

Application of Motion Vector for Railway Platform Security System

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Abstract—Railway is a convenient and efficient public transit organization in the world. The Indian Railways is the biggest railway system of Asia and the second biggest railway system of the world. Indian Railways is the biggest zone which provides more employment. Security of station platform is an important issue in recent years. Many have lost their lives due to carelessness about safety. The existing systems only monitor the passenger and could not give any warning message to passenger immediately. This paper proposes a novel method that could detect the passenger moving direction and give warning message to passenger immediately without using additional passenger detection equipment. We use motion vectors to determine whether passenger is approaching railway. Once passenger is approaching the warning line of the railway, the proposed method will notify the passenger via broadcasting or speech message to increase the safety in the platform. This method reduces the complex operation of the image recognition system and may successfully go on rainy days and dark time.

Index Terms— Railway platform, monitoring system, motion vector, security system.

I. INTRODUCTION

A railway platform is a part of pathway, alongside rail tracks at a railway station, metro station at which passengers may board or alight from trains. Almost all railway stations have some type of platform, with larger stations having multiple platforms.

The deployment of rail safety procedures not only prevent loss of life and property, but also inspire greater confidence in commuters factors that have fast come to the attention of governments and rail transport providers worldwide. The related maintenance and management task will be increased for facility in addition installed, representing certain exclusion effect to budget of the unit. Hence, it has become the focus of this study if platform safety protection function can be improved without having to additionally install platform safety facility but by making use of existing equipment or system through novel processing technology.

In the past, studies on platform accidents would largely focus in the analysis of human error, and it is why every of the operation units would, in steps, increase safety facilities to stop the occurrence of accident. Withal, every of the facilities established has priced a lot; accept the installation of train approaching a red illumination along the political program for example, associate degree island-type platform would about want lot of expense. The subsequent maintenance and

management responsibility are redoubled for facility in addition put in description bound exclusion result of the budget of the unit. Hence, it has become the main target of this study if platform safety protection performs is increased while not having to additionally install platform safety facility, however by creating use of existing equipment or system through novel process technology.

Mainly, motion object as a passenger is the primary object on station platform, and their scope of movement is restricted to a limited area on the platform. In addition, image monitoring system set up at the station is mostly MPEG-4 or H.264 recording format. These formats are already stored with motion estimation in sequence within an image recording file. This article would develop images of the monitoring system to directly extract in sequence of motion vector, and predict object movement direction so as to track down as a major form of accumulation rapid transit, rail transport is not only a fast, but also an efficient way of transporting huge a lot of people and goods from one location to another. Nevertheless, without sufficient protection from threats such as international terrorist actions, which have become more and more established and diverse over the years, such vital transport arteries present critical security weaknesses that stand to spoil public stability.

II. RELATED WORK

In world the millions of passengers use railway systems every day. On the railway platform, there are many passengers who travel by train, they would extend their head to see if the train has arrived or not and stand within the warning line of the platform. Therefore, several incidents have taken place with passengers. In recent years strengthen the safety and security of station platform has become a significant issue. Now a day for performing passenger behavior on platform, security is a major worry. We can use monitoring equipments like, CCTV and DVR.

As per the recent progress there are dissimilar cases of security arrangements. But the main disadvantage of such a system is that it just could record the video frames and could not give warning message to a passenger immediately. Hence, we propose a novel method that could detect the passenger moving direction without using additional passenger exposure equipment. [2] In this paper they proposed visualization based monitoring system for railway station platform. The system right away perceives treacherous factors of passengers on the

platform by oppression image process technology. [3] This paper analysis the integrated use of safety looking with the domestic and international latest analysis on rail safety protection system, relate degrees focus on the finishing of an associate organic full system, with the looking and early warning, risk assessment, prophet organization and emergency exit system. [4] This literature delineated the depart management of the rail transportation software package and conferred the most effective strategy and spot of departing intelligent decision network supported Petri web. Literature formally sculptured definition; design and realization of the self-check perform in automatic driving control software. Literature had researched the analysis and design of the train strategic conclusion supporting system by using the method facing objects. Literature optimized the train's initiative driving by using linear quadratic Gaussian (LQG) method and hereditary algorithm.

