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# HUMAN ATTRIBUTES MONITORING USING OpenCV AND DEEP LEARNING

Sagar Khandade
Dept. of Electronics and Telecommunication
Vishwakarma Institute of Technology, Pune

Shubham Indulkar
Dept. of Electronics and Telecommunication
Vishwakarma Institute of Technology, Pune

Anay Pampatwar
Dept. of Electronics and Telecommunication
Vishwakarma Institute of Technology, Pune

Saurabh Thalkari
Dept. of Electronics and Telecommunication
Vishwakarma Institute of Technology, Pune

***Abstract***

**Human attributes such as their hair length, hair color, and clothing style highly characterizes human appearance and plays a vital role in interpersonal relations. Convolutional Neural Nets (CNN) have been shown to perform very well on large scale object recognition problems . In the context of attribute classification, however, the signal is often subtle and it may cover only a small part of the image, while the image is dominated by the effects of pose and viewpoint. Automatic recognition of human attributes can be an important component of natural human-machine interfaces; it can be used in behavioral science and in clinical practice. An automatic Human Attributes Monitoring system needs to perform detection of length of human hair, the colour of hair , clothing pattern of the human from the given data set in a cluttered scene and classify them accordingly. Human Attributed Monitoring system is implemented using OpenCV and DNN(deep neural network).**

***Keywords:*** Human Attributes Monitoring, Deep Neural Network, Convolutional Neural Network, Deep Learning.

## I. INTRODUCTION

Recently, recognition of human attributes, such as gender, glasses and clothes types, has drawn a large amount of research attention recently due to its great potential in real surveillance system. For example, attribute has been used to assists human detection , person re-identification , face recognition , and has been shown to greatly improve other vision related tasks . As a middle-level representation, attribute may bridge the gap between low-level features and human description . In addition, attribute may play the critical role for people search in practical applications for anti-terrorism, such as the retrieval of the two suspects in Boston marathon bombing event. Despite its importance, attribute recognition remains a challenge

problem in real surveillance environments, due to the large intra-class variations in attribute categories (appearance diversity and appearance ambiguity).

Deep learning methods, and in particular convolutional nets, have achieved very good performance on several tasks, from generic object recognition to pedestrian detection and image denoising. One possible application for this lies in the area of surveillance and behavioral analysis by law enforcement. However the most promising applications involve the humanization of artificial intelligence system.

## II. LITERATUREREVIEW

Recognizing an attribute of a person is a challenging task in the field of Computer vision. Attributes such as person-tagging in the multiple-streaming video frames, person hair color, hair length, people dressing style is the classical problem to solve using DNNs. Lot of research is going on in this field and a precise and accurate solutions are still under considerations. The objective of this project is to create an end to end pipeline for Facial attributes recognition using OpenCV and DNN.

### *A. Person hair length and hair colour*

The Hair region is one of the most important components in human face. It is one of the main reasons for the different appearances among different people. Reference [1] argued that hair region provides cues during the face recognition process for humans. Reference [2] proved that hair region is the most important feature during the recognition of familiar people according to experiments. In spite of face recognition, hair segmentation is also the key component in automatic facial caricature synthesis systems. It is

pointed out in [3] that hair has great impact on face animation. So, recognition of the hair region play a vital role to recognize a person and also can contribute in behavior analysis of a person.

**Fig.1 Different hair lengths**

*B. Person dressing style*

Dressing style detection involves of two steps. 1]To detect the clothes of a person in the given image. 2]To classify the clothes according to the given requirement.

Depending on the particular application of fashion classification, the most relevant problems to solve will differ. We will focus on optimizing fashion classification for the purposes of annotating images and discovering the most similar fashion items to a fashion item in a query image.

