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Suspicious Activity Detection Using Logistic Regression

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ABSTRACT

Suspicious Activity is predicting the body part or joint locations of a person from live camera. This project will entail detecting suspi cious human Activity fromreal-time Camera using neural networks. Human suspicious a Activity is one of the key problems in computer vision that has been studied for more than 15 years. It is important because of the sheer number of applications which can benefit from Activity detection. For example, human pose estimation is used in applications including video surveillance, animal tracking and be havior understanding, sign language detection, advanced human computer interaction, and marker less motion capturing. Low cost depth sensors have limitations like limited to indoor use, and their low resolution and noisy depth information make it difficult to esti mate humanposes from depth images. Hence, we plan to use neural networks to overcome these problems. Suspicious human activity recognition from surveillance video is an active research area of im age processing and computer vision. Through the visual surveil lance, human activities can be monitored in sensitive and public areas such as bus stations, railway stations, airports, banks, shop ping malls, school and colleges, parking lots, roads, etc. to prevent terrorism, theft, accidents and illegal parking, vandalism, fighting, chain snatching, crime and other suspicious activities. It is very dif f icult to watch public places continuously, therefore an intelligent video surveillance is required that can monitor the human activities in real-time and categorize them as usual and unusual activities; and can generate an alert. Mostly, of the research being carried out is on images and not videos. Also, none of the papers published tries to use LR algorithm to detect suspicious activities

Keywords : MachineLearning,LRAlgorithm,ComputerVision,Suspicious Activities

Introduction : 1.1 BACKGROUND AND CONTEXT OF THE PROJECT We plan to build an application for detection of suspecious activity of people in public places in real time. Our application can be used in surveillance at places like malls, airports, railway stations, etc. where there is a risk of robbery or a shooting attack. We will be using deep learning and neural networks to train our system. This model will then be

deployed as a mobile and desktop app which will take real time CCTV footage as input and send an alert on the administrator's device if some suspicious pose is found. Human suspecious activity is related to identifying human body parts and possibly tracking their movements. Real life applications of it vary from gaming to AR/VR, to healthcare and gesture recognition. Compared to image data domain, there is relatively little work on applying CNNs to video classification. This is because, a video is more complex than images since it has another dimension- temporal. Unsupervised learning exploits temporal dependencies between frames and has proven successful for video analysis. Some suspecious activity approaches use CPU instead of GPU so that suspecious activity can run on low cost hardware like embedded systems and mobile phones. Low cost depth sensors are another new technology in computer vision. They are present in gaming consoles like the Kinect for Xbox 360. They are motion sensors which allow the user to interact with the console without a game controller, through just hand gestures. These are RGB-D sensors that obtain depth information by structured light technology. The structured light sensors infer the depth values by projecting an infrared light pattern onto a scene and analyzing the distortion of the projected light pattern. However, these sensors are limited to indoor use, and their low resolution and noisy depth information make it difficult to estimate human poses from depth images. 1.1.1 Challenges Obtaining sufficient and representative training data for machine learning models can be difficult, particularly for rare types of suspicious activity Developing and deploying sophisticated detection systems can be expensive, espe cially for smaller organizations. College Short Form Name, Department of Computer Engineering 2021 2 1.1.2 Machine Learning Technology Machine learning (ML) technology refers to the subset of artificial intelligence that enables systems to learn from data, identify patterns, and make decisions with mini mal human intervention. Machine learning technology continues to evolve, with ongoing research and inno vations expanding its capabilities and applications across various industries. 1.1.3 Rise Of Machine Learning In Suspicious activity The rise of machine learning (ML) in suspicious activity detection has transformed how organizations monitor and respond to potential threats Volume of Data: ML algorithms can analyze vast amounts of data from multiple sources (e.g., surveillance footage, transaction logs, social media) quickly and effi ciently. The integration of machine learning in suspicious activity detection is revolutioniz ing security measures across various sectors, leading to more proactive and effective responses to potential threats.

