Colour and Clothing Pattern Recognition for Visually Impaired People using GLCM technique

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Abstract- *choosing clothes with different patterns and colours is a challenging task for visually impaired people. Automatic clothing pattern identification is also a challenging research problem due to scaling, illumination, and especially maximum intra-class pattern variations. In the study of Human-computer-interaction (HCI) the design and use of technology digitalized computer systems mainly focusing on the particular interfaces between people and computers. This system mainly introduces the automatic study on "Blind and visually impaired people Human computer and access to Graphics represents a recent scenario towards solution for visually impaired people and brings together a new researchers and practitioners. This Proposed system developed camera-captured on the real cloth system that identification clothing patterns into under 4 categories (plaid, striped, pattern less, and irregular) and identifies 11 clothing colours. The system integrates a camera, a microphone, a computer, and audio description of clothing patterns and colours. A camera surrounded upon a pair of sunglasses is used to capture clothing images. The clothing patterns and colours are described to blind users verbally. Present system can be controlled by speech input through microphone. To recognize clothing patterns, we propose a novel Radon Signature descriptor and a schema to extract statistical properties from standard wavelet sub bands to capture global features of clothing patterns. To evaluate the effectiveness of the proposed approach, we collected the various Clothing Pattern dataset. Our approaches have 99.55% recognition accuracy which gathered output performs the state-of-the-art texture analysis methods used on clothing pattern identification.*

Keywords- Clothing pattern identification, assistive cloth system, texture analyze, global and local features, visually impaired people.

I. INTRODUCTION

Human machine interaction (HMI) is the way in which humans interact with computers else sensory machines and design technologies that let humans with computers in novel ways. As a field of research, Human Computer Interaction (HCI) is situated at the intersection of signal processing computer science, behavioural sciences, electronics, design, media studies, and several other fields of study [1]. Humans communicate with computers or machines in many ways; and the communication between the both (machines and humans) they use is difficult to facilitating this interaction. Desktop and laptop applications, internet browsers, handheld computers, and computer function make use of the graphical user interfaces (GUI) of today.

Most visually impaired people don't have access to extra special teaching aids they needed to learn. Based on data from the World Health Organization in Geneva (WHO) [1][2][4], there are much more than 47 million people across the globe who are blind, over 15.24 million are in India .Our system mainly says about how the human computer interaction can be done with the help of sensors and like other devices helps the visually impaired people. Our system focus on these kinds of fields where such as pattern recognition in the form of clothes how a visually impaired person can come to know about the pattern and colour of those clothes. Our system can handle clothes with complex designs and notice clothing patterns into four categories (striped, plaid, pattern less, horizontal, vertical and irregular etc.). Our system is able to identify 11 colours [5][1][6][4][13]: red, golden ,orange, yellow, green, cyan, blue, purple, pink, ash, black, grey, and white. For the large intra class variations etc.

Although many methods have been developed for texture analysis based matching and colour detection in the computer vision based and image processing research, currently there is no device that can effectively supply matching choices for visually impaired people. In this paper, we develop a computer vision-based (HCI) [13] prototype to match a pair of images of clothes for both cloth pattern and colour. The image pair is captured by a camera also connected to a computer. To configured and controlling the system, users can simply speak out the commands to switch on or off the system, implement corresponding functions, and adjust the sound of audio outputs. Our different algorithm can detect: 1) Colours of the clothes; 2) whether the clothes have pattern or have homogeneous same colour 3) if the colours match for a pair of database images. We introduce a (HCI) camera-based [1][2] system to use visually impaired people to recognize clothing patterns and colours. The system contains following three main components:

1) system like Sensors including a camera for capturing clothing images, a microphone or earphone for speech command input and speakers (or Bluetooth) for audio output;
2) Data capture (cloth) and analysis to perform control system on computer, clothing pattern recognition, and colour identification by using a computer which can be a desktop laptop ,or Smartphone in a user's bedroom or a wearable computer like such as a mini-computer or a Smartphone;
3) Audio outputs to be recognition results of different types of clothing patterns and colours.

II. RELATED WORK

Assistive clothing verification or recognition systems are being developed for different and various clothing patterns and color in visually impaired people (blind people) to improve the life quality and safety of such people including indoor navigation using RFID and way finding, display reading, banknote recognition, rehabilitation, and many more.

