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A Survey On: Cheating Detection in Exams

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Abstract: Cheating in exams has become a serious issue these days. Exams play an important role in every student's life. Cheating in exams has been a common problem all over the world. Manual cheating detection methods may not be completely successful, to stop cheating during examinations. Automating this process will help in detection with use of machine learning. The proposed method helps to make this process automated. So there is no need to wholly depend on manual method.
Keywords: Machine Learning, automated, cheating detection.

I. INTRODUCTION

Cheating in exams has become a widespread phenomenon in the world regardless of the levels of detection development. Many studies have been conducted over the past decade about cheating activities performed by students and the means by which university could attempt to combat this problem. In the U.S., it was revealed that 95% of secondary school students who admitted cheating said that they had not been caught, 51% of secondary school students did not believe cheating was wrong. There are three main reasons why students cheat in exams; being afraid of failure, wanting to take risks and having no fear of getting caught. While the first factor is purely under the student's control, the other factor can be controlled. This majorly happens due to poor invigilation, or less number of invigilators to assist. Hence manual invigilation has many demerits and making this system automated makes this system fool proof and reliable. The aim of this model is to detect abnormal or cheating activities in an exam in an automated way. In our model, this is done by detecting the body posture of the student during the examination using the video footage. Actions like turning back, bending etc. are detected which are considered as possible cases of cheating. If the number of such cases detected are more than a predefined threshold, it is determined as cheating and a report is sent to the examiners. This situation can be reviewed again by the examiner to make a final decision. Faces are registered to a database by using a dataset creator which is implemented using OpenCV. The student who is caught cheating is recognized using facial recognition and a report about their activities along with a timestamp is sent to the examiners following which action can be taken after reviewing the report. This kind of system has never been implemented before which makes it unique. The possibility of conducting an exam without the presence of an invigilator is unthought of and is definitely needed to make examinations strict and efficient. The time and energy of the invigilators can be definitely used productively elsewhere.

II. LITERATURE SURVEY

Automated Cheating Detection. Nischal J, Ms. Sanjana Reddy, MS. Navya Priya : The method has been proposed that automatically detects the cheating activity using temporal and spectral based features. The method is fully automatic and required no prior information about the input signal.

Exam cheating detection system , Razan Bawarith, Dr Abdullah Basuhail,Dr. Anas Fattouh and Prof Dr. ShehabGamaleDin-King AbdulAziz University Saudi Arabia : Simulation experiments with real surveillance image show that the method can attain good results for finding the track of moving objects and achieve the purpose of detecting the cheating behaviors in examination room. This paper addresses the cheating in online exam. Specifically, it introduced the concepts of cheating and how it can be controlled in online exam. It provides a technique for detecting and preventing student from cheating through continuous authentication and online proctor. E-exam management system is proposed to investigate cheating in Dexam using Fingerprint Reader to authenticate the examinee, and Eye Tribe Tracker to continuously guarantee that the examinee is the one who is claiming to be. This system was developed in visual C# and SQL server database. As a result, the system classified the examinee status as cheating or noncheating based on two parameters: the total an examinee time on out screen and the number of times, the examinee is out of screen.

Classifying Abnormal Activities in Exam Using Multi Class Markov Chain LDA based on MODEC features: In this paper, MCMCLDA model to classify abnormal activity of students in an examination. Abnormal activity in exams is defined as a cheating activity. We compare the usage of Harris3D interest point detector and a human joints detector, MODEC (Multimodal Decomposable Models), as the feature detector. Experiment results show that using MODEC to detect arm joints and head location as interest point gives better performance in accuracy and computational time than Harris3D when classifying cheating activity. MODEC suffers low accuracy due to its inability to differentiate elbow and wrist when the object wears clothes with indistinguishable colors. Meanwhile, Harris3D detects too many irrelevant interest point to recognize cheating activity reliably

N.M Nayak , Modeling and recognition of complex human activities in Visual analysis Of Humans: Looking at people, T Moselund, A. Hilton, V. Kreger& L.Sigal **:** Proposed two classification models for cheating detection by using a decision tree supervised algorithm. Then, both classifiers are compared against the result produced by a domain expert. Starting from simple single person activities, research in activity recognition is moving toward more complex scenes involving multiple objects and natural environments.