Literature Review :

1.Paper Name:Real-TimesuspiciousDetection andLocalization in CrowdedScenes Author:Mohammad Sabokrou , Mahmood Fathy Abstract :In this paper, we propose a method for real-time suspecious detection and localization in crowded scenes. Each video is defined as a set of non-overlapping cu bic patches, and is described using two local and global descriptors. These descrip tors capture the video properties from different aspects. By incorporating simple and cost-effective Gaussian classifiers, we can distinguish normal activities and anoma lies in live camera. The local and global features are based on structure similarity between adjacent patches and the features learned in an unsupervised way, using a sparse autoencoder. Experimental results show that our algorithm is comparable to a state-of-the-art procedure on

UCSD ped2 and UMN benchmarks, but even more time-efficient. The experiments confirm that our system can reliably detect and lo calize anomalies as soon as they happen in a video .

2.Paper Name:Learning Temporal Regularity in Video Sequences Author:Mahmudul Hasan Jonghyun Choi Abstract : : — Perceiving meaningful activities in a long video sequence is a chal lenging problem due to ambiguous definition of 'meaningfulness' as well as clutters in the scene. We approach this problem by learning a generative model for regu lar motion patterns (termed as regularity) using multiple sources with very limited supervision. Specifically, we propose two methods that are built upon the autoen coders for their ability to work with little to no supervision. We first leverage the conventional handcrafted spatio-temporal local features and learn a fully connected autoencoder on them. Second, we build a fully convolutional feed-forward autoen coder to learn both the local features and the classifiers as an end-to-end learning framework. Our model can capture the regularities from multiple datasets. We eval uate our methods in both qualitative and quantitative ways- showing the learned regularity of videos in various aspects and demonstrating competitive performance on suspecious detection datasets as an application .

3.Paper Name:suspecious Detection in Video Using Predictive Convolutional Long Short-Term Memory Networks Author::Jefferson Ryan Medel Description :—Automating the detection of anomalous events within long video sequences is challenging due to the ambiguity of how such events are defined. We approach the problem by learning generative models that can identify anomalies in videos using limited supervision. We propose end-toend trainable composite Convo lutional Long Short-Term Memory (Conv-LSTM) networks that are able to predict the evolution of a video sequence from a small number of input frames. Regular ity scores are derived from the reconstruction errors of a set of predictions with abnormal video sequences yielding lower regularity scores as they diverge further from the actual sequence over time. The models utilize a composite structure and examine the effects of 'conditioning' in learning more meaningful representations. The best model is chosen based on the reconstruction and prediction accuracies. The Conv-LSTMmodels are evaluated both qualitatively and quantitatively, demon strating competitive results on suspecious detection datasets. Conv-LSTM units are shown to be an effective tool for modeling and predicting video sequences .

4.Paper Name:Abnormal Event Detection in Videos using Spatiotemporal Autoen coder Author: : Yong Shean Chong Description :—We present an efficient method for detecting anomalies in videos. Recent applications of convolutional neural networks have shown promises of con volutional layers for object detection and recognition, especially in images. How ever, convolutional neural networks are supervised and require labels as learning signals. We propose a spatiotemporal architecture for suspecious detection in videos including crowded scenes. Our architecture includes two main components, one for spatial feature representation, and one for learning the temporal evolution of the spatial features. Experimental results on Avenue, Subway and UCSD benchmarks confirm that the detection accuracy of our method is comparable to state-of-the-art methods at a considerable speed of up to 140 fps.

5.Paper Name:Unrolled Optimization with Deep Priors Author:Steven Diamond Vincent Sitzmann Abstract:A broad class of problems at the core of computational imaging, sensing, and low-level computer vision reduces to the inverse problem of extracting latent images that follow a prior distribution, from measurements taken under a known physical image formation model. Traditionally, handcrafted priors along with itera tive optimization methods have been used to solve such problems. In this paper we present unrolled optimization with deep priors, a principled framework for infusing knowledge of the image formation into deep networks that solve inverse problems in imaging, inspired by classical iterative methods. We show that instances of the framework outperform the state-of-the-art by a substantial margin for a wide variety of imaging problems, such as denoising, deblurring, and compressed sensing mag netic resonance imaging (MRI). Moreover, we conduct experiments that explain how the framework is best used and why it outperforms previous methods.

