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Implementation of Hand and Speech based Interaction with Mobile Phone

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***Abstract*—**With the ever increasing role of computers in society, Human Mobile Interaction (HMI) has become an increasingly important part of our daily lives.In the recent years new methods of Human Mobile Interaction are being developed. It uses various types of modes for interaction with machines through hand gesture, head, facial expressions, speech, and touch and there are still various current topic of research. Relying on one of them reduces the accuracy of the whole Human Mobile Interaction and is also limiting the options available to users. In proposed system, we uses the fusion of two types of modalities hand gesture and speech. For hand gesture recognition we use Artificial Neural Network (ANN) technique & for speech recognition we use Google search by voice and android SDK. The objective of this system is to use two of the important modes of interaction: hand and speech to control some mobile application.

Keywords- *HMI, ANN, SDK.*

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I. INTRODUCTION

The interaction of humans with their environment is naturally multimodal. We speak about, point at, and look at objects all at the same time. We also listen to the tone of person's voice and look at a person's face and arm movements to find clues about his feelings. To get a better idea about what is going on around us, we look, listen, touch, and smell. When ii comes to HMI, however, we usually use only one interface device at a time—typing, clicking the mouse button, speaking, or pointing with a magnetic wand. The "ease" with which this unimodal interaction allows us to convey our intent to the machine is far from satisfactory. An example of a situation when these limitations become evident is when we press the wrong key or when we have to navigate through a series of menus just to change an object's color. In today's society, one of the most popular electronic products is mobile phone. Using mobile phones is a top priority for anyone living in the world, from young to old. Therefore there is a need of combining gesture-based interaction technology and mobile phones.

The rapid growth in the number of Smartphone's is giving rise to new class of mobile applications, or apps. These Smartphone's, such as the iPhone, Motorola Droid or Nexus One, are different from traditional cell phones because they have multiple sensors such as phone orientation, accelerometer, GPS, camera, touch screen, etc. that are not found in personal computers and laptops. This gives Smartphone applications the ability to explore new possibilities in terms of functionality. Smartphone's also having more memory and a more powerful processor than traditional cell phones that allows them to run more computationally intensive applications.

Mobile phones are the most pervasive wearable computers currently available and have the capabilities to alter and manipulate our perceptions. They contain various sensors, such as accelerometers and microphones, as well as actuators in the form of vibro-tactile feedback. Visual feedback may be provided through mobile screens or video eye wear.

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II. PROPOSED WORK

Our proposed work will be worked out in three phases as follows:

Phase 1: In this phase first we initialize the web cam and touch on the screen from this it will get real time training data. On that data learning is done using neural networks with back-propagation algorithm. Then it will store the final value after learning. Then for testing image is capture by using web cam and after processing it will compare with training data. Finally we get the desired gesture.

Phase 2: After getting hand gesture next we move toward the speech recognition part. In this we are using Google Voice. That converts voice into text. After getting the text we have to convert it into number.

Phase 3: Next compare the gesture value with the speech value. If both value match with each other then perform action.

III. IMPLEMENTATION OF PROPOSED METHODOLOGY

The starting point in the hand gesture recognition is the creation of a database with all the hand gesture images that would be used for training and testing. The construction of such a database is clearly dependent on the application. Each gesture represents a gesture command mode. These commands are widely used in various application programs. Therefore, these gestures are allowed to be flexible and natural so that they can successfully be applied to a wide range of people and situations. The gestures images are real images with different sizes acquired using digital camera and taken from one subject. So here we are using online training of images so need to create database. It takes images on the real time basis each time different image.

A. Working Steps of Proposed System

Step 1:- On first touching the screen the system captures the touch points and creates 5*5 arrays of neurons. There are 25 neurons, each having different color training. Segmentation is done to isolate hand object from the background. Convert the RGB image into HSV for better performance as HSV identify the skin color more perfectly as compared to RGB. Calculate the height offset and width offset as a general feature. Then save this feature image as a training pattern.