The main challenges in the task include being able to localize and recognize events in a video and deal with the large amount of variation in viewpoint, speed of movement and scale. This chapter gives the reader an overview of the work that has taken place in activity recognition, especially in the domain of complex activities involving multiple interacting objects. We begin with a description of the challenges in activity recognition and give a broad overview of the different approaches. We go into the details of some of the feature descriptors and classification strategies commonly recognized as being the state of the art in this field. We then move to more complex recognition systems, discussing the challenges in complex activity recognition and some of the work which has taken place in this respect.

Finally, we provide some examples of recent work in complex activity recognition. The ability to recognize complex behaviors involving multiple interacting objects is a very challenging problem and future work needs to study its various aspects of features, recognition strategies, models, robustness issues, and context, to name a few.

Arinaldi,A ,& Fanany, M.I.Cheating video description based on sequences Of gestures**:** The gestures recognized during the runtime of the video from sequences of actions performed by the subjects which are then used to generate textual descriptions based on the detected cheating gestures. These textual descriptions help the process of documenting activities that transpired during the exams for later use. Our proposed system comprises two primary subsystems, a gesture recognition model based on 3DCNN and XGBoost and a language generation model based on an LSTM network. The gesture recognition model achieves recognition of the cheating gestures with 81.11% accuracy and Kappa statistic 0.760. The language generation model achieves95.3 % word accuracy and average edit distance 1.076 on single subject description sentences, and 96.6% word accuracy and average edit distance 3.305 on interaction description sentences.

Topic Models for Scene Analysis and Abnormality Detection∗ Jagannadan Varadarajan1,2 , Jean-Marc Odobez1 Published in the ICCV Visual Surveillance (ICCV-VS) workshop, Kyoto, 2009: In this paper we have presented an unsupervised approach to activity analysis using pLSA. A novel scene segmentation based on the learned topics is proposed to localize and analyze the activity patterns, and results show that the obtained segmentation matches well with locations of semantic activities of the scene. A detailed investigation on various abnormality measures is presented. The results obtained from our experiments on a real dataset show that topic modeling approach is effective for abnormality deduction. They have highlighted the need for normalizing abnormality measures w.r.t. the document size, and, we believe, have provided greater insights into the merits and demerits of the abnormality measures, enabling one to choose the most appropriate method for the task.

III. RELATED WORK

A. MCMCLDA (Multi-class Markov Chain Latent Dirichlet Allocation)

This [2] model was used to classify abnormal activity of students in an examination. It compare the usage of Harris3D interest point detector and a human joints detector, MODEC (Multimodal Decomposable Models), as the feature detector. Experiment results show that using MODEC to detect arm joints and head location as interest point gives better performance in accuracy and computational time than Harris3D when classifying cheating activity

B. CNN

Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a CNN is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, CNN have the ability to learn these filters/characteristics. The architecture of a CNN is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area.

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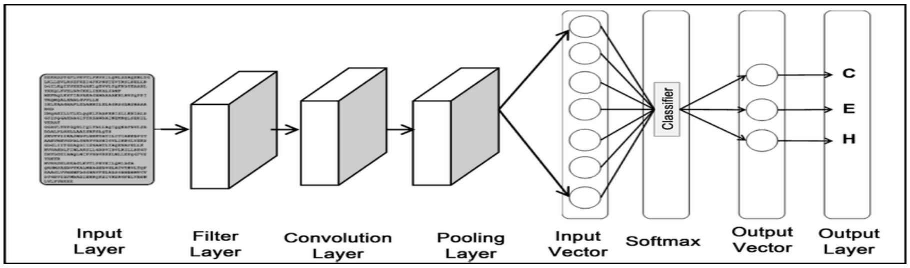

Fig. 1 CNN

C. LDA(latent Dirichlet allocation)

[16]A system for event detection in single fixed camera surveillance video using bag of words model and LDA. By slicing a video into small segments and treating every video segment as a document, they quantize optical flow features as vocabulary. The obtained optical flow descriptors are quantized using kmeans clustering to build the vocabulary. The cluster centers are the visual words and the bag of words model is constructed using this codebook of visual words. By treating every video clip as document and the feature descriptors as visual words, they model the activities using LDA.

