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GENDER CLASSIFICATION USING VIOLA JONES IN VM BASED CLOUDLET ENVIRONMENT

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Abstract - Gender classification refers to designate an image of a person into one of the categories of male or female. Itwill helpfulin some of security issues existed in real time applications.It is one of the prime are in computer vision. There are Different methods have been implemented for gender classification.Now a day's mobile devices are being used by many people for processing various computer applications. So we can process various complex computer applications like image processing, communicating with cloud servers etc, with the help of mobile devices from any place.One of the infrastructures for communicating with cloud server with mobile phones is cloudlet. In this paper we are presenting an approach for gender classification using viola jones algorithm in cloudlet.
Keywords:Gender classification, viola jones, Cloud Computing, Cloudlets, VM Synthesis, Mobile Cloud Computing

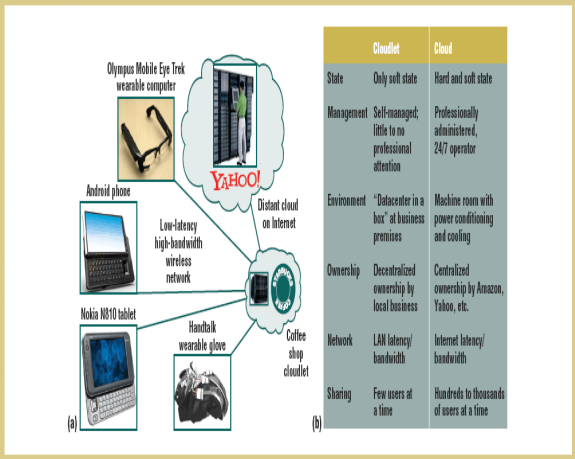
1. INTRODUCTION

Gender Classification one of the basic application in computer vision. A different gender classification approaches can be found in [1] [2] [3] [4] [5]. In computer vision, the majority of studies on gender classification are based on face because it provides important cues for gender classification.Automated face recognition has basically two parts; one is face detection and other one is recognition. To detect a face from an online surveillance system or an offline image, the main component that should be detected is the skin area. Skin color has proven to be a useful and robust cue for face detection, localization and tracking. A various methods are presented for face detection using skin in [6] [7] [8].

Present mobile devices are becoming powerful with more processing power, storage, and sensing capabilities. In addition to this, it is now possible to rent computing, storage, and network resources as needed via cloud computing. One of the well-known challenges for using the cloud as a server is the long latency between the mobile device and the cloud server. This can be overcome by using new infrastructure called cloudlet [9]. A cloudlet is a mobility-enhanced small-scale cloud datacenter that is located at the edge of the Internet. The main purpose of the cloudlet is supporting resource-intensive and interactive mobile applications by providing powerful computing resources to mobile devices with lower latency [9].

2. RELATED WORK

The cloudlet term was first coined by M. Satyanarayanan, Victor Bahl, Ramón Cáceres, and Nigel Davies, and a prototype implementation is developed by Carnegie Mellon University as a research project. According to this approach the mobile device offloads its workload to a local 'cloudlet' comprised of several multi-core computers with connectivity to the remote cloud servers [10].The comparison between cloud and cloudlet described as follows:



	Cloudlet	Cloud
State	Only soft state	Hard and soft state
Management	Self-managed; little to no professional attention	Professionally administered, 24/7 operator
Environment	"Datacenter in a box" at business premises	Machine room with power conditioning and cooling
Ownership	Decentralized ownership by local business	Centralized ownership by Amazon, Yahoo, etc.
Network	LAN latency/ bandwidth	Internet latency/ bandwidth
Sharing	Few users at a time	Hundreds to thousands of users at a time

Fig.1 (a) The cloudlet concept involves proximate computing infrastructure that can be leveraged by mobile devices; (b) some key differences with the basic cloud and cloudlet

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MOCHA (mobile-cloudlet-cloud architecture) for face recognition has been described by authors in paper [11]. One of the well-known challenges for using the cloud as a server is the long latency between the mobile device and the cloud server in comparison to localized computing and small-scale distributed computing called cloudlet. So by using a mobile-cloudlet-cloud framework and develop algorithms that minimize the overall response time for face recognition based on estimated communication latencies and processing powers of the cloud. The Architecture of MOCHA as shown below:

