Assistive Clothing Recognition Tool for Color Blind People

TK Harshini, TS Kannan, Hemlata Dakhore
Department of Computer Science and Engineering
Rashtrasant Tukdoji Maharaj Nagpur University, GHRIETW
Nagpur, India
tkharshini@gmail.com, hemlata.dakhore@raisoni.net

Abstract- Choosing clothes with different colors is a challenging task for color blind people. Automatic clothing color recognition is also a challenging research problem due to large intraclasscolor variations. We have developed an assistive system that assists color blind people in the recognition of colors along with other clothing features such as category of clothes, cost, material, size, length. The system consists of a microphone, computer, camera. The system can be controlled by speech input through microphone. The recognition is done by global and local feature recognition based on the command analysis received through speech input by the system. For the identification of items satisfying many local features multilevel clustering is used.

Key words- Assistive system, clothing color recognition, global andlocal feature identification, color blind people.

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I. INTRODUCTION

BASED on statistics from the World Health Organization(WHO), there are more than 161 million visually impaired people around the world, and 37 million of them are blind. Choosing clothes with suitable colorsis a challenging task for blind or color blind people. They manage this task with the help from family members, using plastic braille labels or different types of stitching pattern tags on the clothes, or by wearing clothes with a uniform color or without any patterns.

Automatically recognizing clothing patterns and colors may improve their life quality. Automatic camera-based clothing pattern recognition is a challenging task due to many clothing pattern andcolor designs as well as corresponding large intraclass variations. Existing texture analysis methods mainly focus on textures with large changes in viewpoint, orientation, and scaling, but with less intraclass pattern and intensity variations. We have observed that traditional texture analysis methods cannot achieve the same level of accuracy in the context of clothing pattern recognition.

Here, we introduce an assistive system to help color blind people to recognize different clothing colors along with other features. The system contains three major components: 1) sensors including a camera for capturing clothing images, a microphone for speech command input 2) data capture and analysis to perform clothing recognition and color identification by using a computer which can be a desktop or a wearable computer 3) display of resulting items on the screen of desktop or wearable computer.

The system preparation becomes important to process the voice input, this system preparation includes adding the data to the system. Data added to the system includes item samples that are to be entered to the system, through system camera. Also the updation of category names and subcategory names of clothes to the system based on its availability, the system preparation process is done by the shopkeeper. The system that is ready to process the voice input, on giving the voice input it captures the voice input and the input in acoustic sound waves are to be converted to the character string format that is suitable for semantic interpretation. The result of character string format obtained is then led for the global and local feature identification, global feature such as the gender and category, category such as pant, saree, dresses, shirt and so on while the local feature such as red pant then the red is the local feature of the global feature pant. This identification may require multilevel clustering as there can exist many local features such as color, cost, size, material, length, and so on. The final level of clustered items may yield the actual group of items that the user is searching for.

The proper display of the resulted items are required for easy user interpretation where the description of features, that are also given by the user, are displayed below each associated image of the item sample. Now the user can ask for one of the items displayed as final result to the shop keeper for billing.

II. REVIEW OF LITERATURE

Assistive systems are being developed for different kinds of visually impaired people to improve the life quality and safety of such people including indoor navigation and way finding,display reading, banknote recognition, rehabilitation, and many more. Xiaodong Yang [1] developed a system for blind people to select clothes based on cloth pattern and colors in a cloth shop independently. This is a camera based system that can handle clothes with complex pattern and recognize clothes into four categories(plaid, stripped, patternless, and irregular)and identify 11 colors: red, orange,yellow, green, cyan, blue, purple, pink, black, grey and white.

FAIZ .M. Hasanuzzaman proposed a system to automatically recognize banknote of any currency to assist visually impaired people in [2]. This is also a camera based computer vision technology. This system has features like high accuracy, robustness, high efficiency, ease of use. This system is robust to conditions like occlusion, rotation, scaling,cluttered background,illumination change, wrinkled bills, and also eliminating false recognition and can guide theusertoproperly and correctly focus at the bill to be recognized using speede up robust features(SURF).

DimitriosDakopoulos and Nikolous developed a vision substitution system for travel aid for blind in [3]. Out of the three main categories of navigation systems (Eectronic Travel Aids, Electronic Orientation systems, Position Locator Aids) here the focus is on Electronic Travel Aids. In all these three

systems the needs of blind people are considered but there is a need to also consider the need of an assistive system for the color blind people. The main area where a color blind person faces a problem other than the traffic signals is ina cloth shop for selecting clothes of desired colors without the help of a second person. The proposed assistive system here depicts the same.

III. INSERTING ITEM SAMPLES

The clothes in a cloth shop has to be entered in the system along with its attributes, for the system to be made usable in the final stage the database must be made available and all the items in the shop must be entered with the description of attributes for each item. The number of attributes can vary for each item depending on the clothing category. The system can vary its category according to the requirement and the availability of various categories. Also with the attributes the image of each item is kept in the database. The images of each item is captured through camera in the system.