D. Natural Language Generation Model

The natural language generation model translates sequences of vectors into simple sentences describing the actions of the subjects and their interaction. The language model needs to learn the regularities in human language to be able to make sentence predictions. The model is based on the LSTM network introduced in [15]. The main difference of LSTMs compared to regular recurrent neural networks is the explicit memory provided in the form of a counter guarded by an inner gate and can be reset by a forget gate, which helps to learn long-term dependencies in sequences. The model must perform a sequence to sequence mapping, where the input is two sequences of gestures from each subject and the outputs are two sentences describing single subject actions (one for each subject) and another sentence for describing the interaction between the two topics of varying length. The model thus must be able to take two inputs and produce three outputs simultaneously. Thus the model must be structured in a branching manner

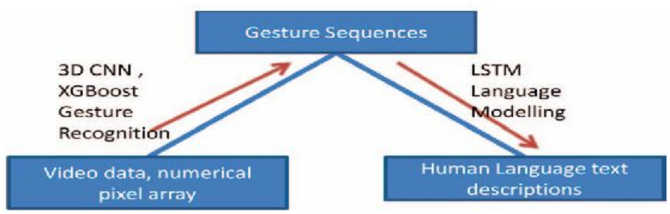

Fig. 2 LSTM

E. XGBoost Classifier

XGBoost is a new decision tree based boosted classifier proposed in [14]. The novelty of XGBoost is that instead of using a class label as the leaves of the decision tree, the leaves are continuous weights that can be optimized using a gradient descent method. By building a new tree for every round of training, and setting sampling parameters that sample the data and features to use for training each tree, an ensemble of different trees can be built and optimized using boosting. As with deep learning, XGBoost has a lot of hyperparameters to tune, such as those related to the complexity of the model, i.e. maximum tree depth. The parameter of gain required for a new split can also be tuned. XGBoost is also natively regularized with both L1 and L2 regularization factors (alpha and lambda) which help prevent overfitting of the model. The final prediction is the sum of all the predicted leaves of the decision trees in the model.

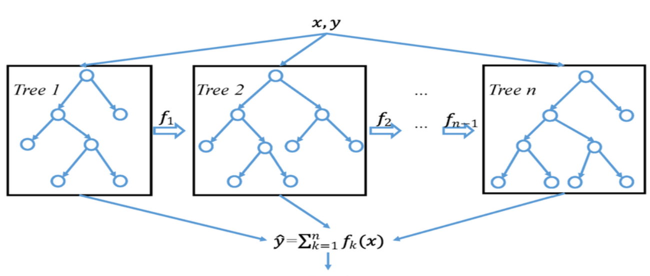

Fig. 3 XGBoost

F. pLSA

Probabilistic latent space models [7], [9], [12] have been used to capture co-occurrence information between elements in a collection of discrete data in order to discover the recurrent topics in the collection. In our context, we expect such analysis to discover the main scene activities, where an activity mainly consists of the recurrent observation of the same motion and size words in scene regions. In this paper, we used the pLSA [7] model which originates from a statistical view of LSA. Although pLSA is a non-fully generative model, its tractable likelihood maximization makes it an interesting alternative to fully generative models like LDA [9] with comparative performance. pLSA is a statistical model that associates a latent variable z ∈ Z = {z1, .., zNA } with each observation (occurrence of a word in a document). These variables, usually called topics, are then used to build a joint probability model 1This means that when constructing documents, a pixel will provide two words for the cell it belongs to: a motion word and a size word. over documents and words, defined as the mixture P(w, d) = P(d)P(w|d) = P(d) zXNA z=z1 P(z|d)P(w|z).

IV. CONCLUSION

To solve this problem of cheating during the examination we need to automate this system which will catch in any abnormal activities that are done during the examination. To automate this phenomena we need to create a system that will detect the human and keep a watch on their behaviour so that if any abnormal activity is found we can raise a alert and also capture the abnormal activity so that it can be used for further investigation and a decision whether a person is cheating or not can be given.

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