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Pedestrian Counting System Using Raspberry-Pi and Opencv

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Abstract: The Pedestrian Counting System is a real time people traffic measurement and analysis system for business intelligence solutions. The Pedestrian counting system provides precise data on Pedestrian entry and exit activities that concede users to make strategical decisions necessary to improve business performance. It helps managers to understand factors poignant human traffic and thus plan and optimize resources effectively. These factors may include new tenants, special ascent activities, market research, and customer advertising campaign, new competition and renovation. Most of the time, counting the number of visitors at a particular building such as museum, government building's etc. is necessary from security point of view. For this purpose we propose a system people counter using pi camera and open CV. This system is important for the marketing research (pedestrian traffic management, tourists flow estimation) or in security use. In the proposed system we would be using raspberry pi module as the controlling unit which would transfer the video signal from the pi camera to the screen connected. Open CV software is used for image processing which would calculating the number of pedestrian entering and leaving the premises. Programming in open CV can be done using c++, ruby, java, python etc. We would be programming it in python as it is an open source language. In the literature overview, Many papers have been published this last ten years for counting (or tracking) people by using video processing with different technique (extraction of the pedestrian silhouette, make rectangular patches with a certain behavior, Placing the camera vertically to avoid blocking problem, segmentation of human region by using stereo video camera).

Keywords: Pedestrian Counting System, Open CV, Pedestrian Tracking Management, Raspberry-Pi.

1. INTRODUCTION

Background Real-time people flow estimation can be very use-full information for several applications like security or people management such as pedestrian tracking management or tourists flow estimation. The use of video cameras to track and count people increase considerably in the past few years due to the advancement of image processing algorithms and computer's technology. Several attempts have been made to track people but all those different ways can be classify in three categories of separate complexity:-

1. Methods using region tracking features. To improve this method some adding a classification scheme of pixels based on color or textures. 2. Methods using 2D appearance of humans.3. Methods using multiple cameras to make a full 3D modeling. The third category is more accurate than the two others because it rebuilds precisely the scene but it is also the most difficult with complex algorithms. Some of the time, this system required a complex camera set-up and cannot operate in real-time because the 3D models are too slow. This is why most of the systems used the two other categories. The goal of this people counting system is to count the number of people entering and exiting a closed area like a building, museum or shopping mall. This should be accurate and not costing too much, where a camera is going to be mounted almost vertically from the roof covering an entrance to a building. This system could count pedestrian entering and exiting and count multiple people if they are not walking to close each other. When two or more people walk too close, the system will have problems counting how many people that is. One of the most difficult problems is people occlusions, where the camera has a limited view of each individual in a group. In the area of people flow estimation uses multiple cameras to create 3D models of the scene and its contents, this is however too slow to be used in real-time due to complex algorithms and is heavily dependent on good calibration of the cameras. Though multiple cameras are the most accurate, a single camera will be used in this project

2. LITRETURE SURVEY

For counting and tracking moving pedestrian several systems [1],[2],[3],[5] using image processing by a camera have been expected, recently. To process image data, these systems were based on motion analysis of moving pedestrian. Rossi and Bozzoli [2] have developed a system to detect and track moving pedestrian using a fixed video camera. Their goal was only to count the number of pedestrian crossing a counting line. In their system, a motion detection module complete whether any person has entered the scene which is a tracking module combining prediction and matching then follows pedestrian until people reach the counting line. However, this system did not consider an area that electric power is not supplied or survival network is not constructed. Segen and Pingali [3] have developed a system for real-time tracking of pedestrian in video sequence. In their system, the input to the system is live or recorded video data captured by a stationary camera in an environment and the output consists of trajectories which give the spatiotemporal coordinates of individual persons as they move in the climate. Teradaetal. [5] Proposed a counting method