A. Entry of category name

Different clothing shops may have different category of clothes, so the category of clothes may vary from shop to shop. The system should be able to update its list of categories. Category of clothes may include shirts, pants, sarees, dresses, different kids wear and so on. The preparation of the system should be the first step that includes addition of the category list.Below figure shows, the different elements required on the system's screen for the addition and updation of category list.

Fig.1. Snapshot of category updation.

In the above figure, the snapshot of the category updation screen is shown here it can be seen that the space given beside the lable category is for the entry of the name of the label that is to be updated. After the name of category is entered for the updation, the shop owner can either click over the "Submit" button to enable the addition of the category with the respective name ent0ered, click over the "Update" button to make any changes in the already existing category name, click over the "Delete" button to delete any particular category already present in the list or click over the "Close" button to close the updation process.

B. Entry of sub-category name

It may be that within a particular category there exists many different sub-categories, the number and name of them within each category may vary from shop to shop based on its availability. This makes it necessary to also update sub-category. The below figure shows the snapshot for the same.

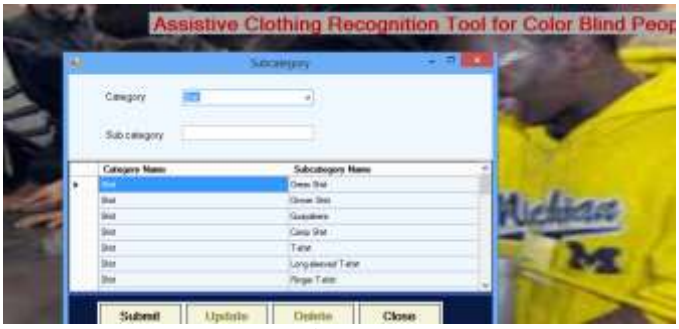

Fig.2. Snapshot of sub-category updation.

In the above figure, it can be seen that a space is provided besides the category lable and also beside the sub-category lable, in these spaces the user can enter the name of the category within which the sub-category has to be added and the name of the sub-category in the respective spaces. The "Submit" button will add the respective sub-category name within the category name entered, the "Update" button will make any changes to the already existing sub-category name with respect to the user entered one. The "Delete" button will simply delete the entered sub – category and the "Close" button will close the sub-category updation process.

C. Entry of item samples

When the category and sub-category names have been entered, the item samples of the products in the shop may be entered, the image of the product also has to be entered, the images of the item samples are entered by the system camera. First all the images of the products to be entered in the system has to be captured all at once and then it has to be associated with the entered product features as shown in the below figure.

Fig.3.Snapshot of product entry.

In the above figure it can be seen that spaces hasbeen provided for the entry of various product features. Also the need of features may vary from shop to shop based on the type of clothing marketed by the shop. After entering the features the

image for these features may be chosen from the location where the images are stored using the "Choose Image" button
The "Submit" button will add the image with the entered data to the system, the "Update" button is for making any changes to the system data ,the "Close" button will simply close the process.

IV. SPEECH INPUT RECOGNITION

The entry of category, sub-category, and the item samples, that is, after preparing the system, the system is now ready to take speech input, that is, the voice input given by the user. The system should be able to recognize and capture this voice input. The voice input are signals that are in the form of acoustic waves that are given to the system. These waves undergo conversion into character string.

V. CHARACTER STRING CONVERSION

The user interacts with the system via speech input, the speech recognition algorithm, before displaying, has to process the input to transform the speech input to a form in which further processing can be done. For this purpose the input has to be converted to character string format. Once the input is converted to character format the command obtained is analysed. According to the analysis the items from the database are selected to display as the final result.
The speech input in the form of acoustic signals captured are needed to be converted into a form suitable for further processing, that is into character string format. This conversion of input voice signals to character string format includes some specific steps.
The input voice captured undergoes linguistic processing in which noise in the input are eradicated. When the input is given to the system it is possible that along with the input some other unwanted sounds also entered the system unknowingly such as the sound of air blowing, shouting children from far distance and so on. The entry of such sounds cannot be avoided, so these sounds that enter the system along with the actual voice input, called as noise, has to be removed for proper and correct conversion of input voice to character string. This removal of noise also purifies the actual input and minimizes the effort of the system in further processing. An audio wave sequence feature vector is created to store the remaining sound wave. The sound waves are stored in different fragments. These fragments stored in the featured vector are then decoded to find out the more significant fragments based on various criteria such as intensity, the higher intensity one are to be taken into consideration.
The words are obtained after decoding, the semantic interpretation of these words are done to determine if they are meaningful or meaningless words. The further processing of words that come out to be meaningless to the systemare aborted while the words with some meaning in the knowledge of the system are further processed in response generation, where the word with some matching is considered and the resulting items are to be displayed on the display screen.

VI. CONCLUSION

Here, we are developing a system to recognize clothing features and colors in particular to help color blind people in their daily life to lead an independent and quality life, using global, local feature identification and multilevel clustering to increase the accuracy of the assistive system. Also the performance evaluation of the assistive can validate the resulting performance of the system.

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