International Journal of Scientific Research & Engineering Trends
Volume 5, Issue 6, Nov-Dec-2019, ISSN (Online): 2395-566X

Crowd Monitoring System using Artificial Neural Networks

Shreyash Pimpalshende pshreyash250@gmail.com
Barsha Koley barshakoley11@gmail.com
Shubham Patil patil.pshubham@gmail.com
Supriya Kudale supriyakudale2@gmail.com
Dr. Archana Chaugule
archana.chaugule@gmail.com
Department of Computer Engineering,
Pimpri Chinchwad College of Engineering and Research
Pune, MH, India

Abstract **- Detection of objects and their analysis into useful data has always been the core concern throughout the human evolution. From the introduction of computers, to providing those human like capabilities, to the upcoming trends in computer vision and natural language processing, these abilities are now been started to replicate by the computers. Use of Artificial Intelligence is currently the prime focus of industry in development of such core abilities for computers. Our Project involves the use of Artificial Neural Networks to determine, analyze and classify the objects been given to the feed input of it and generate useful insights, resulting in the determination of person head count in particular place, thereby monitoring the crowd and taking appropriate actions.**

Keywords- **Artificial Neural Networks, Deep Learning, Crowd Management, Computer Vision, Tensor Flow.**

I. INTRODUCTION

The issue that has been put forth for concern here is that, many places which are prime locations for people gathering like temples, company placement drives or other important places sometimes get heavily crowded resulting in unpredictable mishaps. So, the need is to create a computer based intelligent application that could monitor the crowd and take appropriate measures. This literature content review about various techniques that are being used for object detection and provides a brief comparison between their performances attributes for considering the most suitable approach for the application.

II. AREA OF APPLICATION

1. **Deep Learning:** Deep learning is part of a broader family of machine learning methods based on artificial neural networks. Deep learning architectures such as deep neural networks, convolution neural networks have been applied to fields including computer vision, speech recognition, natural language processing, where they have produced results comparable to and in some cases superior to human experts.
2. **Computer Vision:** Computer vision is an interdisciplinary scientific field that deals with how computers can be made to gain high-level understanding from digital images or videos. From the perspective of engineering, it seeks to automate tasks that the human visual system can do.

III. CONCERNS AND MOTIVATION

The Computer vision has always been a popular field of interest and work since its introduction. The idea of seeing the world in digital terms and also in the way that a machine could understand diverse characteristics in its surrounding environment has been a great interest. With the development in artificial intelligence and learning techniques, it is now possible to provide these human-like capabilities to computers or more broadly, machines as well. The main motive was to develop an application that would be able to detect the objects, analyze the detected data from the field and perform classification to determine the object characteristics and understand it's use. Without having the knowledge about what is currently been looked upon, one cannot consider the fact of taking out inferences from the particular scenario, nor even the machines. So, it brings in the motivation for developing such application, assisting the visual aid for computers.
So, the need is to create a computer based intelligent application that could monitor the crowd and take appropriate measures.

IV. GOALS AND OBJECTIVES

1. **Goals**

- Detection of human in the video feed.
- Classifying humans and differentiating from other objects present.
- Monitor and count the number of people.

© 2019 IJSRET

- Operate the entry gates to the place accordingly.

2. Objectives

- To develop an application, capable of detection and classification of objects (person) from camera video feeds.
- To accompany the use of Artificial Neural Networks for performing specified task.
- To generate patterns based on the classification for object recognition.
- To monitor the crowd of people in a particular place, avoiding the issues regarding overpopulated spaces.
- To actuate required measures (entry control) based on the head count of people.

V. LITERATURE SURVEY

1. Object Detection with Deep Learning: A Review

Authors: Zhong-Qiu Zhao, Member, IEEE, Peng Zheng, Shou-tao Xu, Xindong Wu

Publication: IEEE Transactions On Neural Networks And Learning Systems, April 16,2019

Review: This paper provides a detailed review on deep learning-based object detection frameworks which handle different sub-problems, such as occlusion, clutter and low resolution, with different degrees of modifications on R-CNN. The review starts on generic object detection pipelines which provide base architectures for other related tasks. Then, three other common tasks, namely salient object detection, face detection and pedestrian detection, are also briefly reviewed. Finally, we propose several promising future directions to gain a thorough understanding of the object detection landscape. This review is also meaningful for the developments in neural networks and related learning systems, which provides valuable insights and guidelines for future progress[1].