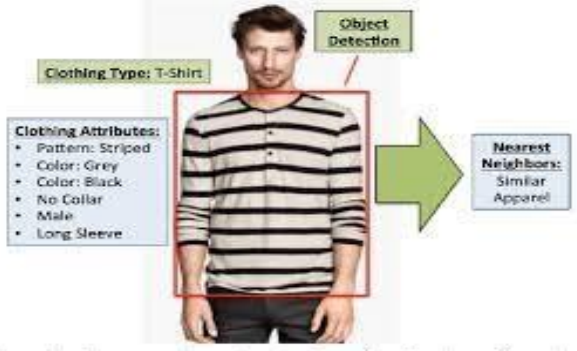



Fig.2 Dressing style classification

*C. Person tagging and tracking*

A Highly accurate person tracking will *combine* the concept of person detection and person tracking into a single algorithm, typically divided into two phases:

**Phase 1 — Detecting:** During the detection phase we are running our computationally more expensive person tracker to (1) detect if new person have entered our view, and (2) see if we can find a person that were "lost" during the tracking phase. For each detected person we create or update an person tracker with the new bounding box coordinates. Since our object detector is more computationally expensive we only run this phase once every *N* frames.

**Phase 2 — Tracking:** When we are not in the "detecting" phase we are in the "tracking" phase. For each of our detected people, we create an person tracker to track the person as it moves around the frame. our person tracker should be faster and more efficient than the person detector. We'll continue tracking until we've reached the *N*-th frame and then re-run our person detector. The entire process then repeats.

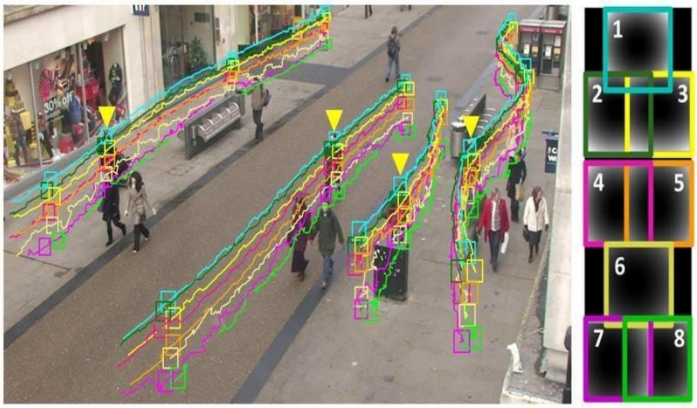



Fig.3 Human tracking

## III. AIM AND OBJECTIVES

To recognize the attributes of the person using Deep Neural Networks following attributes needs to be detected:

1. People hair colour
2. Person tagging and tracking
3. People hair length
4. People dressing style

## IV. METHODOLOGY AND STEPS INVOLVED IN HUMAN ATTRIBUTES MONITORING

The Human attributes monitoring system is implemented using convolutional neural network. The block diagram of the system is shown in following figure. The first step is to obtain the input from the IP camera or a video stream. In the intermediate stage individual frame is extracted from the captured video, then the image is compressed in order to ease the upcoming actions. From the image acquired following attributes needs to be detected:

