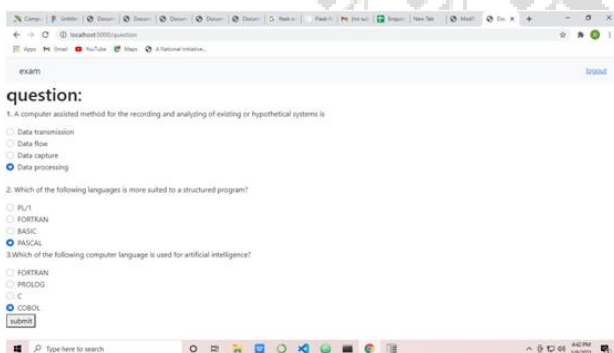


Fig 5:Final Test

5. CONCLUSION

We proposed complete course validation process. our system is based on automation. we monitoring student learning using webcams. Main theme is once student gets portion, at that time camera will watch the student's activity. Once he used mobile phone or not &how much time takes finish the one page etc etc.once student gets not learning means some pop displayed. Students attain the tests & admin done their job well. Finally admin/teacher predicts students learning status with high accuracy.

6. REFERNCES

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