Step 2:- In this the training pattern neurons learning using neural networks with back propagation algorithm is done by checking the entire image, and reducing the error to the portion only where the finger is present. The output is again converted to RGB for better speed.

Step 3:- In testing phase real time image is capture. Again segmentation is done to isolate hand object from the background. Contour detection is done as a geometric feature. Calculate height offset and width offset as a general feature. Compare this with the output of training phase.

Step 4:- If comparison done successfully then find out the area by using contours height and width parameter.

Step 5:- There are five conditions for getting final finger number.

(i) If area is less than 100 then finger number is 1.
(ii) If area is less than 200 then finger number is 2.
(iii) If area is less than 300 then finger number is 3.
(iv) If area is less than 400 then finger number is 4.
(v) If area is less than 500 then finger number is 5.

Step 6:- Store this value as a final finger number for later use. Here the hand gesture recognition part is over.

Step 7:- Next is the speech recognition. In this the speech is converted into text by using google voice and android sdk which is in build in Android Mobile phone. Then for processing this text is converted into number.

Step 8:- After getting the number compare this with final finger number which we get in hand recognition.

Step 9:- If both numbers are same then apply following case:-

a) If number is equal to 1 then perform "DIAL CONTACT" action.
b) If number is equal to 2 then perform "OPEN GALARY" action.
c) If number is equal to 3 then perform "MAXIMIZE BRIGHTNESS" action.
d) If number is equal to 4 then perform "ENABLE BLUETOOTH" action.
e) If number is equal to 5 then perform "DISABLE BLUETOOTH" action.

In this way the system work for hand and speech based interaction for android mobile phone for performing five actions.