[1] Developed a system for visually impaired people to select clothes based on cloth pattern and colours in a cloth shop independently. This is a camera depended system that can handle clothes with very complex pattern and recognize clothes into four categories (plaid, stripped, pattern less, and irregular) and identify different colours: red, orange, yellow, green, and cyan, ash, blue, purple, pink, black, grey and white. Proposed a system to automatically identification banknote of any currency to assistive visually impaired people in

[2]. This is also a video camera and computer based vision system. This system has features like high accuracy, robustness, high efficiency, ease of use. This system is robust to conditions like occlusion, reversing, cluttered background, illumination change, wrinkled bills, and also eliminating false identification and can the guide to properly focus at the bill to be recognize using features extraction (SURF) algorithm. Developed a vision substitution system for travel aid for blind in

[3]. Out of the three main classification of navigation system (different Electronic Travel Aids, Electronic Orientation systems, (GPS) Position Locator Aids) here the focus is on Electronic Travel Aids. In all these three systems the needs of visually impaired people are considered but there is a need to also consider the importance of an assistive clothing system for the colour visually impaired people. The main area where a colour blind person faces a problem other than the traffic signals is in a cloth shop for selecting clothes of desired colours without the help of a second person. The proposed assistive system here depicts the same.

[4] Proposed a method to attach the Radio Frequency Identification tags to the clothes. Information about the clothes was stored in online database maintained by fashion expert. Using the various devices, like smart phone laptop etc information about the clothes can be read. Visually impaired people can pick matching clothes with the help of the online stored database. There are approximately 190 million persons in the world today that are blind. Although there have been a multitude of advancements in the functional area of optometry and other surgery, most of these visually impaired persons will never see an improvement in their condition. The Closet Buddy system was designed to allow visually-impaired people to select outfits and find the appropriate or closest clothing in their cloth set. Utilizing an interface designed for the visually-impaired, users will be picking out their own clothes and dressing to impress in no time. this system depends on tag a radar communication distances, difficult to communicate each devices considered as main drawback of this system

[5] proposed system which would permissive to the clothes suitable to values. The system is useful for the person with the normal vision. Matching clothes is a challenging task for many visually impaired people. In this paper, we present a ID of concept system to solve this type of problem. The novel proposed system consists of 1) a camera connected to a computer to perform pattern (plaid, stripped, pattern less, and irregular) and colour matching process; 2) voice commands for system control and configuration; and 3) audio feedback to provide matching results for both colour and patterns of clothes. This system can handle clothes in deficient colour without any pattern, as well as clothing with multiple colours and complex patterns to aid both blind and colour deficient people. Furthermore, our method is robust to variations of contrast, clothing rotation and wrinkling. To evaluate the proposed prototype, we collect two challenging databases including

Identification [6][12][18] [23] of clothing pattern with reduced set of feature. Clothes pattern recognition is a challenging task for blind or visually impaired people. Automatic clothes pattern identification is also a challenging problem in visually impaired people computer vision system due to the large pattern variations and combinations of colour. In this paper, we present a new method to classify clothes patterns into 4 categories: plaid, stripped, pattern less, and irregular. While existing texture analysis methods mainly focused on textures varying with distinctive pattern changes, they cannot reach the same level of accuracy and efficiency for clothes pattern recognition because of the [16] [27] large intra-class variations in each clothes pattern category. The recognition experiment is conducted on a database with 628 clothes images of 4 categories of patterns. Experimental results implements that the proposed novel method outperforms the state-of-the-art texture and image analysis methods in the context of clothes pattern recognition.

Combined scale invariant feature transformation (SIFT) and conversion spin for texture and image classification. Recently, methods based on local image features have show different promise for texture analysis and object identification tasks. This paper presents a large-scale findings and evaluation of an approach that represents images as distributions (signatures or histograms) of features extracted from a sparse set of key point locations and learns a SVM classifier with kernels based on two effective measures for comparing distributions, the Earth Mover's Distance. [19] [20] [29] We first evaluate an analysis the performance of our proposed system with different key point detectors and descriptors, as well as different kernels and classifiers. We then conduct a compression with evaluation with several state-of-the-art identification methods on four texture and five object databases Recognizes clothing patterns using SIFT, DWT and Radon Transform feature in four categories and identifies 12 clothing colours.[26][28] City college of New York, America (CCNY) clothing pattern dataset[media-lab.engr.ccny.cuny.edu/ data is used In this paper, clothes patterns are classified either into one of the four categories: stripe, plaid, plain and pattern less. For recognition SURF (speedup robust feature), more compact, robust to SIFT [32] [10] is combined with feature extracted by applying GLCM algorithm on images obtained by DWT transform techniques. The four categories are able to meet the basic requirements.

