Automatic Suggestion of Outfits using Image Processing

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Abstract — The **lack of fashion sense or ignorant about what is the best and worst suited outfit, people feel less confident in the society and aren't fashion forwarded. There are few applications which give us numerous options about the latest fashion and trends but again in-decisive people are unable to judge what suits them the best. This application with respect to specific parameters will provide, with the best choice that will suit the features of the user. Unlike present system this system will provide outfits with respect to the user's features, making them confident. To choose the right outfit for right occasion could be frustrating and time consuming. Problems of looking less confident, not keeping up with fashion occur as a huge dilemma for indecisive & negligent people. The project emphasises on face detection and recognition of facial features using image processing. It also involves the analysis of the dataset by which the user gets its best suited outfit with respective to the given features .**

Keywords: Image processing, Skin tone detection, suggesting colours.

1.Introduction

We tend up to see and get inspired from the people in the west who believe in dressing up well, which affects the way we come across each other, show-off the personality which is one of the top ways to increase self-esteem. Nowadays everyone are strong believers in the concept of dressing in clean tidy and well fitted clothes, which eventually makes them feel good and positive. As a result and also many psychological studies have showed, clothing is like a form of self expression, it controls and masks emotions. Like when someone compliments us on good clothing, the good feelings come out again when they wear it again and when not, it boils down to self imaging and being our worst critics.
So, this is what motivates us, keeping a happy and depression-free society because happiness is the key to success and what's better than dress to success!

The language of clothing has become more intricate and personal as more wearable technologies are being introduced into our lives. Either male or female of all age groups are spending more time choosing the right apparel to appear more presentable to impress their colleagues, superiors, family and friends. However, to deal with choosing the right garment for the right occasion could be frustrating and time consuming. Thus in order to make it easier we will develop a shopping site where we have a client who is customer and an admin.

Admin can manage product and view orders whereas client can browse and order that product . In order to get the specification for the respective user some parameters are kept in mind such as face shape skin tone and sizes. Facial features involve haar classifiers and for that we use opencv.

2. Related Works

Image segmentation is a key technology in digital image processing. Image clothing can be roughly divided into two categories one with human model and one without human model. In the paper related to GrabCut algorithm more accurate localisation frames were obtained, which can replace the part in traditional classical GrabCut algorithm that requires manual participation and realise automatic batch operation of image segmentation. With the rapid development of network information, use of image information transfer is becoming increasingly widespread, and there is a growing demand for analysis and retrieval of vast amounts of image information in
network. How to quickly find needed information from tens of millions of image information, how to accurately extract useful existing algorithms with respective strength, how to open up new ideas based on the original foundation to meet the new demands for image processing have been the issues that researchers concern. Aiming at this problem, with image segmentation problem in clothing image retrieval of online clothing sales system as example, based on introduction of research status quo in first chapters and understanding of relevant basic knowledge, this paper made in-depth study on classical algorithm Crab cut, made improvement based on advantages and disadvantages of the algorithm, proposed clothing image segmentation algorithm based on pre-detection, and finally provided an objective evaluation of the new algorithm.

The results show that the new algorithm achieves the desired effect. It involves image segmentation, initial location method, clothing edge detection method research and Clothing Image Segmentation Algorithm Based on Pre-detection. This paper proposes the advance. In this paper, pointing at the situation that existing image segmentation algorithm can not adapt to massive image data processing.Clothing image segmentation algorithm based on pre-detection was proposed, algorithm was improved based on classical algorithm Grabcut, and original manual operation was replaced by location box automatically generated by algorithm

A mixed reality based virtual clothes try-on system using one consumable RGB-D camera (i.e., Kinect). A series of novel techniques were proposed and integrated into a virtual try-on system, which includes three scenarios, i.e., virtual clothes on the avatar, virtual clothes on the actual user's image, and virtual clothes on the avatar blended with the user's face image .In this paper, we present a mixed reality system for 3D virtual clothes try-on that enables a user to see herself wearing virtual clothes while looking at a mirror display, without taking off her actual clothes. The user can select various virtual clothes for trying-on. The system physically simulates the selected virtual clothes on the user's body in real-time and the user can see virtual clothes fitting on the her mirror image from various angles as she moves. The major contribution of this paper is that we automatically customise an invisible or partially visible avatar based on the user's body size and the skin colour and use it for proper clothes fitting, alignment and clothes simulation in our virtual try-on system.

