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New era of educational administration: The virtual classrooms advantages and challenges

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ABSTRACT

The need of flexible way of learning and education/ knowledge delivery is knocked in the recent times due to several urgencies including pandemics i.e. (Covid-19). Traditional education system stands inefficient for facing such challenges especially after the sever world lockdowns. Virtual classrooms are widely propagated during these episodes and almost replaced the traditional classrooms and dominated the educational sector in many parts of the world. This paper is illustrating the challenges that faced in virtual classes and the technologies adopted for tackling it. This paper is concluded that every feature of traditional classrooms can be incorporated with the virtual one in light of the advance data and communication technologies.

Keywords: Classrooms, LMS, e-learning, voice, features, classification

INTRODUCTION

Emotional recognition is vital sector in human machine interface where computer can identify the emotional status of users [1]. This technology has wide spread in various applications including health, security, marketing, human resources, call centers, etc. more recently, learning management systems (LMS) have intensively utilized to tackle educational obstacles in events where students and tutors are unable to reach the colleges/schools [2]. The goalbehind development of LMS is about finding efficient and reliable alternative of the traditional education systems. More likely, students who are exhibiting remote areas and facing serious challenges for reporting into schools in time are the most beneficiaries of this technology. However, other matters alike finical crises where students cannot afford the enrolment fees or in pandemic situations where educational organizations itself are none operational are major motivations for development of virtual education portal for knowledge delivery. Although it outperformed during crises events, the virtual classes are utilized for supporting education quality alongside with conventional classrooms [3]. Thus, such system are vital for education continuity during of prementioned circumstances and hence, their performance need to be optimized in such way both educators and students are granted with best education experiences. Several approaches were adopted in order to enhance the reliability of virtual classrooms during examination practices such as voice based personal verification system during oral examination for preventing of cheatings [4]. Furthermore, educational enhancement experience is also supported in [5] and [6] by incorporating of graphical objects e.g. avatars form motivating students/learners to enrolls in education. Gamification of learning system is proposed at [7] for facilitate knowledge delivery. Other attempts were made for enhancement of educational experience through using of biometrical recognition such as [8-10], brain electrical activity using electroencephalogram (EEG) [11], pattern recognition for physical activity detection [12, 13]. Eye contact between the tutor and learners is important to deliver the information; it conveys the readiness of learner to receive the information taught in the class. Electronic learning systems (e-learning) may involve tens of learner at the time (number may be more), however, it is challenging for the tutor to follow the eye contact, face emotional actions. Thus, learning about alternative methods for performing of emotional recognition is important for e-learning platforms. Recognizing of the learner's emotional status is curtail in as it helps the tutor to turn the lecture topics as per the learner readiness to receive the knowledge. Due to their outstanding role in e-learning systems efficiency enhancement, emotional recognition systems (ERS) where been a focal of many research activities. In this paper, survey of the most proposed state of the arts in emotional recognition and behaviours recognition is made.

RESOURCES AND STRUCTURE

ERS is establishing of connection between different emotional status and their respective features. Six emotional status are widely adopted in recognition process namely anger, fear, sadness, happiness, disgust and surprise. ERS utilizes different sources of data such as voice, images, video and statistics while performing of emotional recognition [9]. Automatic ERSs are more advanced and

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reliable breeds of the system which are employing of deep learning and machine learning algorithms for performing of emotional recognition. Images are most popular source of emotional recognition followed by the voice. Large number of features can be extracted from an image in regard of emotional status. More specifically, face image can be utilized for same since face can reveal more than any other organ about human emotions. However, image is basically two dimensional (2D) data that contains of rows and colours of pixels where each pixel is represented by a number. The variance among pixels values are forming the information of an image as it seen by naked eye. Extracting of features corresponding with emotional status or any other biometrical information from an image is challenging task due to the none linearity, none stationary nature of image data [14]. That is manifested by features changing due to physical or environmental influences. More specifically, same features is impossible to be extracted from same person image within particular amount of time. Aging [15], is one of the most challenges in image recognition system (IRS). Other disturbances alike bad illumination [16], face wear and face orientation [17], noise due to dusts [18] are the common degradations of ERS performance. From the other hand, voices are crucial raw materials in ERSs process and as well were widely used in by previous researches. Activity recognition is another type of important emotional detection approaches [13]. This technology utilized images data in order to extract the emotions according to person limbs movement. Image processing technologies are valid for extracting those features.