III. SYSTEM OVERVIEW

The system of automatic pattern and colour identification system capable of real time recognizing the patterns (plaid, stripped, pattern less, and irregular) and colours (red, orange, yellow, green, cyan, ash, blue, purple, pink, black, grey and white). Choosing the appropriate pattern and colour of the clothes is important to assist the visually impaired people to make decisions.

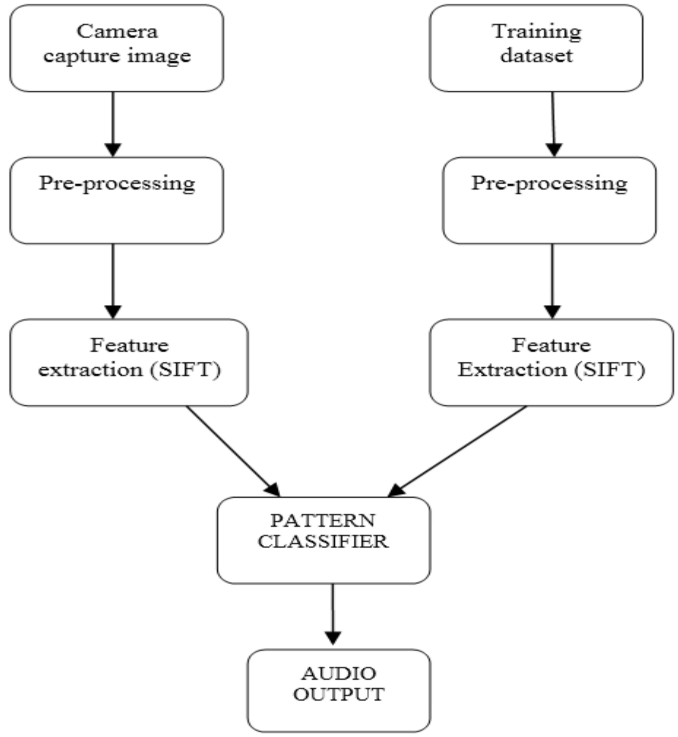

Figure 1. Image Processing Process

The identification process depends basically on two factors they are pre-processing and feature extraction they are required to implement a system to recognize the different patterns. For that the training algorithm called SVM are used. The figure 1 gives the flow diagram of the system.

This system can handle clothes with complex patterns and recognize clothing patterns of four categories they are plaid, striped, pattern less, and irregular. This system is also able to identify 12 colours are red, orange, yellow, green, cyan, blue, purple, pink, black, grey, and white. In the case of multiple colours in the colours, the first several colours are spoken to users. In order to handle the large interclass variations the combination of global images and local image features extraction significantly outperforms the overall state-of-the-art texture analysis methods for clothing pattern identification. It achieves comparable results to the state-of-the-art approaches on the traditional texture classification problems. The colour can be identified using colour normalized histogram of each clothing image in the HSI colour space. In this three quantization is used they are hue, saturation, intensity. The weight of each colour is the percentage of pixels belonging to this colour each pixel in the image has its own saturation value and intensity. The white, gray, black colour can be easily identified using the comparison of this saturation and intensity value. When the captured image undergoes this normalized histogram, the percentage of each colour can be classified and gives the particular colour.

Figure 2. Intra-class variations in clothing pattern images and texture images: (a) clothing pattern samples colour variations

The captured image will be processed with image processing technique. The image will be analyzed for various patterns like (plaid, stripped, pattern less, and irregular) lines and shapes. The shapes include circle, square, triangle and few other shapes. The mat lab software will be programmed to recognize these shapes. Also the various colours will be identified for example the captured picture has red colour then red colour will be detected and voice will tell that captured image has red colour. Same way if captured image has many colours like blue, green and yellow then all three colours will be announced through voice. Some 11 to 13 colours can be detected approximately. Since the colour and pattern detection depends on camera resolution and lighting conditions.