6.paper Name:A Revisit of Sparse Coding Based suspecious Detection in Stacked RNNFramework Author:Weixin Luo Abstract:—Motivated by the capability of sparse coding based suspecious detec tion, we propose a Temporally-coherent Sparse Coding (TSC) where we enforce similar neighbouring frames be encoded with similar reconstruction coefficients. Then we map the TSC with a special type of stacked Recurrent Neural Network (sRNN). By taking advantage of sRNN in learning all parameters simultaneously, the nontrivial hyper-parameter selection to TSC can be avoided, meanwhile with a shallow sRNN, the reconstruction coefficients can be inferred within a forward pass, which reduces the computational cost for learning sparse coefficients. The contri butions of this paper are two-fold: i) We propose a TSC, which can be mapped to a sRNN which facilitates the parameter optimization and accelerates the suspecious prediction. ii) We build a very large dataset which is even larger than the summa tion of all existing dataset for suspecious detection in terms of both the volume of data and the diversity of scenes. Extensive experiments on both a toy dataset and real datasets demonstrate that our TSC based and sRNN based method consistently outperform existing methods, which validates the effectiveness of our method.

SYSTEM OVERVIEW :

System Architecture : The architecture has different phases like video capture, video pre-processing, feature extraction, classification and prediction. The general layout of the system architecture is shown in Fig.1.The system classifies the videos into three classes. 1)Students using Mobile phone inside the campus-Suspicious class 2)Students fighting or fainting in campus-Suspicious class 3)Walking, running- Normal class

Video Capture : Installation of CCTV camera and monitoring the footage is the initial step in video

surveillance system. Various kinds of videos are captured from different cameras, covering the whole area of surveillance. The processing in our implementation is carried out using frames, so the videos are converted to frames.

Dataset : The KTH dataset is a standard dataset which has collection of sequences representing 6 actions and each action class has got 100 sequences. Each sequence has got almost 600 frames and the video is shot at 25 fps [14]. The model is trained on this dataset for normal behavior (running and walking). CAVIAR dataset, videos taken from campus and YouTube videos are used for training suspicious behavior (mobile phone using inside the campus, fighting and fainting). Around 7035 frames are extracted from different videos. The whole dataset is manually labelled and separated into 80% for training set and 20% for validation set. The directory structure of dataset is as shown in Fig.2. A combination of KTH, CAVIAR, YouTube videos and videos captured from campus are used in our system.

Video pre-processing : A deep learning network is using in our proposed system for suspicious activity detection from video surveillance. By deep learning architectures, the accuracy obtained can be higher and it also works better with large datasets. A detailed design overview is represented in Fig.3. The input videos are taken from existing and created datasets. As part of pre-processing, frames are extracted from the captured videos. Based on the videos, three labelled folders are created and stored the frames in it. The entire video is converted to 7035 frames and the frames are stored as images in jpg format. Each frame is then resized to 224 ×224 to suite 2D CNN architecture and stored them. The testing video is also converted to frames and resized to 224 ×224 and stored in folder. OpenCV library in python is used for video pre-processing.

Data Flow Diagram : In Data Flow Diagram,we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system,In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like wise in DFD 2 we present operation of user as well as admin.

Data Flow Diagram :

RESULT & DISCUSSION

All of the research papers mentioned above propose different approaches for identification of human activity and various suspicious behaviour using machine learning techniques.

The performance of human activity identification and suspicious behaviour detection system can be evaluated based on various metrics such as accuracy, precision, recall, and F1 score. These metrics reflect the system's ability to correctly identify and classify human activities and behaviours, as well as its ability to detect suspicious behaviour.

In the case of logistic regression or random forest classifier-based systems, the accuracy of human activity identification and suspicious behaviour detection can be affected by factors such as the quality of the camera feed, lighting conditions, and occlusions. Therefore, it is essential to use high-quality cameras and carefully select the camera placement to ensure maximum visibility.

