Journal of Engineering and Applied Sciences 9 (6): 205-209, 2014
ISSN: 1816-949X

A Study on Store Environment as an Application in Image Processing and Pattern Recognition

J. Gitanjali, C. Ranichandra and M. Pounambal
School of Information Technology Engineering, VIT University,
632014 Vellore, Tamil Nadu, India

Abstract: The system is intended to provide an ease in purchasing accessories for face from an online shopping website. The system creates a virtual store environment where the individual could trial accessories upon their interests. The application can help in analyzing if the accessory/s fits an individual's personality. This study is intended to processes the image using image preprocessing techniques, detects the face from the processed image using face detection techniques and identifies the unique facial features using feature extraction techniques. When the accessory for trial is set, then the product is displayed at the respective feature of an individual's. Using image fusion, the feature with the accessory is fused with the original image.

Key words: Image preprocessing, face detection, feature extraction, image fusion, India

INTRODUCTION

Shopping online was started from the year 1990 and past a decade online shopping has become a trend and comfort for people to shop for their requirements. From the routine purchase to the extravagance purchase, people depend on shopping over the web. During the initials of the shopping through the net the quality of the product could not be assessed by the shopper. Upon severe survey of different online shopping applications, enhancements to it were made by embedding detailed and enlarged view of products which had satisfied the shoppers to certain extent. But, when researchers purchase online, though researchers can view the details of the product and its quality factor, researchers often fall behind in assessing, if the product fits out personality. The wear about of a product varies from person to person. Hence, while shopping through web often people end up in buying products that does not suit their personality. This has become a notable issue observed in e-shopping.

The system intended here finds a way to clear the issues mentioned earlier. This system enables a virtual trial mechanism where a trial of the product can be made upon the shopper's image. Thus, the shopper gets an opportunity to analyze if the product suits his individual personality. This is the more trusted mechanism for e-purchase of products. This enhances the reliability factor of e-shopping. The shopper is satisfied with such an ease in purchase and the vendor's profit increments.

The study is intended to provide information regarding the methods that is used to implement its objective.

WHAT IS IMAGE ACQUISITION?

Image acquisition is achieved by considering an in-built camera to the system or an externally connected camera which enables to capture the intended image. Image preprocessing technique is applied on the captured image which reduces the noise and background data in the image which is unnecessary and may deviate the results from the objective. Product acquisition is to acquire the required product preferred for trial which is selected by the user while purchase. Face detection is applied on the preprocessed image to reduce the dimensionality of concentration. Facial feature extraction is the way to extract the features of the face such as eyes, nose, mouth, ears. This way, researchers identify them and extract each feature individually. The extracted feature is firstly mapped using product mapping and then fused with the product acquired using image fusion technique. The final image is then reconstructed by superimposing the fused image with the original image.

EXISTING SYSTEM

Researchers depend on online shopping for various reason, such as due to lack of time, patience, availability of the desired store and product within the reach. E-shopping enables us to shop over the web from any place and at any time. But while shopping online,

Corresponding Author: J. Gitanjali, School of Information Technology Engineering, VIT University, 632014 Vellore, Tamil Nadu, India

researchers often cannot trust the vendors upon the quality of the product, since often the product researchers purchase does not meet the expectations as it might not suit the personality. Though, researchers can view the details of the products researchers cannot analyze if the product suits upon us. As in the product that appears could be small upon view or upon the models but it might actually look large upon us. Thus, researchers cannot be sure of the product purchased as such.

Literature survey: As per system and discussion about the proposed system, need many methods for noise removal, detecting the image and the extracting the features of an image. As per the analysis, images might have ruined by instinct noise while image getting transmitted. Removing impulse noises in the image is the challenging problem. Vector median filter (Astola *et al*., 1990) affords effective noise reduction in contradiction of impulses. This method treats all the pixels of an image and inclines to change pixels which are not ruined by noise. This method may leads to blur of information and modification in signal configuration. Researchers used a method for impulse noises recognition and removal of noises by using 2 phase method (Garnett *et al*., 2005) for removal of noise impulses. In 1st phase, researchers find absolute differences to do detection of impulses. And in 2nd phase, using magnitude information of vectors of pixels filtration can be done.

