CROWD COUNTING METHOD BASED ON CONVOLUTIONAL NEURAL NETWORK WITH GLOBAL DENSITY FEATURE

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ABSTRACT

Crowd counting is an important research topic in the field of computer vision. The multi-column convolution neural network (MCNN) has been used in this field and achieved competitive performance. However, when the crowd distribution is uneven, the accuracy of crowd counting based on the MCNN still needs to be improved. In order to adapt to uneven crowd distributions, crowd global density feature is taken into account in this paper. The global density features are extracted and added to the MCNN through the cascaded learning method. Because some detailed features during the down-sampling process will be lost in the MCNN and it will affect the accuracy of the density map, an improved MCNN structure is proposed. In this paper, the max pooling is replaced by max-ave pooling to keep more detailed features and the deconvolutional layers are added to restore the lost details in the down-sampling process. The experimental results in the UCF_CC_50 dataset and the ShanghaiTech dataset show that the proposed method has higher accuracy and stability.

Key Words : OpenCV, Haar Cascade,ShanghaiTech dataset,deconvolutional layers, global density

1. INTRODUCTION

Crowd counting (CC) aims to count the number of objects, such as people, cars, cells, and drones in still images or videos. It can be performed in different ways, such as digital-image processing, machine learning, and deep learning. More specifically, crowd counting can be done through various state-of-the-art techniques, such as counting by detection regression density estimation and clustering . The problem of crowd counting is of significant importance in computer vision due to its wide variety of applications in urban planning, anomaly detection, video supervenience, public safety management, defence, healthcare, and disaster management .

Crowd-counting techniques face many challenges, such as high cluttering, varying illumination, varying object density, severe occlusion, and scale variation caused by different perspectives. For instance, high cluttering can distort the resolution of an estimated map, and light illumination can reduce its accuracy. Further, varying object density reduces prediction accuracy due to nonuniform density distribution. Similarly, severe occlusion increases prediction error,and scale variation reduces both counting prediction and density-map resolution.

Due to a wide variety of applications, from commercial to military purposes, with significant importance in computer vision, crowd counting is a challenging scientific problem to be solved. A number of researchers tried to provide detailed surveys and analyses of previous techniques by considering various crowd features. These traditional crowd-counting techniques mainly focus on handcrafted low-level crowd features. These low-level features are selected, extracted, and transformed into an organized input for the regression model that is used for loss-function evaluation and minimization. In this regard, comprehensive analysis was provided for general crowd counting. They mainly reviewed vision and nonvision problems. In vision-based problems, crowd modelling is based on extracted information from visual data and employed for crowd-event inference. Nonvision approaches, on the other hand, aim to describe and predict the collected effects of crowd behavior by rectifying the relationship between features. Later on, a focused on crowd-counting models with emphasis on their limitations. Their main contribution was the categorization of crowd-modelling techniquesinto motion-flow-based models, learnt-appearance-based models, and hybrid approaches.

Motion-flow-based models were further subcategorized into optical-flow-based models.

2.LITERATURE SURVEY

YEAR	AUTHOR	TITLE	ABSTRACT
2012	Alexy andriyashin	Counting crowds and lines by clustering	This paper proposed a methodusing image clustering
2015	Sheng chang	Cross scene crowd counting	This paper proposed a method using mapping images
2016	Desen zhou	Crowd counting via scale adaptive convalutional neural network	This paper proposd mthod usingextracting feature maps from multiple layers and adapt them to have the same output size

2.1 INTRODUCTION

In order to generate a more comprehensive density map, the max-ave pooling layers are used to keep more features of the image. Meantime, the deconvolutional layers are added to the convolutional neural network in order to restore the lost details in down-sampling process

Crowd-counting techniques that utilize both the local and global contextual information of an image for improving counting accuracy fall into this subcategory. The contextual information of an image means a relationship of nearby pixels (i.e., neighboring information) with a targeted area for overall improvement. Techniques under this category are very useful in applications that need contextual

2.2 EXISTING SYSTEM

There are various methods for Crowd counting in the literature:

1. Detection-Based Methods: Here, we use a moving window-like detector to identify people in an image and count how many there are. Although these methods work well for detecting faces, they do not perform well on crowded images as most of the target objects are not clearly visible.

2. Regression-Based Methods: We first crop patches from the image and then, for each patch, extract the low-level features.

3. Density Estimation-Based Methods: We first create a density map for the objects. Then, the algorithm learns a linear mapping between the extracted features and their object density maps.

4. CNN-Based Methods: Instead of looking at the patches of an image, we build an end-to-end regression method using CNNs. This takes the entire image as input and directly generates the crowd count.

2.3PROPOSED SYSTEM

A.FEATURE MAPS WITH GLOBAL DENSITY FEATURE

By knowing the characteristics of the input image, techniques with less complexity and error rate can be designed. The density classification sub-task is used to classify the density level. Through estimating the crowd density level of the image and using the corresponding density feature as supplementary information, the different regions with different densities in the image are assigned with different weights. So that the density feature of each region will change with the crowd density. With density feature, the crowd distribution can be described well and the crowd in different regions can be counted accurately.The accuracy of density maps is important for estimating the number of people. The comprehensive information contained in the density maps will affect the accuracy of the final estimation

3.DESIGN

Design is a meaningful engineering representation of something that is to be built. Software design is a process through which the requirements are translated into a representation of the software. Design is the place where quality is fostered in software engineering. Design is the perfect way to accurately translate customer's requirement in to a finished software product. Design creates a representation or model, provides detail about software data structure, architecture, interfaces and components that are necessary to implement a system

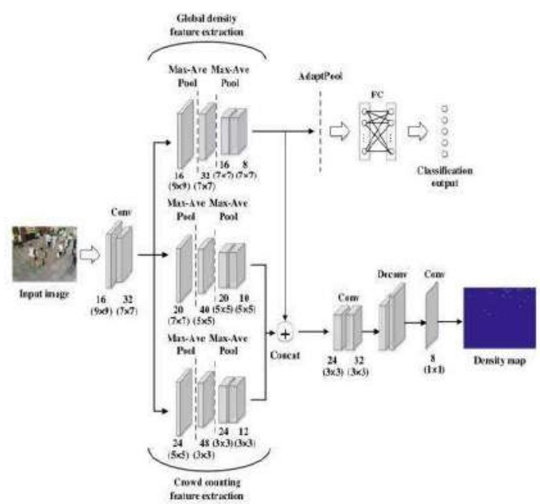

Figure 1. System Architecture

4.FUTURE ENHANCEMENT

In future we will be consider as a pre-processing step. .

Further, we will enhance the accuracy and quality of estimated density maps by using varying receptive fields. Besides accuracy, we are interested in reducing the computational cost (number of parameters) of CNN-based crowd-counting networks.

5. CONCLUSION

In conclusion, an improved convolutional neural network combined with global density feature is proposed. It is different from existing crowd counting methods. The proposed method focuses on uneven crowd distribution. Moreover, the maxave pooling and de convolutional layers are used to generate a more comprehensive density map. The experimental results show that the proposed method achieves competitive performance on different crowd datasets.

6. REFERENCES

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