Another system presents a scalable approach to automatically suggest relevant clothing products, given a single image without metadata. We formulate the problem as cross-scenario retrieval : the query is a real-world image, while the products from online shopping catalogs are usually presented in a clean environment. : It consists of Detect the clothing classes present in the query image by classification of promising image regions and use image retrieval techniques to retrieve visually similar products belonging to each class found present .A novel framework presentation for a fully automated cross-scenario clothing suggestion application that can suggest clothing classes for a query image in the order of a few seconds.A simple and effective segment refinement method is proposed, in which we first limit segmentation only on image regions that are found to have a high probability of containing clothing, over-segment and then cluster the over-segmented parts by appearance. Finally, presenting novel region representation via a binary spatial appearance mask normalised on a pose estimation referenced frame that facilitates rapid classification without requiring an actual learning step

3. System Architecture and Methodology

The proposed system talks about generating the outfits of specified colour based on user's skin tone. When the user uploads the image, Haar works by detecting the face from the image by using the concept of rectangular boxes to extract the features. On the other hand , Azure which already has embedded training data classifies the image in either of the three skin tones: fair, dark,brown and also determines the face structure of the customer. Based on this and the occasion determined by the user certain outfits are generated of specified colours that suits the customer's skin tone and face structure. We have a database which keeps record of registered users, products added etc.

Object Detection using Haar feature-based cascade classifiers is an effective object detection method. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images.

Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to train the classifier. Then we need to extract features from it. For this, Haar features are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under the white rectangle from sum of pixels under the black rectangle.

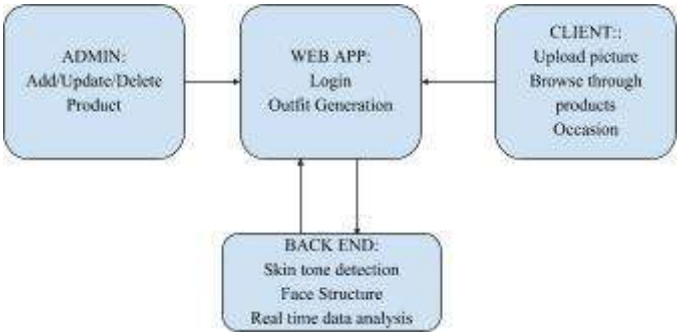

Fig. 1 Architecture diagram

The description of Fig.1 is given below:

1. Admin block represents the tasks of the admin in the backend which includes adding, updating and deleting the products.

2. In the web application , processes of login, colour selection by the customers and eventual output that is outfit generation takes place..

3. The client side includes the tasks of uploading pictures(image of the user),option of browsing through the products generated by the selection of desired type of occasion.

After face detection using haar classifiers, the respective image generated is passed to the classifier that is trained with images in microsoft azure.The Custom Vision service uses a machine learning algorithm to apply labels to images. Then the algorithm trains to the labelled data and calculates its own accuracy by testing itself on those same images. Once the algorithm is trained, we can test, retrain, and eventually use it to classify new images according to the needs.

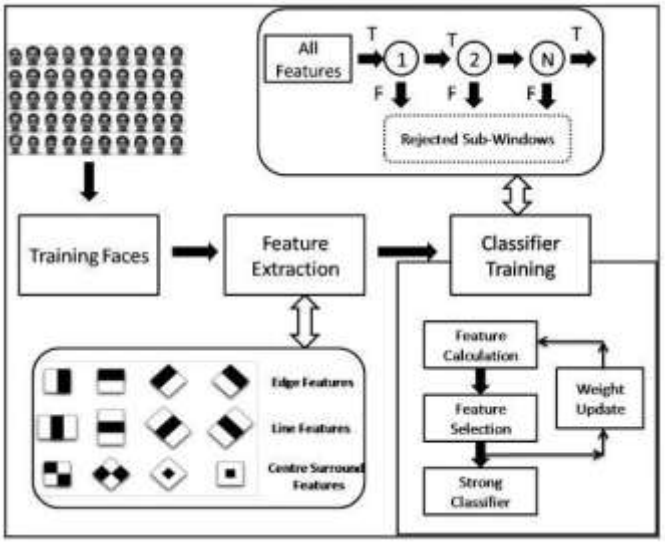

Fig. 2 Methodology of Haar

4. Implementation

FACE DETECTION USING HAAR

Haar Classifier is a machine learning algorithm used for face detection. The algorithm works on training the data using negative and positive images then the features are extraction. Feature Extraction is nothing but extracting the numerical information from images which eventually help in distinguishing one image from another. These features are just like the convolution kernel.