By using the independent background subtraction method (Ivanov *et al*., 1998) was used to detect the objects in an image having stationary background. And other method which will be having the better performance is component based detection (Heisele *et al*., 2000) which was used. Idea is on outlines of few objects might differ fewer undergoes variations than the outline belongs to the whole object. There is a method to acquire the features from the image by decomposing the image into the contourlet transform (Wang *et al*., 2011). After that co-efficient of frequencies which are low and the frequencies which are high in diverse measures.

As Kirby and Sirovich (1990) proposed the use of primary component exploration in features extraction of objects. An eigen image concept was used to indicate functions of co-variance matrix of set of images contains faces. There are automated system (Turk and Pentland, 1991) using the eigen images with like perception to categorize images. SVM (Support Vector Machine) (Thi *et al*., 2008) is the method used for the system where the set of pixels can be collected as one and eigen values would be found. These values are used for feature extraction.

PROPOSED SYSTEM

There is a severe need for a system that will enhance the purchase mechanism by creating a virtual store environment where shoppers can trial the products before his purchase. In the system intended, the shopper is facilitated with the opportunity of trying the products upon them before they intend to buy. The proposed system on the first step provides a choice to the shopper to either upload an image or capture an image of the individual. The image considered is processed using image processing techniques to reduce noise and unwanted image data which may deviate the scope of concern. Since, researchers are concentrating on trials of the facial accessories, in the system researchers now detect the face region from the processed image using face detection techniques. From the detected face researchers now extract the unique features using feature extraction mechanisms. The product that the shopper intends to trial which is in the image format is mapped such that the system can identify the feature that it belongs to. The product is fused with its identified respective feature, using image fusion techniques. The feature with the product, as a whole is stored as a new image which is reconstructed with the original image of the shopper and is displayed to the intender. Such way, the product is set for trials virtually. This enhances the e-shopping and is more trust-worthy. The design of the system proposed is given in Fig. 1.

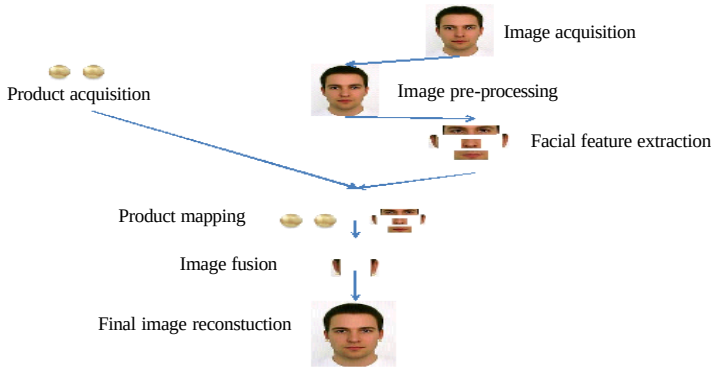

Fig. 1: Architecture diagram-virtual store environment system

RELATED WORK

The image that is either captured or uploaded by the shopper is the original individual's image. The original image is preprocessed to reduce noise and unrelated data. Researchers have several preprocessing techniques to achieve the same.

Each technique has uphill's and downfalls but the best one that fits the application using impulse noise removal algorithm (Astola *et al*., 1990) which is the enhancement of the XZS algorithm (Garnett *et al*., 2005; Wang *et al*., 2011). The preprocessed image is now used for detecting the face using component based method (Heisele *et al*., 2000). The detected face image is used to extract the facial features using the concept of SVM (Support Vector Machine) (Ivanov *et al*., 1998). The product mapping is then done and the image fusion takes place with the help of matrix AND operation. The fused image is then superimposed with the other extracted features of the human face to take the form of the original image with the help of combination SVM (Ivanov *et al*., 1998).

