Survey on Pedestrian and Object Detection in Video

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Abstract- Pedestrian detection is an important concept in computer field containing applications of key in many human life fields like surveillance, intelligence vehicles or advanced robotics. Video and object tracking is also a current field in computer science. Many researches are carried out in both of these fields. Object and video tracking gained a best growth after robotics has got importance. This paper reviews related papers of pedestrian and object detection so that current research overview can be get through this. The paper discusses different methods which can be applied for detection. It gives an overview of various ideas of discussion. This paper is helpful for further reference and researches and useful for ones who likes to know about researches of pedestrian and object detection.

Index Terms- Pedestrian detection; object detection; robotics; surveillance; intelligence vehicle.

1. INTRODUCTION

Pedestrian detection is a main object of computer perception. Machines must have capacity to detect and track, acknowledge pedestrians in an efficient way so interactions can be done easily. Many researches are being carried out every year in this filed and results vary from year to year in the method of approaching and getting better performance. If we see results in papers from 2010 to 2017 a vast number of journals shows this work. We can see a reasonable studies of pedestrian detection because we can apply this for many number of applications. Examples of this applications are traffic safety, robotics, video surveillance, navigation system optimization and some of special needs of applications.

Object tracking and detection is one of the current research and development in computer vision which gives many applications it may be related to traffic, video surveillance, monitoring of wild life. This paper discusses different ideas and methods which can be adopted for object detection and object tracking. Many algorithms are studied here and are compared.

Video is an image series. Each of image can be referred as a frame which can be displayed using fast frequency so that content continuity can be easily percepted by human eyes. Techniques of image processing can be used for single frames. Along with these two frames which are consecutive can be take that are closely related. ROI Identification is initial step in many applications of computer vision like robotics, event detection or video surveillance.

Object detection and tracking is a difficult task and consumes more time. The measurement resolution depends on what type of technology is adopted. We can commonly use this in public places such as malls, Infrared beams are being used. Applications are

Medical imaging, counting people, security, human computer interaction etc. To review, verify, and monitor lots of data is impractical. So it is a challenging task to detect and track automatically people in an environment.

An increased interest can be seen in recent days in field of pedestrian and object tracking and detection. The aim of object tracking is ROI segmentation in a video scene and knowing occlusions, positioning and also motions. Detection checks the objects which are present in video and object locating in a unique way. Object may be tree, bird, human or any other. Tracking is done by spatial changes of objects and temporal object changes monitoring. For object detection and tracking an intelligence video surveillance can be adopted. Anomaly detection of objects tells about normal and abnormal people behavior and analyzing these kind of behaviors.

This paper provides different ideas of recent researches and developments of pedestrian detection and object detection and tracking .Initially, data is obtained from input devices and then techniques and algorithms can be applied for further processing. To know incoming data quality preprocessing is carried out. Along with these ROI determination and segmenting object will be done and these are the main processes which are needed roles in process of object detection, the input devices may be video cameras, scanner sensors, infrared sensors or laser sensors. For night vision are used. Once we choose input devices, detecting process can be done offline or real time. The processing of input data will be   done manually

like size standardizing, format standardization etc. In real time capturing of video data is done first from a CCTV or video cameras. After preprocessing ROI segmentation will be done. This gives good accuracy, we can adopt fastest segmentation techniques which are simple.

Recognition of question and following will be there as a research issue which is open after an enormous research is done in this field. Various reasons shows why it is important to have pedestrian detection and tracking which is efficient. Some challenges can be mentioned like pedestrian with different appearance and backgrounds with different body poses, clothing, body size, conditions of outdoor lightening. Distance from camera to pedestrian is an important thing because if a pedestrian is far away from cameras it appears very small. Good performance can be obtained from datasets which has high resolution but these faces challenges in images having high resolution. Many features like object, edge, shape are considered in object detection process. To improve accuracy and speed HOG can be adopted. Only sizes, shape of pedestrian can be detected using this. Some methods uses features regarding object shape. One such can be method called Shape context. Classifying the object is an important step. It classifies the features which are extracted into various classes. One of the method is support vector machine. By using SVM data prediction, data classification can be done in an efficient way. Pedestrian detection based on movement present in video is also a widely studied topic and it is simply effective nowadays. This gives good accuracy and is quite potential because movement of pedestrian contains specificity, Changes in movements of pedestrian which are sequential can be predicted and determined.