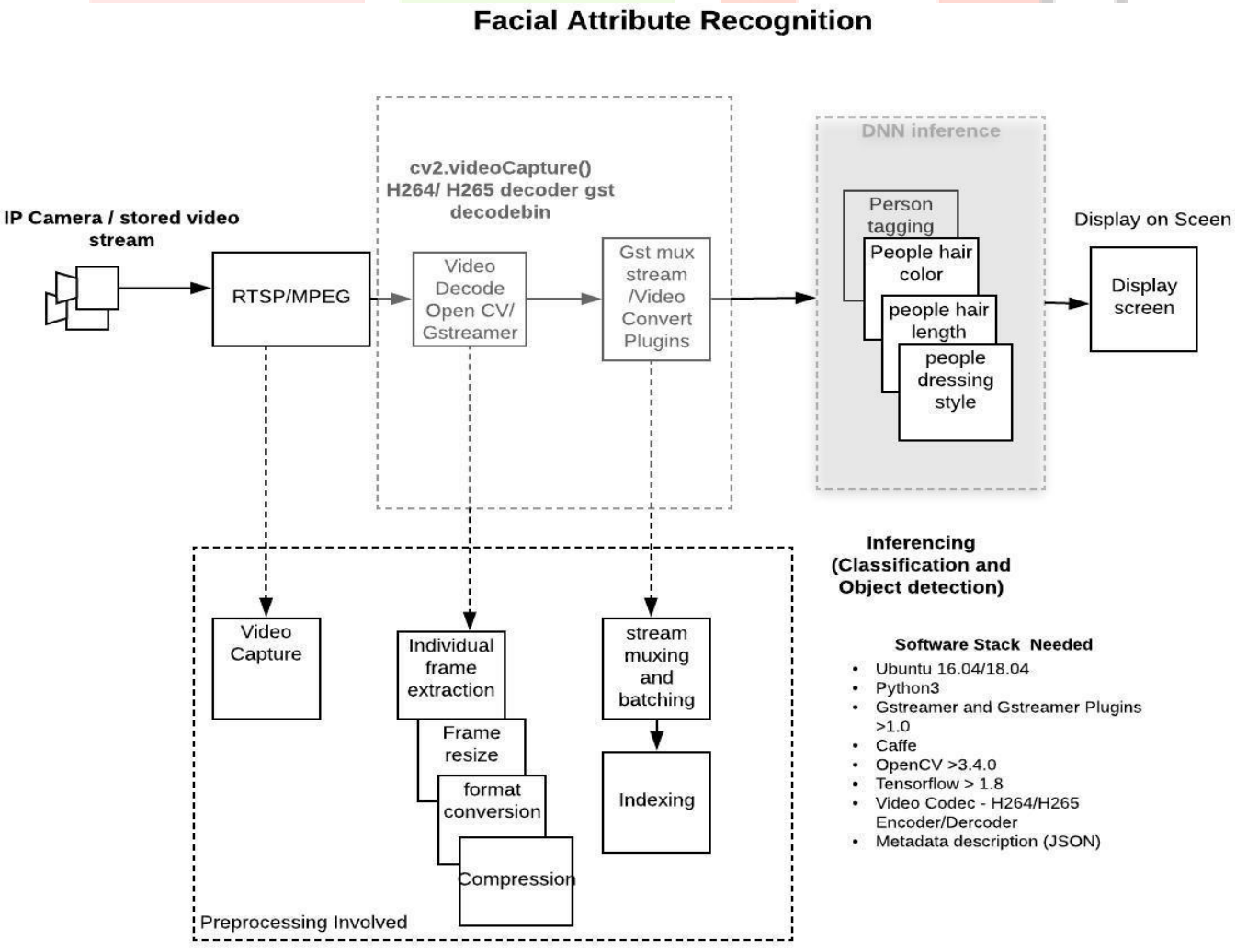
1. People hair colour.
2. Person tagging and tracking
3. People hair length

4. People dressing style

From the above requirements ,the first attribute to be monitored should be person tagging and tracking. This will make the rest of the tasks easy to proceed. The best way to track a person is through face recognition. Face recognition could be done using various methods such as using haarcascades from the open CV library or using dlib algorithm. Once the person is detected, we can use the same methods used in object tracking to track the person.

The first detection step aims at creating a probability map of hair presence at patch level, to help in distinguishing image patches which likely contain hair from those belonging to the background. We tackle this task by a classification pipeline which is purely based on hair texture analysis. The detection involves: a) a feature extraction phase, where hair and non-hair patches from the training set are represented by texture descriptors; b) a model learning phase, where texture descriptors representing hair and nonhair classes are exploited by a machine learning method to train a classifier; and c) the final classification phase, where the trained classifier eventually categorizes patches of the input image either as hair or non-hair. Once the hair are detected in the image the hair length and hair colour can be identified according to the dataset which is to be used.

For detection of clothing style of the person we can follow one of the techniques used in the research paper published by Brian Lao. Clothing type classification is the multiclass classification problem of predicting a single label that describes the type of clothing within an image. Thus, clothing type datasets will include images of clothing annotated with a label such as hat, jacket, or shoe. Prof. Brian used the Apparel Classification with Style (ACS) Dataset [3], which contains 89,484 images that been cropped based on bounding boxes aimed at encapsulating the clothing on an individual's upper body. Each image is labeled with one of 15 hand-picked clothing categories . Bossard et al. (2012) [3] used the ACS dataset to extract features including Histogram of Oriented Gradients (HOG), Speeded Up Robust Features (SURF), Local Binary Patterns (LBP), and color information. Bossard then used these features to perform multiclass classification with One vs. All SVM, random forests, and transfer forests, achieving average accuracies of 35.03%, 38.29% and 41.36%, respectively. Using their CNN, they exceeded these accuracy baselines on the ACS dataset



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