IEEE standardization committees are dependable for the survey, impel management of the IEEE standard, thoughtful and propose IEEE standard. For the last few years, IEEE standardization committee is extremely active in standardization investigate part of rail transportation information and management, closely follow after releasing many standards in this region, and some parts are correlated to transportation safety.

III. THEORETICAL BACKGROUND

Along the railway platform, we will avoid the accident by using this proposed technology. In our programming we tend to use netBean, which has associated with Integrated development surroundings (IDE). The NetBeans IDE tool, it is written in Java and can run on different operating system like Windows, Linux. NetBeans turn on functionality as we use it. Start creating and opening projects and the IDE will just activate the features we need, making our experience quicker and cleaner. It comprises of a base space associated with an protractible plug-in system for customizing the surroundings and Java development tools. OpenCV contains a standard structure that suggests that the package includes several shared or static libraries.

Digital Image processing Techniques.

Digital image processing has large application in several areas. Image processing refers to processing of an image by standard algorithms, For instance, if $a(x, y)$ is an image, then 'a' represents the amplitude (e.g. brightness) of the image at the coordinate position (x, y) . Smart digital technology has produced its potential to control multi-dimensional signals with systems that vary from simple digital circuits to advanced parallel computers.

Capture Frame:

Video capture refers to storing video pictures in an particular computer Graphical monitors show recording by splitting the video display into thousands (or millions) of pixels, structured in rows and columns. The pixels are close therefore they appear attached.

Motion Detection:

In a video monitor, survey, motion detection refers to the potency of the closed-circuit television to identify movement

and capture the results. Motion detection is typically a software-based observation formula that, once it detects motion can signal the monitor analysis camera to start capturing the event. A complicated motion detection closed-circuit television will associate analyze the sort of motion to examine if it warrants an alarm associate appliance that permits rooted image capture capabilities that permits video, pictures or extract data to be compressed, hold on or transmit over communication networks or digital link.

Motion vector

The motion vectors area unit compresses video by storing the changes to a picture from one frame to successive. The method of video compression plays a key role in the motion evaluation process. The H.264/MPEG-4 AVC normal defines motion vector as a two-dimensional vector used to lay to rest estimate that gives an offset from the coordinates within the decoded image to the coordinates in a reference image.

The motion vectors could also be described by a change of location model or several substitute models that may approximate the motion of a true video camera, like rotation and translation and zoom.

In general, a video is created by a group of 2-D continuous pictures with in relation to thirty frames per second. In other words, the interval of your time lapse is concerning 1/30 second for 2 successive frames, and alter of object in between 2 continuous frames will hardly be powerful in such short-span of your time, create use of such a feature, it will divide the photographs that required to be encoded into many overlapped blocks, and so take reference video recording for correlation. Thus, the primary ideal approach of correlation is to go looking for the whole system and determine the foremost similar block. The actual fact is that two successive frames are extremely similar and apply correlation at the relative position with the current frame and the reference frame.

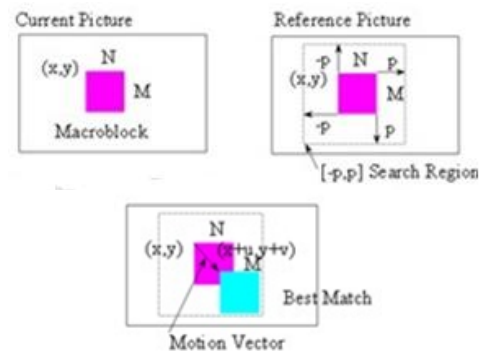


Figure 1. Motion Vector

Basically three algebraic calculations such as Mean Square Error (MSE), Mean Absolute Error (MAE), and that have often been used to determine the similarity between two frames. These equations are described as follows:

1. Mean Square Error (MSE):

$$\frac{1}{N * M} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} (C(x, y) - R(x + u, y + v))^2$$

2. Mean Absolute Error (MAE):

$$\frac{1}{N * M} \sum_{x=0}^{M-1} \sum_{y=0}^{N-1} |C(x, y) - R(x + u, y + v)|$$

3. Sum of Absolute Difference (SAD):

$$\sum_{x=0}^{M-1} \sum_{y=0}^{N-1} |C(x, y) - R(x + u, y + v)|$$

In these three equations, $C(x, y)$ is the pixel value of the current block and $R(x+u, y+v)$ is the pixel value of the reference block, while u and v are the corresponding positions for block motion. All above equations shows the effect of MSE is considered the best. However, it requires multiplication and division during calculation and has complex operation. But SAD simply uses addition and subtraction, and its calculation is comparatively easy so that it is considered as the base for mathematical calculations in this paper.