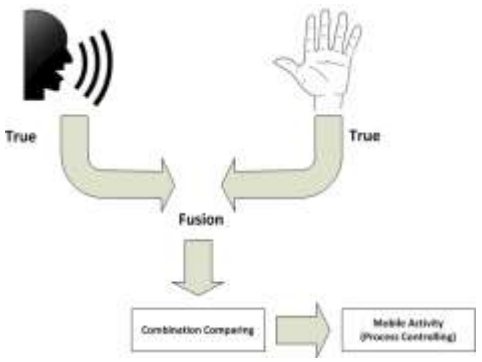

Figure1. Diagramatical Representation of System

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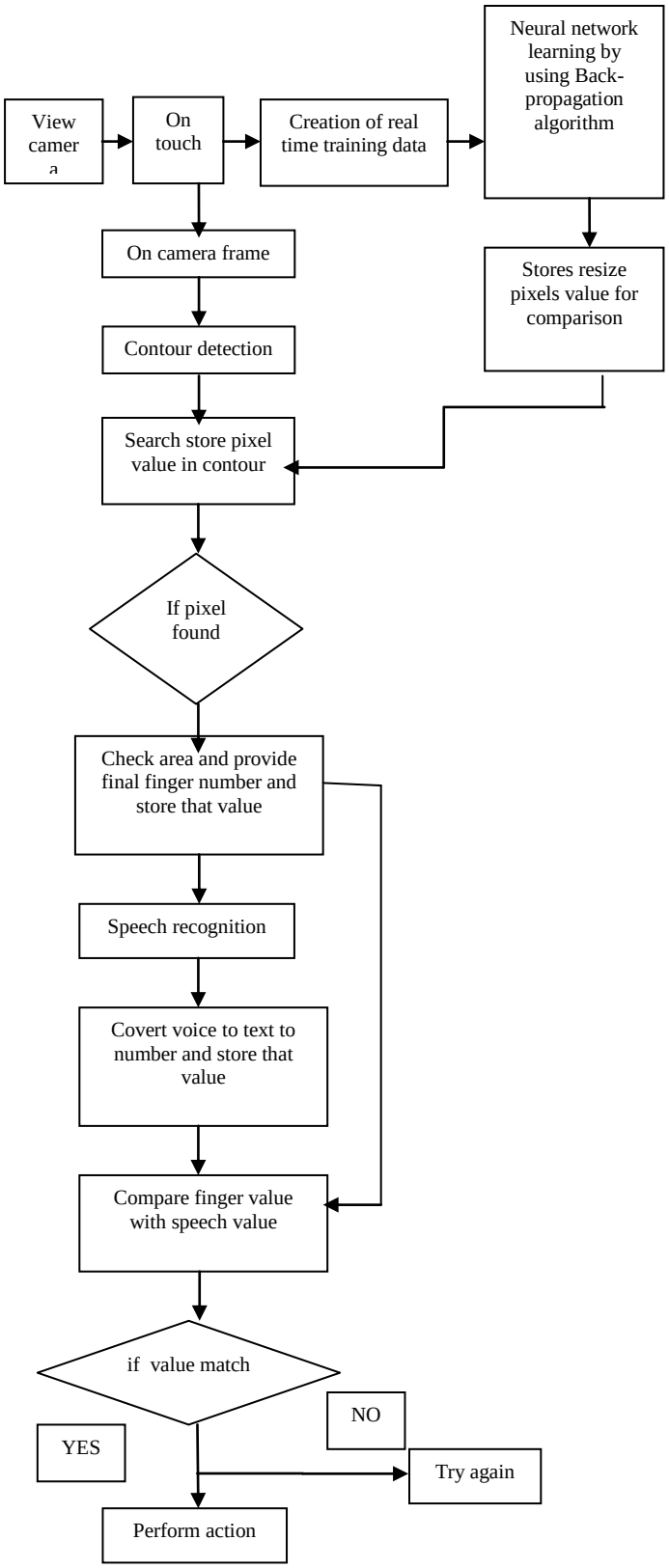
5148 - 5151