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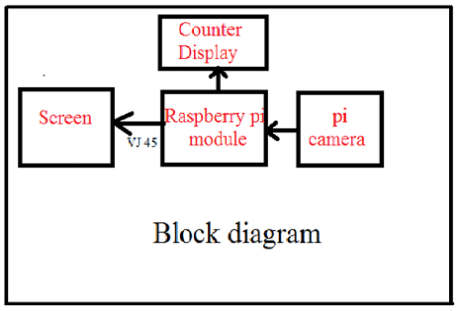
accurately for passing pedestrian by using stereo images. In proposed method, the stereo camera is hung from the ceiling of the gate and the optical pivot of the camera is set up so that the passing pedestrian could be observed from just overhead. Masoud et al. [1] prospective a real-time system for pedestrian tracking in sequences of gray scale images acquired by a stationary camera. The objective is to integrate this system with a traffic control application such as a pedestrian control program at intersections. The proposed approach can also be used to detect and track humans in front of vehicles. There are few systems for a habitat monitoring using sensor network. The Intel Research Laboratory at Berkeley, the institute of the Atlantic and the University of California at Berkeley has jointly developed a habitat monitoring kit that permit researchers worldwide to engage in the non-intrusive and non-disruptive monitoring sensitive wildlife and habitats

3. SYSTEM DEVELOPMENT

Block diagram:-



This block diagram consists of following components:
1. Raspberry pi module
2. Pi camera
3. Counter display
4. Screen
5. VJ 45 cable

The pi camera captures the real time video frames and sends the video to the raspberry pi module, which processes the video frames and display the video on the screen. The screen has virtual line which indicates the people count on the screen placed at the remote location. The counter shows the count on 7segment

THE SOFTWARE REQUIREMENT

1. Opencv:-

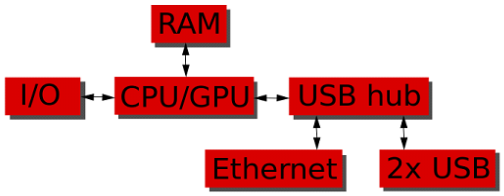
OpenCV is an Image Processing archive created by Intel and maintained by Willow Garage. Cross-platform (Linux, OS X, Win2K, WinXP) are used. It is originally developed by Intel.It is Free for commercial and research use. It is Easy to use and install Open CV provides easy and suited ways to read and write image.

2. Python:-

Python is a one of the programming language that lets you work more quickly and combine your systems more capably. Python is developed under an OSI-approved open source license, making it freely usable and distributable, even for commercial use. Python license is administered by the Python Software Foundation. Python is often used as a supportive language for software developers.

Hardware Description:

Raspberry pi module: The Raspberry Pi is a series of credit card sized Single board computers advanced in the UK by the Raspberry Pi Foundation with the intention of promoting the teaching of basic computer science in school. The Raspberry Pi primarily uses Linux-kernel based operating systems. The ARM11 chip at the heart of the Pi (first generation models) is based on version 6 of the ARM The Raspberry Pi 2 has 1 GB of RAM.



2. Pi camera:

On 14 May 2013, the foundation and the distributor RS Components & Premier Farnell/Element 14 launched the Raspberry Pi camera board with a firmware update to put it. The camera board is shipped with a Flexible flat cable that plugs into the CSI connector placed between the Ethernet and HDMI ports. In Raspbian, one enables the system to use the camera board by the installing or advancing to the latest version of the OS) and then running Raspi-config and selecting the camera option.

In the circumstances of spectrum sensing, the detection technique aims the extracting from the received signal a test statistic from which the spectrum occupancy is checked. An overview of some of these techniques is given below:

4. PERFORMANCE ANALYSIS

In this we have tested various situations, in that if the photo is provided as an input it will recognize the human beings and will count the number of persons and will make the red bordered box to the faces of people. In this if animal or robots photos are provided as an input it will not count anything so only peoples are been counted, And in the video processing the real time video is captured and the video is shown on the output screen as well as it will detect the no of peoples and shows the red bordered box to the human faces even in real time video processing the robot and animals are not detected.