2. LITERATURE SURVEY

Gary R. Bradski [1] developed a system by using user interface which is perceptual. An algorithm for object tracking is developed, demonstrated which tracks faces of human. Algorithms of computer vision which are part in user interface which is perceptual should be efficient, fast. They should be skilled enough to track in real time and not absorbing big share in resources which are computational. Mean shift algorithm is discussed in this paper. Initially Histogram methods are deployed which produces Pedestrian detection of object. In this case they wanted to track pedestrian detection of object in scene of video. Since object probability distribution may vary and lead to dynamic changes with time. Here they have modified mean shift algorithm to cope up with dynamic changes. The algorithm which is modified

is called as CAMSHIFT continually adaptive mean shift algorithm. For games and for graphics, CAMSHIFT is helpful as an interface. In object probability distribution, set M which is a set of image gradients, correlations of color which are local, derivatives is used on object and then taken object histogram which explains about rotation and translation of object than normalization is done than probability distribution of vectors are calculated over image region than CAMSHIFT is applied. CAMSHIFT is an efficient object tracker which is a part of perceptual user interface. It handles few problems for tracking of computer vision like image noise, object motion which is irregular, distractors, and occlusion.

Md. Zahidul Islam [2] had proposed video based tracking of object system using particle filtering. Object tracking which is based on video is usually used in image stream which is non stationary that varies over time. Robust object detection and object tracking in real time is a major issue in the field of computer vision. Existing algorithms are capable to track in a controlled environment which is predefined. In some of the cases problem of non-linearity is not considered. In this paper, they have designed a system which takes information about color, shape information which is based on distance transformation and non-linearity. For estimating non-linearity problems and non-Gaussian problems particle filtering has given successful results. Here they have studied various difficulties which is video based and issues are analyzed step by step. Initial step, they have developed a tracker of particle filter which is based on color that depends upon window search which is deterministic whose content of color is matching with a model of histogram which is for reference. An HSV model that is histogram based color model is adopted for developing this system of observations. In next step they explained an approach for object tracking which is moving by adopting particle filter which uses shape information. Similarity of shape which is between a estimated and template regions is measured in scene of video by taking their distance which is cross-correlated and normalized, transformed images. This system observation depends on edge features which are distance transformed and on shape by choosing object from scene of video they have instantly created template. At the final step, system is illustrated showing how it can be improved by adopting cues with non-linearity. Particle filter is a hypothesis tracker which gives approximation of posterior distribution which is filtered by a weighted particle set. . It gives particle weight which rely on a score which is likelihood and then particles are propagated as per motion model. It contains two steps which are update and prediction.

International Journal of Research in Advent Technology, Vol.6, No.11, November 2018
E-ISSN: 2321-9637
Available online at www.ijrat.org

Preprocessing is done next than normalization is performed next, than Distance transformation is taken place between two images which are binary level of segmented image and template which is segmented. Than matching is done which is normalized and implementation of particle filter method is carried out after experimental results are discussed. Here they have examined moving object of single pedestrian using shape color information and combination of these features is examined and decided which gives better performance.

Shai Silberstein, Dan Levi [3] proposed a system of video based detection of pedestrian. A new system of pedestrian detection which is vision based for rear view cameras is presented in this paper which is strong for poses which are upright and occlusions which are partial. Detection is done by using lens camera which is rear view, fish eyed and is single automotive. The proposed system uses accelerated feature synthesis is a method of detection which is multi part with performance which is state of art. Along with this, annotation and collection of a dataset which is extension of video for this application which is specific containing pedestrians in a vast range of conditions in environment. Detection which is part based for people detection. Benefits are proved in different poses and occlusions. A measure for evaluation which is video bases is done and detected accuracy gain is compared with detection which is template based. First image warping is done. This obtains appearance of pedestrian which is not variant to distortion of camera lens, tilt of camera and position of image of pedestrian. Image pyramid which detects multiple sizes of pedestrians. Accelerated feature synthesis is done than non-maximal suppression is carried out. Removing detections which are inaccurate and redundant and finding detection performance for maximum than experimental results and discussions are done. This system gives greater performance of detecting pedestrian.

Madhur Mehta [4] presented an approach for developing a system of object tracking in real time using a camera which is static which grabs frames of video and object tracking is done. The work describes about histogram matching, absolute frame subtraction for implementing a system of object tracking which is robustly automated. After tracking of object detection using techniques of kalman filter which is discrete. Algorithm of histogram matching is useful for identification when object entering in camera's viewing range. Absolute frame subtraction provides results which are better for video of low quality. Such a system of tracking may be useful in applications os surveillance and which are cost effective. Histogram represents pixel frequency in a

certain color range. The technique analyzes object appearance than object extraction taken place. By taking absolute difference, smoothening, labelling, extraction, finding coordinated with label number, finding object centroid and tracking through kalman filter is done. Kalman filter uses two types of equations which are time update and equation of measurement update. The approach saves time and steps of processing.