Several studies have reported promising results using logistic regression and random forest classifiers for human activity identification and suspicious behaviour detection system. For example, a study published in the Journal of Ambient Intelligence and Humanized Computing showed that a logistic regression-based system achieved an accuracy of 91% in detecting six human activities, including sitting, standing, and walking, using a single camera. Another study published in the Journal of Applied Research and Technology used a random forest classifier to detect suspicious behaviour in a shopping mall and achieved an accuracy of 86%.

In general, the performance of human activity identification and suspicious behaviour detection system depends on the complexity of the activities and behaviours of interest, as well as the size and quality of the training dataset. Moreover, the use of deep learning techniques such as convolutional neural networks (CNNs) can further improve the performance of the system by automatically learning relevant features from the camera feed.

CONCLUSION : Asystemtoprocessreal-timecameratodetectanysuspicious activity will help to create better security and less human intervention.Great strides have been made in the field of human suspecious Activity, which enables us to better serve the myriad applications that are possible with it. Moreover,

research in related fields such as Activity Tracking can greatly enhance its productive utilization in several fields.

REFERENCES :

1. 1 Eralda Nishani, Betim Cico : "Computer Vision Approaches based on Deep Learning and Neural Networks" Deep Neural Networks for Video Analysis of Human Pose Estimation- 20176thMEDITERRANEANCON FERENCEONEMBEDDEDCOMPUTING(MECO),11-15JUNE2017, MONTENEGRO

2. Naimat Ullah Khan , Wanggen Wan : "A Review of Human Pose Esti mation from Single Image"- 978-1-5386-5195-7/18/ 2018 IEEE

3. Qiuhui Chen, Chongyang Zhang, Weiwei Liu, and Dan Wang, "Surveil lance Human Pose Dataset And Performance Evaluation For Coarse Grained Pose Estimation", Athens 2018

4. BaoleAi, YuZhou,YaoYu: "HumanPoseEstimationusingDeepStruc ture Guided Learning"- 978-1-5090-4822-9/17 2017 IEEEDOI10.1109/WACV.2017.14

5. Zhe Cao, Tomas Simon, Shih-En Wei, Yaser Sheikh The Robotics In stitute, Carnegie Mellon University "Real time Multiperson 2D Pose Estimation using part affinity fields"- 1063-6919/17 2017 IEEE DOI

6. Hanguen Kim, Sangwon Lee, Dongsung Lee, Soonmin Choi, JinsunJu and Huyun Myung "Real-Time Human Pose Estimation and Gesture Recognition from depth Images Using Superpixels and SVM classifier." Sensors 2015, 15, 12410-12427; doi:10.3390/s150612410

7. Tripathi, Rajesh and Jalal, Anand and Agarwal, Subhash(2017). "Sus picious Human Activity Recognition: a Review". Artificial Intelligence Review. 50.10.1007/s10462- 017-9545-7.

8. E. Eksioglu. Decoupled algorithm for MRI reconstruction using nonlo cal block matching model: BM3DMRI. Journal of Mathematical Imag ing and Vision, 56(3):430–440, 2016.

9. S. Wang, Z. Su, L. Ying, X. Peng, S. Zhu, F. Liang, D. Feng, and D. Liang. Accelerating magnetic resonance imaging via deep learning. In Proceedings of the IEEE International Symposium on Biomedical Imag ing, pages 514–517, 2016.

10. L. Xu, J. Ren, C. Liu, and J. Jia. Deep convolutional neural network for image deconvolution. In Advances in Neural Information Processing Systems, pages 1790–1798, 2014.

11. Y. Yang, J. Sun, H. Li, and Z. Xu. Deep ADMM-Net for compressive sensing MRI. In Advances in Neural Information Processing Systems, pages 10–18, 2016

12. Z. Zhan, J.-F. Cai, D. Guo, Y. Liu, Z. Chen, and X. Qu. Fast multiclass dictionaries learning with geometrical directions in MRI reconstruction. IEEETransactions on Biomedical Engineering, 63(9):1850– 1861, 2016