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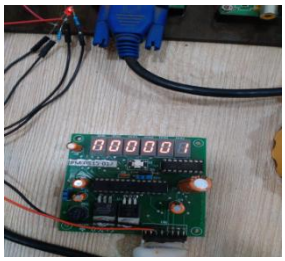
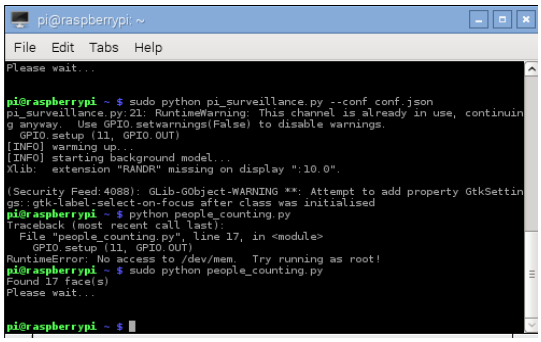
Output window



counter output



Advantages:

1. System can be connected with the company's existing Ethernet network.
2. High accuracy.
3. Management of buildings.
4. Reachable from any place using web application.

Disadvantages:

1. Two persons having equal shoulder and head height pass at the same time then it would be detected as one person instead of two.
2. Accuracy is not 100

Applications:

1. Museums.
2. Shopping centers, malls.
3. Airports, bus stand, and railway stations.
4. Casinos.
5. At the doors of transport vehicles likes bus trains and subways.

5.6 Other applications:

A people tracking system cans be used for others applications not inevitably just for counting people. For example, system can be extended for security application. In fact a real-time people tracker system provides enough information in order to make a good video surveillance. Detect strange behaviors of people and store those information's on a database. This type of system cans be very interesting for storekeeper or supermarket.

5. CONCLUSION

5.1 Conclusion:

The system mentioned is cost effective and reliable in nature. We are trying to develop an automatic people-counting and monitoring system based on raspberry pi and opencv. Our system can be established everywhere. Our system would be able to count the number of incoming and outgoing people. The real time image processing using pi camera and raspberry pi 2 module would be done and hence it would be highly accurate. The system is reliable from security point of view in cases of emergency evacuation of the premises.

5.2 List of features:

1. The people counting system must t with the existing Ethernet network of the company.
2. A high accuracy.
3. Management of several buildings (need a centralized database updated by each building's main computer).
4. Evolution (in order to add some extra features like evaluate the impact of release).
5. Reachable from any place (it is very easy to access from anywhere).
6. Easy management of configuration.
7. Breakdown management (detect the malfunction of sensors by using the TCP/IP protocol).
8. Easy access to statistics for every building or every doors of each building with different interval of time (daily, monthly or yearly).
9. Use, when it's possible, free technologies to reduce the cost of the system.

REFERENCES

[1] J. Manasa, J.T. Pramod, Dr. S.A, Jilani, Mr. S. Javeed Hussian, Real time object counting using raspberry pi, IJARCCE, vol.4, issue7, july 2015.

[2] Sebastian Harasse, Laurent Bonnaud, Michel Desvignes, People counting in transport vehicles, IJCEACIE, Vol 1, No4,200 7. Andre Schmidt, Low-cost crowd counting in public spaces.

[3] Amruta Pandit, Jyothi Rangole "Literature Review on Object Counting Using Image Processing Techniques" Internationl Journal of Advanced Research In Electrical, Electronics and Instrumentation Engineering, vol.3, Issue 4,April 2014.

[4] Selcuk Sevgen, Fethullah karabiber "Implementation of a CNN based Object Counting Algorithm on Bi-Cellular Vision System, Isthambul University, Deportment of computer engineering, Turkey.

[5] Sarah Sookman Matrox Imagining "Blob Analysis and Edge Detection in Real World" August 2006, http://www4.evaluationengineering.com.

[6] E. Bengtsson, J. Lindblad, "Robust cell image segmentation methods", center of image analysis, Uppsala University.

[7] Md. Maminul Islam , Md. Sharif uddin Azad, Md.Asfaqu, Alam, Nazmul, Hussan," Raspberry pi and image processing based EVM", International Journal of Scientific & Engineering Research ,volume 5, Issue 1, January-2014.

[8] G. Senthi Kumar, Gopal Krishna, V.sathis kumar, "Embedded Image capturing System using Raspberry pi", volume 3. Issue 2, March- April 2014 ISSN 2278-6856.

[9] https:// www.cl.cam.ac.uk/projects, physical compiting with raspberry

BIOGRAPHIES

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