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Yawning detection and Head Nodding Detecion Analysis of Student Engagement during online Tutorials

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Abstract: ***Learning involves a rich array of cognitive and effective states.over the past decades research has increasingly highlighted ways in which affective states are central to learning.Learning centered affective states such as engagement and frustration are inextricably linked with the cognitive aspects of learning.Thus understanding and detecting learner affective states has become a become a fundamental research problem.The facial Action Coding System has been widely used to study detailed facial movements for decades.FACS has been widely consumed.This paper presents an automated facial recognition approach to analyzing student facial movements during tutoring and an examination of the extent to which these facial movements corresponds to tutoring outcomes.The result indicate that excellent agreement at the level of presence versus absence of facial movements.Naturalistic video is challenging for computer vision technique.Second the model were constructed to examine whether the intensity and frequency of facial expressions predict tutoring outcomes.CERT produces intensity values for a wide array of FACS facial action unitsthus enabling fine grained analysis of facial expressions .A particularly compelling nonverbal channel is facial expressions which has been intensely studied for decades.***

Keywords: FACS , CERT,learning.onlinr tutoring,cognitive , detection

3 Introduction

Prior research has highlighted the importance of facial expressions in learning centered affective states but tracking facial expression possess significant challenges. This paper presents an automated analysis of fine grained facial movementsthat occur during computer mediated training. We use to represent results on a user independent fully automatic system for real time recognition of basic emotional expression from video.The system automatically detecs frontal faces in video stream.The combination of Adaboost AND SVM enhanced both speed and accuracy of the system. The system presented here is fully automatc and operates in real time at a high level of accuracy of the system. The system represents here is fully automatic and operates .The system automatically detects frontal faces in the video stream and codes each frame with respect to seven dimension.we conducted The term behavioral

engagement is typically used to describe the student's willingness to participate in the learning process, e.g., attend class, stay on task, submit required work, and follow the teacher's direction. Emotional engagement describes a student's emotional attitude towards learning – it is possible, for example, for students to perform their assigned work well, but still dislike or be bored by it. Such students would have high behavioral engagement but low emotional engagement. Cognitive engagement refers to learning in a way that maximizes a person's cognitive abilities, including focused attention, memory, and creative thinking Student engagement has been a key topic in the education literature since the 1980s. Early interest in engagement was driven in part by concerns about large drop-out rates and by statistics indicating that many students, estimated between 25% and 60%, reported being chronically bored and disengaged in the classroom

4 LITERATURE REVIEW

Jania Aghajanian represent the paper "Face Pose Estimation in uncontrolled Environments" which proposed that a probabilistic framework for automatic estimation of pose as a regression problem .Our algorithm uses a generic patch-based representation and does not rely on object-specific landmarks,therefore it can be used for regression problems on other object classes.Current methods acnieve resultsbased on whether classification or regression.In terms of algorithm is linear with respect to size of library and the dimension of the RBF function.Ths suggests that his performance is limited by the fidelity of the original labelling.

Haisong Gu et al. Proposes a graph-based reliability propagation to tackle the occlusion problem and verify the tracking results and their experimental results and their experimental results show validity of their active approach to real – life facial tracking under variable lighting conditions, head orientations , and facial expressions.

Gwen Littlewort proposed systematic comparison of machine learning methods applied to the problem of fully automatic recognition of facial expressions,including Adaboost ,support vector machines and linear discrimination analysis .We reported results on a series of experiments comparing methods for multiclass decisions , spatial frequency ranges,facial feature selection method.The general purpose of learning mechanism presente in his paper for data driven facial expression classification.

Joseph F.Grafsgaard proposes an automated recognition facial recognition approach to analysing student facial movements during tutoring using CERT (Computer Expression Recognition Toolbox) which tracks a wide array of well-defined Facial movements through FACS.This novel approach of fine grained corpous wide analysis of facial expressions has great potential for educational data mining.

3.Proposed Methodology

3.1 FACIAL EXTRACTION

The extraction is basically based on the type of features, Geometric Features and Appearance Features. The two basic concepts employed for extracting features are based on identifying facial deformation and facial motion. The deformation based features recognize the Action Units, and the classifier is trained to differentiate human emotional states based on identified Action Units. The Deformation kind of extraction is applied to images and to image sequences . The motion based features exploit the temporal correlation of facial expressions to identify variations within a probabilistic framework Image based models
extract features from images, or reduced dimensional facial components. Model based features are usually shape or texture models that fit human faces. The output of the feature extractor stage must contain separable and classifiable vectors. Active appearance models and point distribution models are used to fit on the shapes of interest. These shapes constitute the feature vectors. The expression extraction methods are widely classified under two kinds namely deformation extraction and motion extraction. As for motion extraction techniques, some commonly used methods are dense optical flow, feature point tracking, and difference images

3.2 Regression

After performing binary classification of the input image for each engagement level l 2 f1; 2; 3; 4g, the final stage of the pipeline is to combine the binary classifiers' outputs into a final engagement estimate. For the binary classifiers, we chose the SVM(Gabor) architecture and used two alternative strategies: (1) linear regression for real-valued engagement regression, and (2) multinomial logistic regression (MLR) for 4-way discrete engagement level classification.

3.3 Head Pose Estimation

To handle the out-of-plane head motion, head pose estimation can be employed.The
methods for estimating head pose can be classified as 3D model-based methods and 2D
image-based methods .In 3D Model based method Bartlett used a canonical wire-mesh
face model to estimate face geometry and 3D pose from hand-labelled feature points.In 2D
image based method To handle the full range of head motion for expression analysis, Tian et al.
detected the head instead of the face. The head is identified using the smoothed silhouette
of the foreground object as a segment using background subtraction and computing the negative
curvature minima (NCM) points of the silhouette.
Place table titles above the tables. Given the approach of giving a single engagement number to an entire video clip or image, we decided on the following approximate scale to rate engagement:
1: Not engaged at all – e.g., looking away from computer and obviously not thinking about task, eyes completely closed.
2: Nominally engaged – e.g., eyes barely open, clearly not "into" the task.
3: Engaged in task – student requires no admonition to "stay on task".
4: Very engaged – student could be "commended" for his/her level of engagement in task.
X: The clip/frame was very unclear, or contains no person at all.

3.4 Data Annotion

Given the recorded videos of the cognitive training
sessions, the next step was to label them for engagement. We organized a team of labelers consisting of undergraduate and graduate students from computer science, cognitive science, and psychology from the two universities where data were collected. These labelers viewed and rated the videos for the appearance of engagement. Note that not all labelers labeled the exact same sets of images/videos. Instead, we chose to balance the goals of obtaining many labels per image/video, and annotating a large amount of data for developing an automated detector. When labeling videos, the audio was turned off,and labelers were instructed to label engagement based only on appearance.

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Conclusion

The objective of this paper is to show a clean survey on the structure of analysing the
facial expression.The steps involved in expression analysis like face acquisition, feature
extraction and expression classification had been discussed. Each step is discussed with the
approaches and methods that can be applied to attain the required goal. The expression
recognition based on FACS and direct or indirect interpretation are also discussed with some of
the recent research work. Although many researchers have been investigating facial expressions,
basic expressions like happy,sad,disgust,surprise had been the interesting topic that is been
widely discussed.Topics like Expressions recognition during spontaneous movement, intensity
of expressions, combination of facial action elements detection ,temporal segmentation, pain
analysis are still some topics of interest that are under the cover which needs to be unwrapped .

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