IV. PROPOSED WORK

Algorithms:

The algorithm for detecting the motion object is shown in Fig. 2

Reference frame:

The procedure in which the system is based on the pre-recorded videos of different kinds of simulation context with observing to one-side and two-side line-crossing of passengers on station platform that we operate as a reference frame block.

Acceptable minimal error:

The minimal error has to be pre-decided and is due to the effect of camera shock or image shadow, the pixel value could be changed. Therefore, minimal error is considered so as to reduce the probability of misjudging object motion when the system is placed at different area or crossing point. Specific margin can also be chosen on both side of the platform.

Decided margin:

As per the safety reason the system interface can choose its specific margin on both sides of the platform.

Change in pixel:

In this procedure if there is a change in the pixel coordinate of current and reference block and its amount of change has exceeded the minimal error which was initially designed, it can be programmed at its optimal value so that the system can function more effectively.

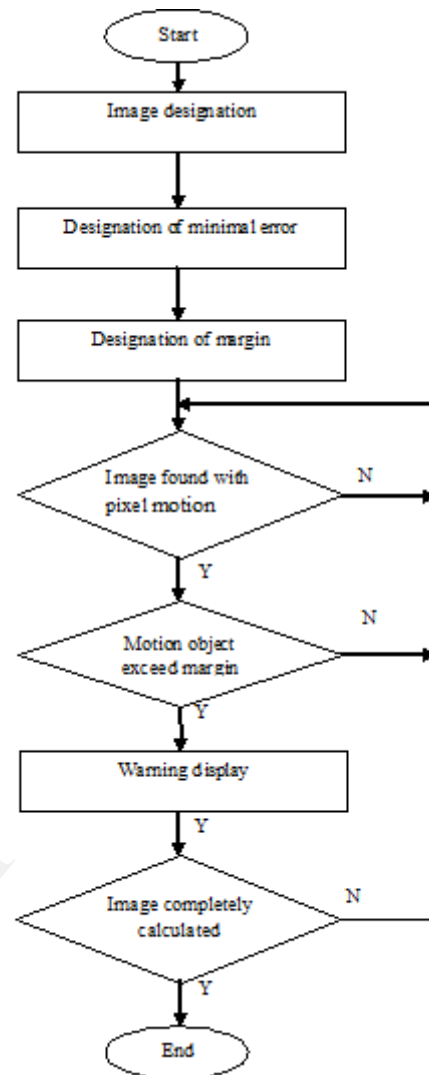


Figure 2. Flow chart for motion object:

The following result shows the motion of the object.



Figure 3. Image found with pixel motion

Crossing the margin

When the motion object has exceeded the margin value as a pre-decided on the system, the system will display warning message immediately via broadcasting or speech message.



Figure 3. Motion object exceed the margin.

In rainy day the system can successfully extract motion vector, and can predict and track down the position and direction of displacement of the target motion object. When the motion object exceeds the margin destination, the system can automatically display warning message. In the night time the system can also successfully extract motion vector and track down the displacement, position as well as direction of the targeted motion object by comparing the current and reference frame.

V. CONCLUSION

In this paper we will be proposing a unique technique that could detect the passenger moving direction without using any additional passenger detection equipment, and then uses these motion vectors to determine whether passenger is approaching railway. Once a passenger is simply too approaching railway, the proposed technique can give notice to the passenger via broadcasting or speech message to extend the security on the platform. This method reduces the complex process of the image recognition system and this system successfully works on rainy days and night. This project is a application oriented it will useful in railway platform system or any bank area system.

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