IV. THE PROPOSED FRAMEWORK

The various Clothing patterns present at the visualized to patterns characterized by the repetition of a few basic primitives (e.g., plaids or stripes). Accordingly, local image features are effective to extract the structural information of revised primitives. Ever, due to the large intra-class variance, local primitives of the same clothing pattern category can vary significantly (Fig. 2). Global image features including directionality and statistical properties of clothing patterns are more stable within the same category. Therefore they are able to provide complementary information to local image structural features. Next, we present extractions of global and local features for clothing pattern recognition, i.e., Radon Signature used to pre-processing, Gray Level co-occurrence matrix algorithm (GLCM) and standard wavelet transform (SWT) algorithm used to feature extraction, and Scale Invariant Feature Transform (SIFT) colour identification, pattern classification done by support vector machine (SVM).

A. Radon Signature Based Pre-Processing

Clothing images present large different variations which result in the major challenge for clothing pattern recognition and identification. However, in a global perspective, the image directionality of clothing patterns is much more consistent across various categories and can be used as a major property to distinguish various clothing patterns. As shown in Fig. 2, the clothing patterns of plaid and striped are both anisotropic and homogeneous. In contrast, the clothing patterns in the categories of pattern less and not a regular are differing with various isotropic patterns. To make use of this difference of directionality, we propose a novel descriptor, i.e., Radon Signature basis, to characterize the directionality feature of clothing patterns.

B. Stationary wavelet transform

The Stationary wavelet transform method (SWT) is a wavelet transform algorithm proposed to overcome the lack of transformation of the dual discrete wavelet transform method (DWT). Translation-invariance is achieved by removing the below samples and up samples in the DWT (dual wavelet transform) method and up sampling the filter coefficients by a factor of display style in the display style jth level of the algorithm. The SWT method is an inherently redundant scheme as the output of each level of SWT method contains the same number of samples as the input – so for a decomposition of N levels there is a redundancy of N in the wavelet coefficients.

C. Gray Level co-occurrence matrix (GLCM)

GLCM compression texture considers the relation between two different pixels at a time, called the reference pixel and the neighbour pixel. In the illustration below, to the neighbour pixel is chosen to be the one to the east (right side) of each reference pixel value. This can also be expressed as a (1, 0) relation: 1 pixel in the image x direction, 0 pixels in the image y direction. Each pixel within the window becomes the reference pixel in turnover, starting in the upper left corner and proceeds to the lower right. Pixels along the right edge have no right hand neighbour wood value, so they are not used for this counter. The sum of all the entries in the GLCM method (i.e. the number of pixel combinations) will be just smaller for a given window size. Combinations of the grey levels that is possible for the test image and train images, and their position in the matrix.

D. SIFT Feature Extraction

Scale Invariance feature transform method (SIFT) SIFT is the local image feature extraction. To perform easier recognition, it is important that the global image and local image features extracted from the training image be identified even over all changes in image scale, noise and illumination, as the name mentioned it is invariant to the scale. The feature extracted is points, patches in the image.

E. SVM based training

The extracted global image and local image features are combined to recognize clothing patterns by using a support vector machines (SVMs) classifier. The recognition of clothing colour is implemented by quantizing clothing colour in the HIS (hue, saturation, and intensity) space. In the end, the identification results of both clothing patterns and colours mutually provide a most precise and meaningful description of clothes to the users. The SVMs tool box as shown in provides functionality for designing complex systems of nonlinear nature that cannot be modelled easily using a closed form equation. Once the feature file is created and output values of the images are decided, then the system can be trained using Multiclass SVM tool box. Support Vector Machines is a supervised to learning models used as Classification algorithm for cloths pattern.

The final feature combined in this way has a low dimension but more discerning image intensity power. It represents the accuracy of prediction output based on a particular feature. The Support Vector Machines (SVMs) is used as the classifier in clothes pattern recognition system. SVMs find a maximum margin hyper-plane in the feature space.

V. EXPERIMENTAL RESULTS AND ANALYSIS

Classification the results were obtained by comparing the training image and the test image. The training image (camera captured image) can be obtained in the database. Each image should undergo all the extraction process. The input image is given by 256X256 pixel size. This image size can be modified according to the need. The system uses the dataset of various, which dataset includes 25 images of four different typical clothing pattern designs are plaid, striped, pattern less, and irregular. All the images are trained and given to the SVMs algorithm. In this the patterns can be differentiated. The processes involved are

(1) Pre-processing-Radon Transformation
(2) Feature extraction-SIFT and SWT
(3) SVM classifier cloth classification