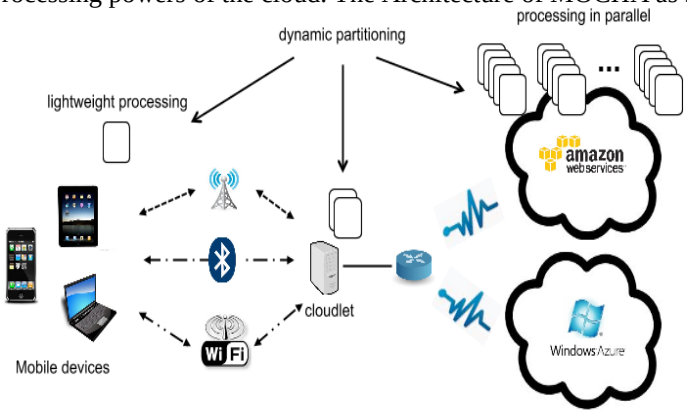

Fig.2 MOCA Architecture [11]

With the help of MOCA and a cloudlet we can for store the huge database related toimages and also required resources for processing. The code and data needed for gender classification are offloadedto the cloudlet from the mobile device. Then the cloudlet will do the required processing and it will give the results back to the mobile device. In paper [12]implemented the face recognition application using PCA and skin color in mobile cloudlet environment as shown below.

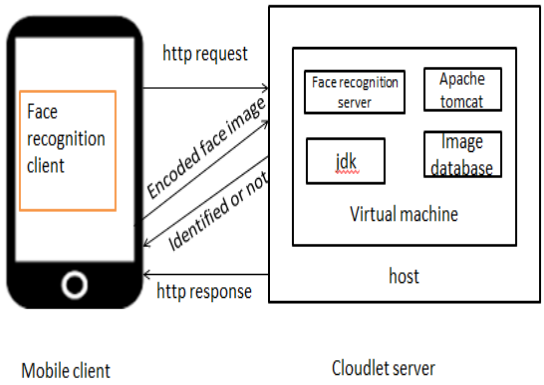

Fig.3 Mobile Cloudlet Environment [12]

In this paper we are using same mobile cloudlet architecture for gender classification using violajones algorithm.

3. METHODOLOGY AND IMPLEMENTATION

3.1 Methodology:

Take the set of images collection data as input

3.2 Perform viola jones algorithm.

Training the images for the gender classification process, use the Haar classifier and k-means clustering.

To classify face compares the training and testing images and give the output as male or female.

The basic principle of the Viola-Jones algorithm is to scan a sub-window capable of detecting faces across a given input image. The standard image processing approach would be to rescale the input image to different sizes and then run the fixed size detector through these images [13]. Viola-Jones has empirically found that a detector with a base resolution of 24*24 pixels gives satisfactory results.

Viola and Jones adapted the idea of using Haar wavelets and developed the so-called Haar-like features[14]. A Haar-like feature considers adjacent rectangular regions at a specific location in a detection window, sums up the pixel intensities in each region and calculates the difference between these sums. This difference is then used to categorize subsections of an image [15].

Image segmentation exhaustively partitions an image into multiple regions. It is the process of assigning a label to every pixel in an image such that pixels with the same label share certain visual characteristics. Pixels are comprised of attributes such as

location, color, intensity, and texture. Pixels are the objects that are clustered using the kmeans algorithm. K-means clustering [16] is a method for finding clusters and cluster centers in a set of unlabeled data effectively [17]. The k-means algorithm partitions a set of n objects into k clusters so that the resulting intracluster similarity is high but the intercluster similarity is low. Cluster similarity is measured with respect to the mean of the objects in the cluster.
Algorithm:
Input: a 24 × 24 image with zero mean and unit variance.
The VM in the Cloudlet server is made ready with JDK, OpenCV, Apache Tomcat, Image Database and Java Face Recognition Server
HTTP call is made to upload the image on the Cloudlet Server
The Gender classification code is executed on the VM Cloulet server.
The result is given back to the mobile client.

3.3 Results

4. CONCLUSION

Code offloading with cloudlets is found to be a better solution to overcome the resource poverties of mobile device. In this paper we have proposed an improved gender classification application using cloudlet and viola jones algorithm for better Performance. The application gives anbetter performance when compared to other gender classification algorithms.

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