2. Research on Daily Objects Detection Based on Deep Neural Network

Authors: Sheng Ding, Kun Zhao

Publication: IOP Conf. Series: Materials Science and Engineering, 2018

Review: With the rapid development of deep learning, great breakthroughs have been made in the field of object detection. The deep learning algorithm is applied to the detection of daily objects, and some progress has been made in this direction. Compared with traditional object detection methods, the daily objects detection method based on deep learning is faster and more accurate. The main research work of this article: 1. collect a small data set of daily objects; 2. in the Tensor Flow framework to build different models of object detection, and use this data set training model; 3. The training process and effect of the model are improved by tuning the model parameters[5].

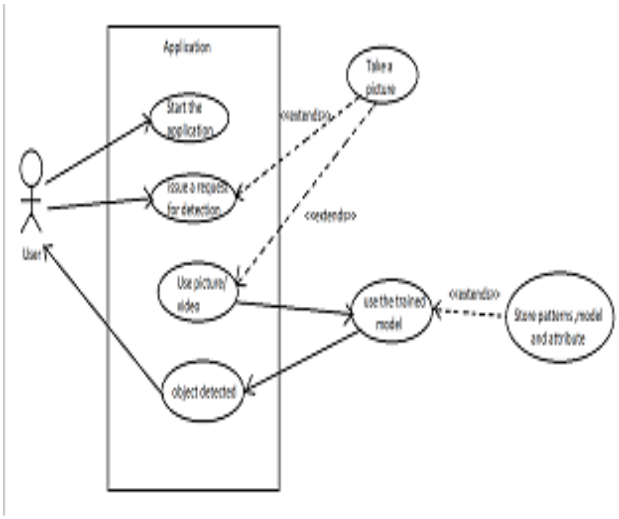

Fig.1. Use Case Diagram.

3. Moving object detection and tracking Using Convolutional Neural Networks

Authors: Shraddha Mane, Prof.Supriya Mangale

Publication: International Conference on Intelligent Computing and Control Systems (ICICCS, 2018)

Review: In this paper, novel approach for object detection and tracking has been presented using convolution neural network. The moving object detection is performed using TensorFlow object detection API. The object detection module robustly detects the object. The detected object is tracked using CNN algorithm. Considering human tracking as a special case of detection of objects, spatial and temporal classes the facilities were learned during offline training. The shift variant architecture has extended the use of conventional CNNs and combined the global features and local characteristics in a natural way. The proposed approach achieves the accuracy of 90.88% [3].

4. Scene Graph Generation from Objects, Phrases and Region Captions

Authors: Yikang Li, Wanli Ouyang, Bolei Zhou, Kun Wang, Xiaogang Wang

Publication: International Conference on Intelligent Computing and Control Systems, 2017

Review: This paper targets on scene understanding by jointly modeling three vision tasks, i.e. object detection, visual relationship detection and region captioning, with a single deep neural network in an end-to-end manner. The three tasks at different semantic levels are tightly connected. A Multi-level Scene Description Network (MSDN) model is proposed to leverage such connection for better understanding image. In MSDN, given an input image, a graph is dynamically constructed to establish the links among regions with different semantic meaning. The graph provides a novel way to align features from different tasks [6].

© 2019 IJSRET

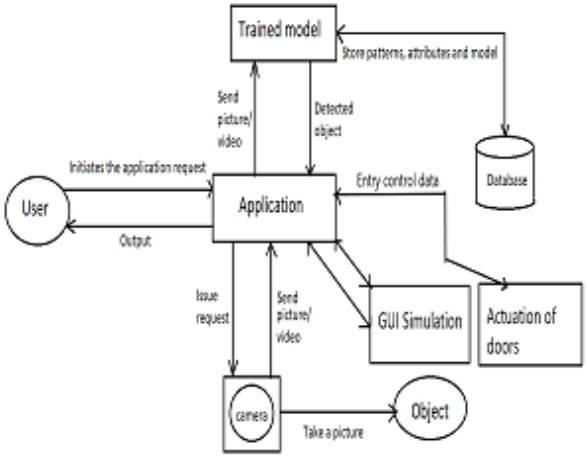

Fig.2. Data Flow diagram.

