Design of Automated Surveillance System to Monitor Human Presence in an Environment.

Madhu B K[1], Hemanth D R[2], Sughas R K[3], Sowjanya N[4], Manjesh P[5]
[1]Information Science, Professor & Head, VVIET, Mysuru, Karnataka, India
[2345]Information Science, VVIET, Mysuru, Karnataka, India

Abstract- The paper aims on the design, development & the artifact to figure out human presence and occupancy in an environment selected, weather the count of human presence is above or below a given threshold. If the count is above the threshold positive response is returned, else negative response is returned. This response by the system is obtained using Machine learning and Deep learning technologies with the support of classification techniques. Here the environmental real time data is captured and humans are identified by classifying human objects and the other objects. At last the human object is counted. The count is returned to the authorized user. The response is represented in the form of a graph, where an individual can just know about occupancy in sitting in one place.

Keywords- Human occupancy, Classification, Human objects, Tensor Flow

I. INTRODUCTION

As the sensor network and ubiquitous computing communities increasingly focus on creating environments that are seamlessly aware of and responsive to the humans that inhabit them, the need to sense people will become ever more pressing. Human sensing encompasses issues from the lowest level instantaneous sensing challenges all the way to large-scale data mining. Several questions circumscribe the problem. For example, we might ask of our sensors: Is there a person in this room? How many people are in this room? What is each person doing?

The simplest applications of human sensing make direct use of such information to review weather a room is occupied/empty. So our idea is to make an application which represents a graph containing the results of human presence in a room. This helps in providing a solution for occupancy dependency problems and much more using Machine Learning and Deep Learning.

II. EXISTING SYSTEM

Nowadays, the sensors available on the market are usually detectors whose technology is based on passive infrared. All living beings emitting heat, these sensors detect the electromagnetic radiations emitted by humans of wavelengths between 6 and 14 μm. When a person moves in the detector field of view, the infrared radiation is focused by the Fresnel lens on the pyroelectric sensor. The corresponding moving hot spot causes the electronics connected to the chip to activate the detection. This technology is now well known and commonly used for lighting management, automatic door openers etc. However, it has several major flaws:

• motionless people can not be detected,

• the sensor is sensitive to shifts in air flow or sunshine radiations,

• the sensor is not able to distinguish between pets and humans.

The technological limits of these sensors, which are more motion than presence detectors, hinder the development of innovative solutions for energy consumption management. Conventional systems relying on a single occupancy sensor often suffer from a lack of data analysis of the measured sensor signals and cannot moreover differentiate between one or more occupants in the monitored space.

The existing system deals with the human detection, presence sensor, occupancy number detection, activity characterization, people localization using renewable energies, second developing passive solutions as insulation and third proposing solutions based on an active management of power. Three applications integrated into the CAPTHOM draft finally illustrate how the developed system can also help in collecting useful information for the building management system, occupancy detection and people counting as well as activity characterization and 3D location extend to a wide variety of buildings technology research areas such as human-centered environmental control including heating adjustment and demand-controlled ventilation, but also security and energy efficient buildings. [1]

III. CAPTHOM

It is based on video analysis obtained from a camera. This method has three main steps:

1. change detection,
2. moving objects tracking and classification,
3. Sense of human face to existing algorithms.

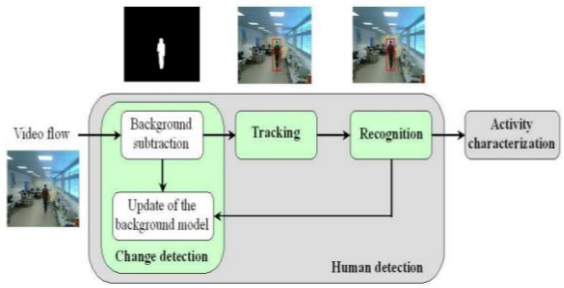

Fig.1: Process for human detection and activity characterization in video sequences. Illustration of the different intermediate results obtained all along the human detection chain: original image, change detection, tracking and recognition.

They compared it with three reference systems:[1]

• IRP: an existing person detector based on passive infrared technology,

• Haar-Boost: the detection system of Viola and Jones used with a sliding window scanning each image,

• Haar-Boost + BS: the previous method in which the search space of the classifier is reduced with a background subtraction.

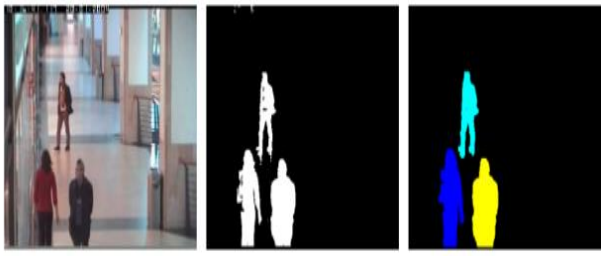

Figure.2: From the left to the right: original image, result obtained after background subtraction and finally after connected components gathering.