Brain activity is one of outstanding approaches that can be utilized in various applications including emotional detection. EEG data is used for this purpose in many previous researches such as [24] and [25]. this data can be recorded using set of electrodes that to be placed over the skull. EEG capturing may be taking place either by invasive or none-invasive ways where the first is performed by placing Nano electrodes underneath of skull through a surgical procedure. The popular method of EEG signal capturing is termed as international 10-20 electrodes [24]. The signal capturing is performed in multiple channel from different regions of the brain where the emotional recognition can be achieved in corresponding with location and voltage level of the captured signal. The conversion of EEG electrical form into data is mainly performed using ADC same as voice signals. In all of the aforementioned sources of emotional data, pre-processing is vital for successful recognition process. Noise and other interferences can be eliminated from the said data by commonly used wavelet transform method [26].

AUTOMATIC RECOGNITION

Considering the previous resources of emotional features, ERS involves three essential steps namely data pre-processing, features extraction and features mapping. The system is generally resulting a recognition score which stands for percentage of materials that correctly recognized by the system. Automatic recognition is a common term which is implying existence of machine learning and deep learning algorithms in the recognition strategies. So-to-say, automatic recognition can be availed in either of the following ways.

NONE FEATURES RECOGNITION

Due to the uncertainty of the features and mostly unavailability of class information (none labelled data) leaves no option but employing of deep learning algorithm to learn and classify the data. This type is commonly performed with image data and known by its high training time requirements (training could last for weeks). Convolutional neural network (CNN) is main state of the art which reported outstanding performance while doing so. CNN is compatible with 2D data such as images and can be extended to intake 1D data as voice after using intermediate stage to reform the data into 2D format [33]. Various breeds of CNN are existed which differs from each other in configurations such as (filters number, layers number, etc.). VGG19 is pre-trained CNN algorithm which can be readily used as in [34]. More breeds of CNN is realized in literature such as AlexNet, GoogleNet, Inception V3, ResNet50 and SqueezeNet. In many events, mix models of deep and machine learning is being used alike that ERS of [29], where features are extracted using CNN and here after classified using SVM, KNN and Linear discriminant analysis (LDA). The common structure of automatic ERS is illustrated in Figure 4. Multi-stage CNN can be used for optimizing of accuracy, that means multiple CNN can be used for where each is responsible of particular feature or task, all outputs from all CNNs are then fused together.

RECOMMENDATIONS

In order to tackle the human error involved into maintenance degradation, several aspects need to be followed in power plants. Human resources need to be efficiently performed in such way the expert bodies and mostly required profiles are hired. The human resources need to be restructured in such ways all the responsibilities and tasks are clearly defined. Adequate structure of the responsibility involves efficiently fulfillment of four majors in the plants namely, operational an maintenance (O&M), Human resource (HR), Finance and materials. Within maintenance department e.g. (O&M), several responsibilities (profiles) are required; the same is listed in Table 2.

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CONCLUSION

Education is vital for the human continuity and considered as important as other life essentials (i.e. food). However, during the pandemic situations, education system is stroked by sever lockdowns that acts against colleges and schools continuity. The technology of virtual classrooms are populated as an alternative to face the problem. Many challenges are noticed hereafter especially those related to the distance where instructors and learners are set far away from each other. Instructors need to realize the emotional condition of his learners in order to interact properly with them during the lessons. Four main resources were reviewed as emotional recognition raw data namely facial images, voice signal, brain activity (EEG) and personal activity (e.g. limbs movement). By whole, all of the reviewed system are made to classify the emotions into six classes (anger, fear, sadness, happiness, disgust and surprise). Machine learning and deep learning can be used together (hybrid) or individually in formation of ERS. Data is existed in different formats and dimensions which created a challenge for the deep learning classifiers for processing with such data. The researchers have obtained various accuracy of classification modifying of classifier configurations such that adding more filters or layers to same. Dealing with other sources of data e.g. (EEG and voice) for emotional recognition purposes may add extra payload on the ERS by involving of filtering and noise reduction techniques.

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