B. Flow Diagram



IV. RESULT ANALYSIS

A. Software Snapshots

1. Snapshots for performing first action.

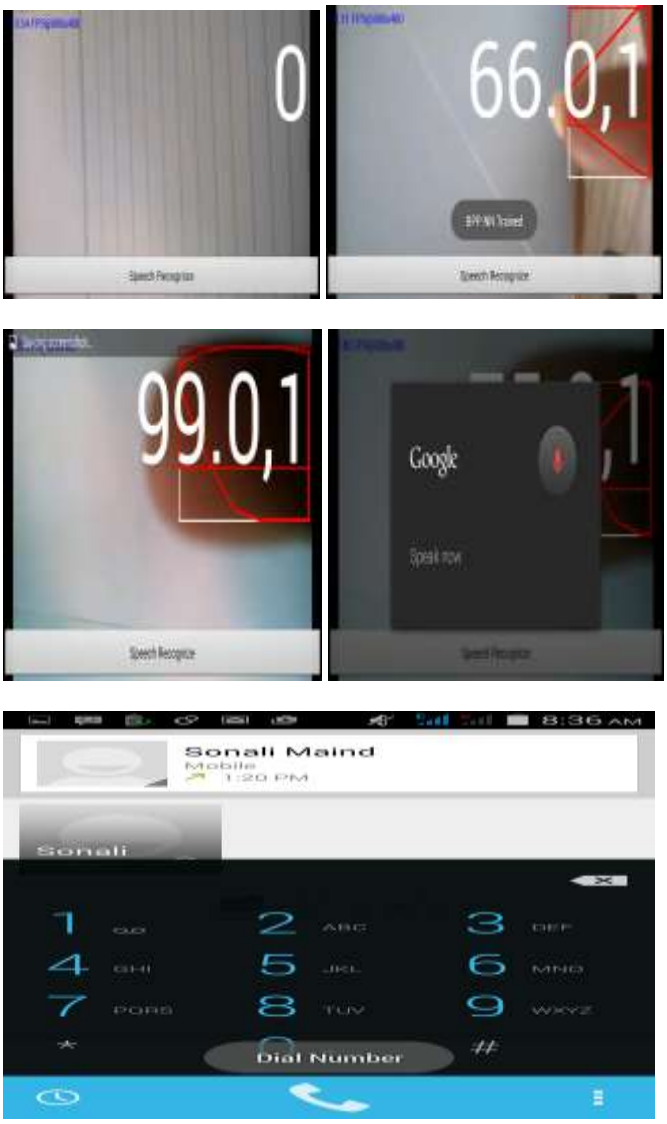


Figure 2. Snapshots for performing "Dial Number" action

2. Snapshots for performing second action.

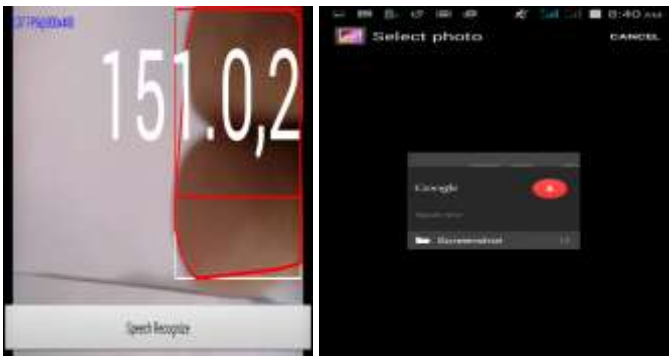


Figure 3. Snapshots for performing "Open Gallery" action.

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3. Snapshots for performing third action.

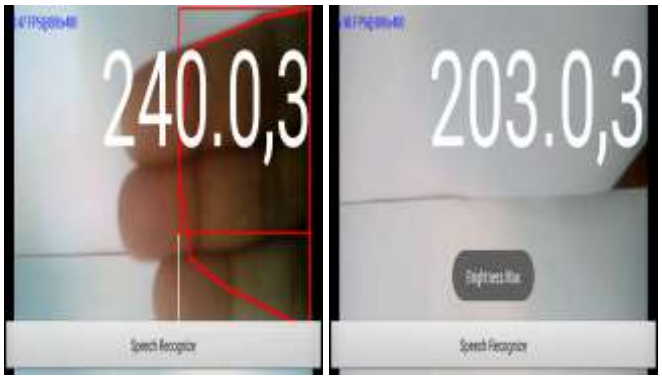

Figure 4. Snapshots for performing "Maximizing Brightness" action

4. Snapshots for performing fourth action.

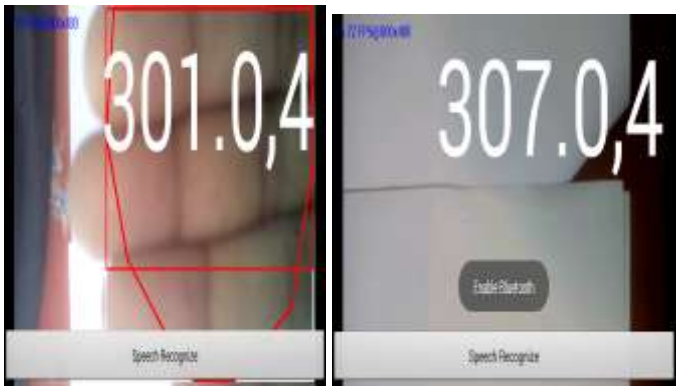

Figure 5. Snapshots for performing "Enable Bluetooth" action.

5. Snapshots for performing fourth action.

Figure 6. Snapshots for performing "Disable Bluetooth" action.

V. CONCLUSION

In gesture interpretation system Human-machine interaction is an important part of system design. Quality of system depends on how it is represented and used by users. To achieve the desired robustness of the Human-machine interaction, multimodality would perhaps be an essential element of such interaction. In today's society, one of the most popular electronic product in mobile phone. Using mobile phone is a top priority for anyone living in the world, from young to old. Therefore, we want to combine gesture-based interaction technology with mobile phones. Proposed system provides the multimodal interaction of two gesture hand and speech. Combination of these two is used for providing the better access to the applications of mobile phone.

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