A. Clothing Colour Identification

In the HSV system, the hue of a colour is its angle measure on a colour wheel. Pure red hues value are 0°, pure green hues value are 120°, and pure blues value are 240°. V is brightness. Intensity is the overall lightness or of the colour, defined numerical as the average of the equivalent red, green and blue (RGB) values. In HSV, definition of saturation is a measure of a colour's purity/greyness value in image. Purer colours have a saturation value closer to 1, while greyer colours have a saturation value closer to 1. In particular, for each of the clothing image, the colour identifier classifies the image pixels in the image to the following colours: white, black, red, orange, yellow, green, ash, blue, purple, and grey. Each image of an article of clothing is first converted from RGB image to HSV colour space image. Then, HSV space is quantized into a small number of colours. If the cloth contains multiple colours, the most dominant colours will be outputted. The dominant colours will be communicated in auditory to the visually impaired people.

Proposed features, we first evaluate and find the complementary link relationships between different feature image channels including global image features of Radon Signature image (RadonSig) and statistics of wavelet sub bands (STA) method, and local features (SIFT) method.
SIFT also represents the local image structural features; STA is the global image statistical characteristics; and Radon Signature captures the properties of global directionality. Table1. And Fig 2 Displays the recognition results of different features as a function of training set size images. For individual feature channels, SIFT method and SWT method achieve comparable recognition accuracies. While the cloth results based on a single channel of Radon Signature image are worse than that of SIFT method or SWT, the performance of (SIFT + SWT) is better than that of SIFT+DWT. Both of them outperform any individual feature channel. Therefore, for clothing patterns recognition, the global image and local feature combination of SIFT and SWT is more effective than that of SIFT and DWT. Furthermore, the combination of all three feature channels further increase the recognition results colour and pattern dominates to in all of different training set sizes and resizes.

Table 1. represents various clothes and color as voice output represents in the current model.

IMAGE				
COLOUR	YELLOW BLUE	RED	BLUISH	GREEN BLUE

B. Pattern Detection

Multiple Features

In order to deal with the various interclass variations presented in the clothes pattern (plaid, stripped, pattern less, and irregular), global image features and local image structural features are concatenated.

Classification

Concatenated feature vector is given as input to SVMs (support vector machines) .The confidence margin is the measure of how close an instance is to the classification boundaries of cloth classifier. It represents the reliability and flexibility of prediction output based on a specific image feature. In the context of cloth classification, an instance close to the class boundary is less reliable than the one deep of the class territory in cloth images. The support vector machines are used as classifier to identification and the clothing patterns, color into four various categories (plain, plaid, stripe and pattern less) in our clothes pattern recognition system. SVMs find a maximum margin hyper plane in the image feature space.

Fig 3 represents to the various pattern identification result of pattern identification using SVMs classifier using various cloths, Fig 4 represents to future system model to cloth or product identification system for visually impaired people, inbuilt various sensors like camera voice enunciator and necessary embedded equipped with this system model

Figure 3. cloth pattern output result (plaid, stripped, pattern less, and irregular)

Table 2. cloth pattern output result compression between existing and proposed

Parameters	**Previous System,**	**This System**
Pre-processing	GREY conversion and GLCM	Radon transformation And GLCM
Color identification	SIFT,DWT	SIFT,SWT
Pattern identification	naive Bayes classifiers,	SVM
Features Used	9	18
% Accuracy	96.180	99.780

TEBLE 2 described compression result between the existing and proposed system result and efficiency proposed system more powerful comparing to the existing system where detect cloth pattern and colors.

Figure 4. future glass in build system implementation

VI. CONCLUSION

In this paper, we have proposed novel system to identification clothing different patterns and colors' to help visually impaired people with our outfit selection in their day today life. The developed prototype has significant detection and identification accuracy and is robust to cloth rotation, cloth illumination, cloth scaling and other such challenges that exist in this domain. Experimental results demonstrate that our proposed novel method is much simpler than many existing systems and significantly outperforms the state-of-the-art methods in various clothing pattern recognition. Furthermore, the performance evaluation on traditional texture several datasets validates the generalization of our method to valuable traditional texture based analysis and classification tasks. This research contributes to the study of various pattern analysis, and leads to modifications and over existing methods in handling complex to clothing patterns with large intra-class variations. Our research proves to be a small contribution towards the task of bringing the blind and the visually-impaired people into the mainstream by providing independence to them and thus uplifting their self-esteem in daily life.

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