To detect human presence and to collect higher level economize energy, there are several solutions: first information on people activity such as occupancy number detection and activity characterization.

Result obtained from the system are

1. People counting
2. Activity characterization

3.People localization in a known environment

IV. CONCLUSION

They have presented in this article a vision algorithm to detect human presence in an indoor environment. This algorithm combines background subtraction, tracking and recognition. The evaluation of the proposed sensor, in many scenarios, gives a detection rate of 97%. The few remaining errors mainly come from three sources. A possible error is when a person is not detected.Through objects tracking, this case is relatively rare because the detection's are smoothed. The contrast between the person and the background is not very distinctive or when the person takes a unusual posture.[1]

How this paper has influenced us is that, implementing a human presence check for small division is a big task. We are considering a classroom as our work division and are going to implement the same methodology by the help of machine learning and deep learning. Here we use Tensor Flow, which is a Python-friendly open source library for numerical computation that makes machine learning faster and easier that ease the process of acquiring data, training models, serving predictions, and refining future results. Here at the beginning a fixed count is feeded for knowing the occupancy. Where pre data is feeded to the sensor and for raw data output

is obtained. Pre data consist of classroom pictures with many information that is required to a system to judge occupancy.

Output is either 0 or 1, where 0 represents the human presence i.e count is less than a fixed number and 1 represents count is

high and human presence is there for a given number. This output is represented in the form of graph and also an page is

designed to view results.

V. REFERENCES

[1]. Towards a sensor for detecting human presence and activity. Yannick Benezeth, Hélène Laurent, Bruno Emile, Christophe Rosenberger [Yannick Benezeth, Hélène Laurent, Bruno Emile, Christophe Rosenberger. Towards a sensor for detecting human presence and activity. Energy and Buildings, Elsevier, 2011, 43, pp.305-314. <hal- 00991093>] HAL Id: hal-00991093 https://hal.archives-ouvertes.fr/hal-00991093Submitted on 14 May 2014

[2]. "Paraphrasing Arthur Samuel (1959), the question is: How can computers learn to solve problems without being explicitly programmed?" in Koza, John R.; Bennett, Forrest H.; Andre, David; Keane, Martin A. (1996).

[3]. Bengio, Y.; Courville, A.; Vincent, P. (2013). "Representation Learning: A Review and New Perspectives". IEEE Transactions on Pattern Analysis and Machine Intelligence. 35 (8): 1798–1828. arXiv:1206.5538. doi:10.1109/tpami.2013.50.

[4]. Deng, L.; Yu, D. (2014). "Deep Learning: Methods and Applications" (PDF). Foundations and Trends in Signal Processing. 7 (3–4): 1–199. doi:10.1561/2000000039.

[5]. Mitchell, T. (1997). Machine Learning. McGraw Hill. p. 2. ISBN 978-0-07-042807-2

[6]. I.J. Amin, A.J. Taylor, F. Junejo, A. AlHabaibeh and R.M. Parkin, "Automated people counting by using low-resolution infrared and visual cameras, " in Measurement, vol. 41, pp589–599, 2008.

[7]. Evaluation of Human Detection Algorithms in Image Sequence Annick Benezeth, Baptiste Hemery, Hélène Laurent, Bruno Emile and Christophe Rosenberger.
[8]. Cucchiara, C. Grana, M. Piccardi and A. Prati, "Detecting moving objects, ghosts, and shadows in video streams," IEEE Transactions on Pattern Analysis and Machine Intelligence (PAMI) , vol. 25(10), pp. 1337–1342, 2003.
[9]. T. Deselaers, D. Keysers and H. Ney, "Improving a discriminative approach to object recognition using image patches," Lecture Notes In Computer Science (LNCS), vol. 3663, pp.326–333, 2005.
[10]. C. Wren, A. Azarbayejani, T. Darrell and A. Pentland, "Pfinder : Real-time tracking of the human body," Transaction on Pattern Analysis and Machine Intelligence , 1997.

Dr Madhu B K
Professor & Head, Dept of ISE
VVIET, Mysuru

Hemanth D R
4VM15IS008, 8th Sem
Dept of ISE, VVIET, Mysuru

Sughas R K
4VM15IS031, 8th Sem
Dept of ISE, VVIET, Mysuru

Sowjanya N,
4VM15IS030, 8th Sem
Dept of ISE, VVIET, Mysuru

Manjesh P
4VM15IS030, 8th Sem
Dept of ISE,VVIET, Mysuru