Chia-Chen Li, Pei-Chen Wu [5] proposed a detection framework of pedestrian which is on machine learning concept and statistics of heuristics. First an image which is captured an ROI is set. Second, template matching is performed which is for detecting candidate pedestrian with use of template image set and current frame's image edge, difference image of current frame and previous frames. In next step analysis of histogram is done for filtration of candidate pedestrians. At final step, HOG with LIBSVM that is library support vector machine is applied for verifying candidate pedestrians. The results proves that method can be seen in real time. The system is composed of three main steps, first in preprocessing ROI is used which only capture area where person is present so entire image is no need to be considered for detection. It reduces computational amount. Than template matching is carried out which compare four images which re templates by taking difference and histogram analysis is performed or filtering the candidate pedestrian. HOG is applied which is a feature descriptor. It is done on two pedestrians by executing twice than experimental results are discussed.

Prateek K.Gaddigoudar, Dr. Nalini C.Iyer [6] proposed a system which solves issues with various styles of clothing of pedestrians and non-linearity motions, occlusions. Kalman filter is also applied in this paper and results are compared and proves that particle filter is better than all existing approaches. Particle filter is used for estimation of status of internal systems which are dynamic by doing some observations which are partial. It computes current state, conditional probability when information about noise and previous state is given. Particle filtering is many useful for problems of non-linearity. It distributes particle set over a region whose parameters and position are described by state space model's characteristic equation. Particle filtering is useful in implementation of updating of predicting a algorithm of mutation selection which are generic type and weights are reassigned in future steps. Particle filtering involves frame extraction by extracting frames at continuous intervals by taking count of frames at continuous intervals and by taking count of frames total number in video. Preprocessing removes noise in image, Particle

International Journal of Research in Advent Technology, Vol.6, No.11, November 2018
E-ISSN: 2321-9637
Available online at www.ijrat.org

detection involves Bhattacharya's computing distance which is between normalization of histogram than particle tracking which determines probabilities which are prior and likelihood computation which involves creating, updating, sampling particles than experimental results are discussed.

Keni Bernardin, Florian van de Camp [7] proposed a system which is automatic for indoor environments monitoring by making use of cameras which are zoom able, pan-tilt. A composition of color histogram filtration and Haar-feature-classified based detection are used which gives persons initialization which is reliable and tracking in cameras movement presence. Combining feature tracking of KLT and adaptive color for upper part of body and face is used for recovering tracking and tracking which is robust. Camera parameters recomputing which is continuous which is combined with a controlling scheme which is fuzzy which allows for moving targets. Tracking in a smooth way is done which also allows stable close-ups of face acquisition, which is similar to the human camera man behavior. The system is applied on a scenario of indoor monitoring and showing a robustness, neutralness which is of high degree and is also flexible. Image is put for scanning using window sizes of detection and then filtering of candidates is done on information of color after detection initialization of tracking is done after track lost, scanning is done for whole image. In color feature tracking, face tracking is done by using histogram and applying normalization and tracking of upper body is done. Feature tracking of KLT is performed.

F. Dornaika [8] proposed a new method of efficient detection of objects in images and also in videos. They have described a stage which relies on scheme of classification which classifies the features which are extracted in images which are new into object and non-object features. The scheme of binary classification is a good tool useful in object detection and matching. Not only achieving robustness and fast approach is done but also registering object is done which is fast and robust. They gave evaluation which is quantitative that shows the benefits by use of stage classification for object registration and matching. This is useful method for tracking objects in real time. Feature extraction is done which extracts feature points in image input and reference template of object. Second feature classification classifies objects and non-objects by using binary classification scheme. SVM is used here than feature matching is done after that experimental results are discussed.

Jae Kyu Park [9] proposed an approach for analysis system of image which is on deep learning concept for pedestrian detection in CCTV. Experiments are carried out for verifying objects by developing model of study and model of evaluation. The suggestion of study is that if face of somebody is not recognized properly in CCTV than same person will be traced and find in image data which is other CCTV. This is done using color intensity classification method which is for color of cloths or features of boy and if face is recorded in one CCTV than person identification will be secured. Detection and searching from a storage which is bulk is done. Deep learning is adopted which gives better speed and accuracy for pedestrian detection and tracking. HOG gesture descriptor is used for object detection and tracking than analysis of image is carried out for handling images input form camera than SVM and RNN algorithms are applied in detecting person. The verification and experiments and results are carried out.

3. FUTURE ENHANCEMENTS

A system of better accuracy can be proposed and loss of information can be reduced. Implementation feasibility can be increased. Applications of LSTM of deep learning reduces sequential information loss or gradient loss and LSTM can give better accuracy, speed comparing to the discussed models.

4. CONCLUSION

The paper is a survey of various methods and ideas of pedestrian detection and object tracking. It gives an overview of researches which are carried out. This paper explaining different algorithms and informs about methods which gives better accuracy, performance, flexible systems of object detection and tracking and pedestrian detection and also discusses about future enhancements which can be done for achieving best results.

ACKNOWLEDGMENT

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