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Crowd Counting using Deep Learning

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ABSTRACT

In Real time we are using many traditional approaches to count the people. we are using many basic methods like sensors-based systems to count crowd and manually counting people, but these will take much time if the action is speed. suppose, we have many people at sports stadium, Tourists places, and at some natural calamities like tsunamis, earthquakes, emergency fire outbreaks in hospitals, petrol stations e.t.c. we can't estimate the crowd very easily. Here, In this paper, we are using modern approaches like DCNN i.e. deep learning to count people for the huge density crowd. We estimate the crowd using CSRnet network model. In this approach we have 3 layers they are convolution, pooling and fully connected layer. By using this technique, we can easily get the count of people accurately. This paper contributes the count of people from input images from shanghai dataset and also count the number of faces when we have a live feed using opencv-python very accurately.
KEYWORDS: - Deep learning, CSRnet network model, DCNN,Shanghai dataset, opencv-python

1. INTRODUCTION

The main aim of crowd counting is to count the people in an image. It is used for many real-time applications. As we have traditional approaches like detection-based counting, regression-based counting, and density estimation methods.but these are not much accurate and they won't give accurate value if we have lot of people in a place or if the people are moving randomly.so, By using this Deep convolutional neural network (DCNN) we get the accurate count of people in an image.

In training process, we have 2 parts in the shanghai dataset,part A and part B In which we have test data and traindata. In part A we have high density crowd images and in part B we have low density crowd images. As we can observe that our dataset will train in all cases like overlapping of heads of people, and imperfect heads also.we can easily count the people incase of any emergency situations like fire outbreaks,and disasters too.

2. RELATED WORK

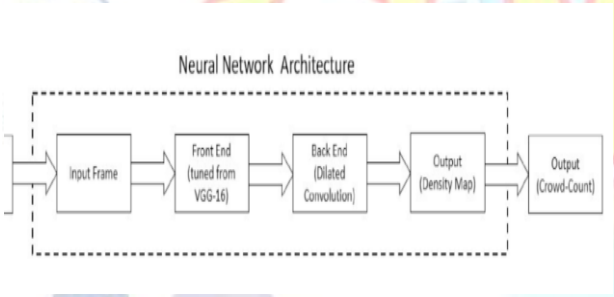
(i)Object-detectionbasedmethod:-In this method, we count the desired objects .These method is used to detect the object and they need well-trained classifiers which the low-level features are extracted.This method will detect face but doesn't work on crowded images and partial desired objects.For this problem,we use faster RCNN or yolo algorithms to detect the intensed objects.

(ii)Regression-based method:-In this method,the entire image is considered as input and we get count as output. This method maps directly and give the object Count based on the extraction of features from image patches.but the accuracy of this method is very medium,and this method is less interpretable,and it lacks the information of location.

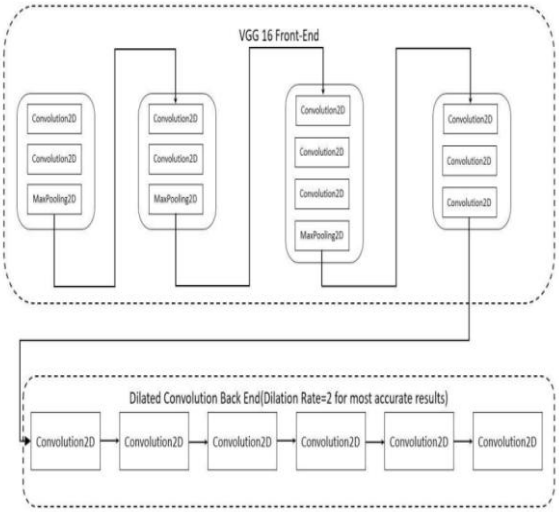
(iii)Density-estimation based method:-This method computes the number of people per pixel.It is a method of linear mapping between features in local region and object density maps.It's location accuracy is medium.and crowd count accuracy is low in low density crowd areas.

3. DCNN

In this paper,our proposed work is employing of Deep Convolutional Neural Network (MCNN) to get more accuracy of getting count of crowd. Here, In DCNN,we employ CSRnet architecture for generating density map estimation and crowd count.In this network,it contains two components they are convolutional neural network and dilated convolution . In Front-end we use CNN and at back-end we use dilated convolution. We choose VGG-16 front-end for extracting of 2D features. In this,we have 10 convolution layers and 3 pooling layers We use 1 x 1 convolution layer size for every layer 2 and also 3 x 3 kernel size. In back-end, we use 6 dilated convolutional layers with a dilation rate of 3



(1) Architecture of Crowd Counting



(ii)Detailed Architecture of CSRnet

4. GROUND TRUTH GENERATION

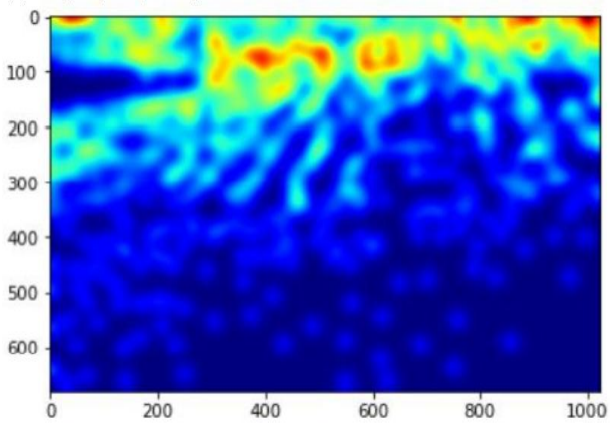
Assume we have a head of person at xi, it is represented by δ(x − xi), for N annotations it is represented by

$$H(x) = \sum_{i=1}^{N} \delta\left(x - x_i\right)$$

Here, σi means the standard deviation. To compute the density map F, we apply convolution H(x) with a Gaussian kernel.

5. RESULTS

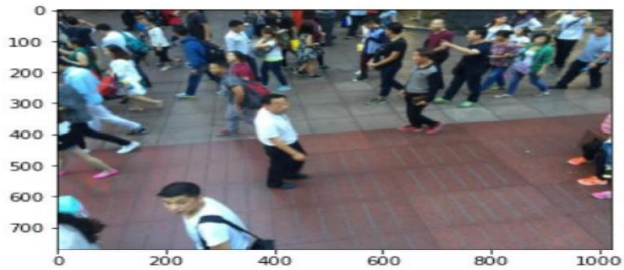
(a)Input Image of part-A in shanghai dataset



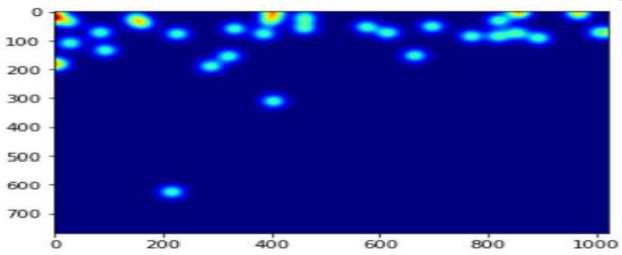
(b)Density map of Input Image

920.0000000000007

(c) Count of crowd from Input Image



(d)Input image of part-B in shanghai dataset



(e)Density map of Input Image

31.000000000000018

(f) count of crowd in Input Image

Count Faces using opencv-python

6. CONCLUSION

This paper represents an approach of counting crowd in a multi images using CSRnet architecture.The proposed system performs very effectively in situations where manual counting is simply not at all easy.The results declare that the proposed system achieves crowd count predictions almost as good as ground truth. Another major advantage of using the end-to-end application is that no other configurations are neccessary for getting crowd-count.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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