5. Application of Deep Learning in Object Detection
Authors: Xinyi Zhou, Wei Gong, WenLong Fu, Fengtong Du
Publication: IEEE ICIS, 2017
Review: This paper expresses the importance of deep learning technology applications and the impact of dataset for deep learning through the use of the faster r-cnn on new datasets. In recent years, the technology of deep learning in image classification, object detection and face identification and many other computer vision tasks have achieved great success. Experimental data shows that the technology of deep learning is an effective tool to pass the man-made feature relying on the drive of experience to the learning relying on the drive of data. Large data is the base of the success of deep learning, large data just as fuel to the rocket for deep learning. More and more applications are continually accumulating increasingly rich application data, which is critical to the further development and application of deep learning. However, the quality of the data affects the deep learning in deed, of course, in addition to these real data, maybe we can also consider some of synthetic data to increase the amount of data in the further [2].

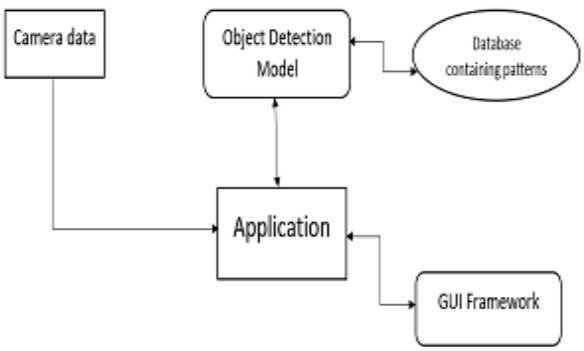

Fig.3. Architecture diagram.

VI. APPLICATIONS

1. **Object Recognition:** Determining the object type, category, shape, texture, etc. attributes can be done. This
2. Can be done by generating significant patterns of objects that are being analyzed by the application.
3. **Face recognition:** This application of recognizing the faces of human requires characteristic study of faces. The characteristic attributes are unique for every human. so, by generating appropriate pattern based on the attributes, faces could be recognized.
4. **Head Count/Object count:** This application involves the categorization of similar characteristic things. The patterns are being generated based on the attribute analysis of object and those patterns being used to group the similar object together for getting their count.
5. **Product Quality Check:** This process is widely used in production lines. The quality of manufactured product is key concern of every industry. Pattern could be created that involves the attributes of benchmark product for comparison.

VII. CONCLUSION

Here, a system is designed with a prime goal to monitor the crowd in particular place. Motive behind building such application is to avoid various mishaps that occur in places where extreme amount of crowd gathers that couldn't be accommodated by the place itself. So, an object detection technique is considered as the backbone of this project and GUI insights as well as Physical actuations could be fired in accordance with the need.

REFERENCES

[1]. I. P. Z. S.-T. X. Zhong-Qiu Zhao, Member And X. Wu, Object Detection With Deep Learning: A Review. Beijing, China: Ieee Transactions On Neural Networks And Learning Systems, 2019.
[2]. W. F. F. D. Xinyi Zhou, Wei Gong, Application Of Deep Learning In Object Detection. Wuhan, China: Ieee Icis, 2017.
[3]. P. S. M. Shraddha Mane, Moving Object Detection And Tracking Using Convolutional Neural Networks. International Conference On Intelligent Computing And Control Systems, 2018.
[4]. K. Z. Sheng Ding, "Research On Daily Objects Detection Based On Deep Neural Network," Tech. Rep., 2018.
[5]. Sheng Ding, Kun Zhao, Research On Daily Objects Detection Based On Deep Neural Networkiop Conf. Series: Materials Science And Engineering 322 (2018)
[6]. Yikang Li, Wanli Ouyang, Bolei Zhou, Kun Wang, Xiaogang Wang, Scene Graph Generation from Objects, Phrases and Region Captions. International

© 2019 IJSRET

Conference on Intelligent Computing and Control Systems, 2018.

© 2019 IJSRET