COMPONENT DESCRIPTION

Image acquisition: The shopper when prefers the system to capture a picture, the system uses the web camera to capture the shopper's picture. It is stored in the image form. This is used as the basic input for the system. The camera is expected to be in active and connected state when the image is required to be captured.

Image preprocessing: When the input image is ready for processing in the system, it is raw and has data that is unrelated to the concern and to avoid deviation and misconception, researchers prefer to chuck the unnecessary data. Researchers use the image noise removal algorithm. In this algorithm, the image data with noise is segmented into components and the size of the region is calculated, the noise is detected and cancelled and the result such obtained is the preprocessed image.

Product acquisition: The shopper is provided with a range of products for sale. The product that interests the shopper is set for trial. The product that the shopper wishes to trial is the product acquired by the system for processing.

Face detection: The noiseless image data is used, as an input for the component based method using principle component analysis. A resolution pyramid is computed for an input image which is equalized using a histogram to avoid any moderations in brightness and contrast. The result of the above is in scales of 0 and 1 which is used as input feature for the support vector machine classifier. For an SVM, researchers use training data which is generated by using 3-D head models using 7 textures.

Facial feature extraction: The 58×58 window is shifted over the detected face. SVM is used to recognize the facial features. Linear SVM is used to recognize left eye, right eye, nose, mouth, ear. The region-wise search is done and the high confidence is obtained by considering the bright intensities from the features. A linear SVM is used to combine all the results of individual linear SVMs that extract distinctive facial features.

Product mapping: Each product's property has a value. After the features are detected from a face, its property is mapped with the property of the product. The success of map gives the right property match.

Image fusion: The image of the product and the image of the feature that gave a success in mapping is fused. The product image is fused onto the respective facial feature image by matrix multiplication of images. The images that are in the matrix form is fixed based on multiplication using and application theory.

Final image reconstruction: The fused image is superimposed upon the original image to construct the final image that is presented to obtain the person image with the product. The superimposition of the image is done by considering the combination SVM where the individual's features are given as input to the support vector machine which analyses the input values, as parts of the human face and construct the original image of the person as that of the input image.

EXPERIMENTAL RESULT AND ANALYSIS

Experimental results and analysis are shown in Fig. 2.

Test cases: Test case of virtual store environment are given in Table 1.

Table 1: Test cases for virtual store environment system

Mechanism	Input	Output	Analysis
Image acquisition	Captured image/uploaded image	Image in pixels	The image of the individual is either captured through an enable camera or the individual is asked to upload a picture
Image pre-processing	Image in pixels	Noiseless image	The unrelated data from the image is eliminated where the relevant data that needs to be focused is considered

Table 1: Continue

Mechanism	Input	Output	Analysis
Face detection	Noiseless image	Facial image	Identifying the objective part of the system in the image to reduce the area or data image to reduce complexity
Feature extraction	Facial image	Individual facial feature images	The individual feature of the face of an individual, such as eyes nose, ears, lips and eyebrows
Product mapping	Feature images and product image	Required image-identified	Each product is usually intended for a certain feature and hence the feature that it is intended is held, as a part of its property and mapped accordingly, e.g., when the shopper selects an ear stud its property is held, as ear with the individual's ear
Image fusion	Required image and product image	Fused image (product over the feature)	The feature image and the product image are fused together such that the product appears on the feature at the right location
Image reconstruction	Fused image and original image	Re-constructed image	The original image of the individual is reconstructed by fusing the fused image with the original image such that the product appears upon the individual at the intended feature and is displayed to the shopper