Rectangular feature extraction is better and more efficient that pixel based system.
Features are calculated by the summation of pixels. Error rates are given by non face images instead of face images.

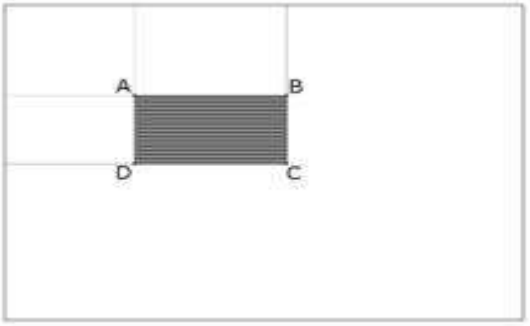

Fig. 3 Shaded Rectangle

Finding the sum of shaded rectangle

sum=I(C)+I(A)-I(B)-I(D)

Example:
Haar Algorithm works on the concept of matrices representing pixels. A random matrix is shown below as it is used for calculating the intensity**:**

2	4	1	8	9
7	9	1	2	0
1	6	0	5	8
5	3	6	5	7
4	3	0	2	6

to calculate the average intensity over the area highlighted from the matrix:

9	1	2
6	0	5
3	6	5

9 + 1 + 2 + 6 + 0 + 5 + 3 + 6 + 5 = 37

37 / 9 = 4.11

This requires a total of 9 operations. Doing the same for 100 such operations would require:

100 * 9 = **900 operations**.

Thus, Creation of an integral image changes other sum difference operations by almost *O(1)* time complexity, thereby decreasing the number of calculations.

AZURE CLASSIFICATION AND PREDICTION:

A model with unknown parameters, and a data set to which the model can be fit which is called the training data set. The fitting process optimizes the model parameters to make the model fit the training data as well as possible. If an independent sample of validation data is taken from the same population as the training data, it will generally turn out that the model does not fit the validation data as well as it fits the training data.

components of the vector are denoted
$\boldsymbol{x}_i$ x , ..., x . If we use
least squares The real *response* *values* y_1, ..., y_n, and n
p-dimensional vector *covariates* $\boldsymbol{x}_1$, ..., $\boldsymbol{x}_n$. The to fit a
function
in the form of a hyperplane $y = a + \boldsymbol{\beta}\,\boldsymbol{x}$ to the data
($\boldsymbol{x}_i$, y_i) $_{i=1,\ldots,n}$,
we could then assess the fit using the mean square error (MSE).

5. Experimental Results

On applying the respective methodology mentioned earlier the system is designed and the output is generated in terms of sets of outfits that best suit the user. The varying skin tones, face structures and the respective occasion various sets of outfits are recommended to the user.

A query is generated regarding the user requested occasion and according to the generated output regarding the skin tone and face shape.

Input	Label	Generated Query
portrait 1	***brown:diamond***	select * from product where Face_shape ***like*** '%Diamond%' ***and*** Face_color like '%Brown%' and gender like '%Female%' and (Occasion ***like*** '%Party%')
avatar	***no face***	-
portrait 2	***dark:angular***	select * from product where Face_shape like '%Angular%' and Face_color like '%Dark%' and gender like '%Male%' and (Occasion like '%Wedding%')

Fig. 4 Input for recommendation

Fig. 5 Output for recommendation

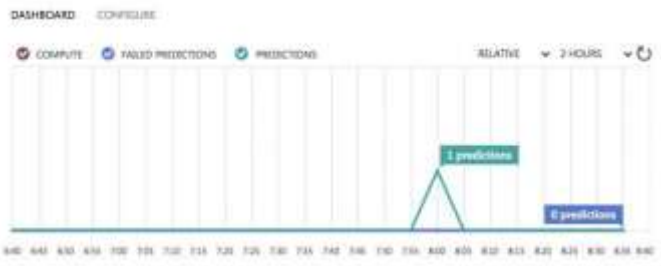

Fig. 6 Azure prediction graph

6. Conclusion

Automatic Generation of outfits is a system which uses HAAR algorithm for detection of face and machine learning of azure helps us in suggesting outfits according to the skin tone. With this system, users are able to do a whole lot more with

the clothing items they have in their wardrobe. Boosting self-esteem, overcoming depression, having positive mood in day to day life also adds on a better living. The main purpose is to help users in selecting the right clothing items that matches their mood or occasion and most importantly their body-type .

Since clothing controls and masks emotions, this system helps in keeping a happy and depression-free society because happiness is the key to success and what's better than dress to success!

5. References

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