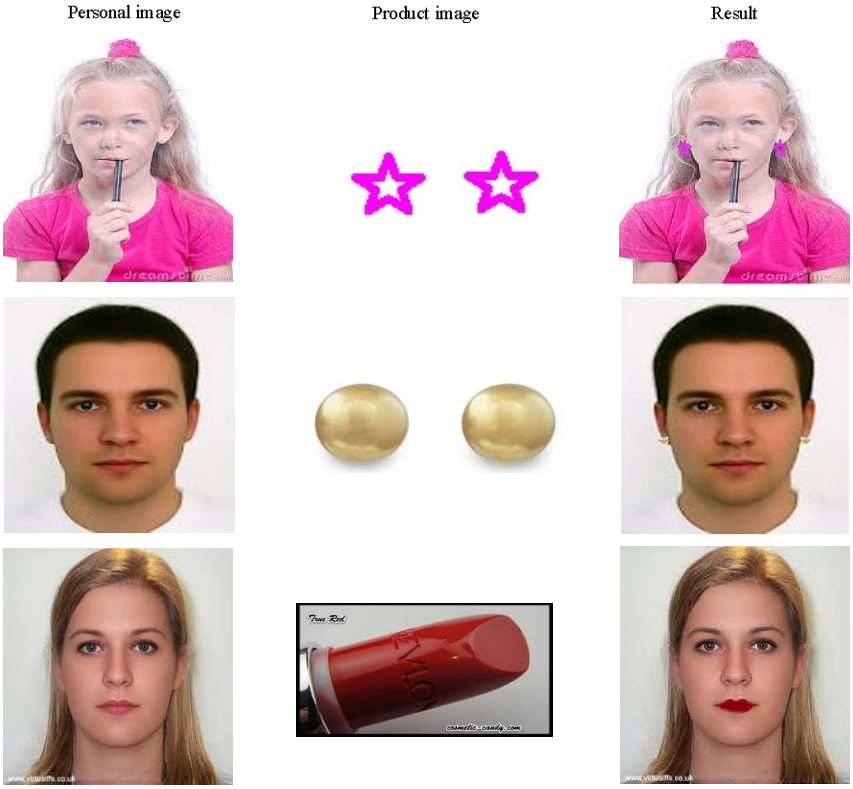

Fig. 2: Experimental result and analysis

CONCLUSION

The virtual trial able store environment application is betterment over the regular way of e-shopping over their enabling the shopper with the ways of purchase of products over trialing the product before purchase. This system provides the shopper with the extent of creating an environment like a store where researchers often trial products before researchers buy them. The individual's image is processed such that the shopper can view the product over their original image which is such that it creates a virtual trial of the product. This is the best way to analyze in shopping through the web, if the product fits our personality.

REFERENCES

Astola, J., P. Haavisto and Y. Neuovo, 1990. Vector median filters. IEEE Proc., 78: 678-689.

Garnett, R., T. Huegerich, C. Chui and W. He, 2005. A universal noise removal algorithm with an impulse detector. IEEE Trans. Image Process., 14: 1747-1754.

Heisele, B., T. Poggio and M. Pontil, 2000. Face detection in still gray images. A.I. Memo No. 1687, CBCL. Paper No. 187, May 2000. http://cbcl.mit.edu/cbcl/publications/ps/AIM-1687.pdf.

Ivanov, Y., A. Bobick and J. Liu, 1998. Fast lighting independent background subtraction. Proceedings of the Workshop on Visual Surveillance, January 2, 1998, Cambridge, MA., pp: 49-55.

Kirby, M. and L. Sirovich, 1990. Application of the Karhunen-Loeve procedure for the characterization of human faces. IEEE Trans. Pattern Anal. Mach. Intell., 12: 103-108.

Thi, T.H., K. Robert, S. Lu and J. Zhang, 2008. Vehicle classification at nighttime using eigenspaces and support vector machine. Proceedings of the IEEE International Congress on Image and Signal Processing, Volume 2, May 27-30, 2008, Sanya, China, pp: 422-426.

Turk, M. and A. Pentland, 1991. Eigenfaces for recognition. J. Cogn. Neurosci., 3: 71-86.

Wang, B., Q. Yang, C. Liu and M. Cui, 2011. An efficient method for face feature extraction based on contourlet transform and fast independent component analysis. Proceedings of the 4th International Symposium on Computational Intelligence and Design, Volume 1, October 28-30, 2011, Hangzhou, pp: 344-347.