Implementation of Desktop Control and Information Retrieval from the Internet Using Augmented Reality

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Abstract: *Augmented reality is the technology that brings life to digital world. The technology offers a way using which a user can directly interact with the digital environment. It increases the intuitiveness of any application that would seem unfriendly at first. This technology can be used or attached to certain existing applications to make them more realistic and intuitive. One such application would be interacting with the computer and accessing the information from the internet replacing the conventional mouse and keyboard.*

Keywords: augmented reality, image optimization, feed, RGB channeling and conversion.

1. Introduction

With every passing day technology is reaching every corner of the world. Computers have now become one of the basic needs of a human. The invention of computers dates back to early 19th century. It was a mechanical computer that was able to perform basic calculations. Since then a lot has changed in the working and design of the computers. The computers we use today were invented in the late 50's that worked on integrated circuits. Since the introduction of mouse in 80's there has been no major replacement to the traditional input devices i.e. mouse and keyboard. The Augmented reality can be a valuable technology which can be used to find an alternate yet an intuitive method to interact with the computer. This can further be extended for retrieving information from the internet. Replacing the conventional input devices creates the need of a new one. What better device than a human hand? Humans are born with hands. Even babies know how to use them. Hence we worked on developing a system which uses human hand to interact with the computer with augmented reality.

2. Literature Survey

The development of human interactions with computers is HCI. Day by day the HCI is becoming more and more intuitive. Augmented reality can be used to enhance the user interactions with the computer resulting in more attractive and intuitive HCI. The working principle of augmented reality is image processing. Augmented reality is the result of number of such image processing algorithms. Humans are very much comfortable in using their hand. It is the natural pointing device. Every human knows to use their hands regardless their age or knowledge. Hence to make the environment more friendly human hand can be used as a virtual object.

3. Related Work

Augmented reality has been in the game for quite some time. But it still has not reached all the users. In recent times it has gained a lot of attention. Various systems are being developed with augmented reality as their base. Popular among them are games, presentations, fields relating entertainment, etc.

Siegl et al. has worked on developing 3D cursors. The idea is that the user will just point his finger on a particular menu or icon and by processing its location the action is performed.

Ching-Hao Lai worked on a system that involved reducing road accidents caused due to distractions caused while working or operating something else while driving. Instead of manually doing work like interacting with gps or music player, his system used movements of hand to perform these tasks assuring that the driver is not distracted.

Rafael Radkowski has worked on a system for creating 3D models using augmented reality. His system allows user to track, monitor and manipulate movements and gestures taking input from the user.

4. Methodology

Camera Interface → Frame Grabbing → Channel Separation → RGB To LAB Color Model Conversion → Image Registration → Background Image → Image Subtraction → Normalization (0 to 255 Range) → Thresholding → Block Wise Histogram ← Customizable Button Profile → Button Detection → Post Processing

1. Camera Interface:

Camera interfacing is the start of the application. The digital camera captures live feeds from the user. One image will be set as a base image.

2. Frame Grabbing:

The images captured by the camera are stored in the system. There is no necessity of a large database as the base image will keep on changing and there is no need to store a large number of images.

3. Channel Separation:

Channel separation is the process of separating the three constituents of a base image. Channel Separation separates the RGB channels of any given image where R stands for the value of Red color in the image, G for value of Green in the image and B for the value of blue in the image. The basic image is of 24 bits. The RGB conversion divides the image into three, each of 8 bits.

4. RGB to LAB Conversion:

The LAB color space is again simplification of the 8 bit images. Here L stands for lightness and a and b for color opponent dimensions. It gives a precise value of the intensity of the image. This precise value enables ease of further processing. Also the LAB model is device independent and it includes all perceivable colors meaning that its gamut exceeds that of RGB.

5. Image registration:

The image registration set the current frame as the base image. The base image acts as a starting point to the application. The movements or the changes in this base image are followed.

6. Image Subtraction:

The base image is already set. There is a need to monitor the movement of the hand hence the frames are subtracted from the base image to get the present location of the hand.

7. Thresholding:

Thresholding is a method of segmenting an image. The gray scale image obtained from normalization is used as input to thresholding algorithm. Thresholding coverts the grey scale image to binary image i.e. black and white image with only two values.

8. Block Wise Histogram:

The histogram is the graphical representation of the values of the pixels of the image obtained after thresholding. The histogram displays the intensity distribution of the images enabling finding the changes in intensities.
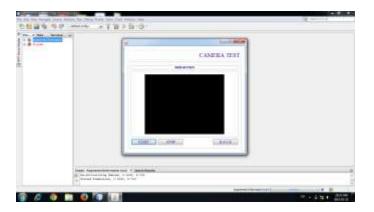
9. Button Detection:

The histogram will give the precise location of the objet in this case the human hand. The position of the hand is checked. If it is over any of the buttons then particular action will be performed.
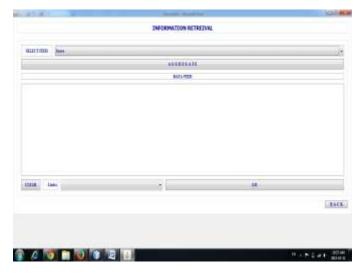
6. Result and analysis

As above 2 project screen shots depict the little operations and analysis of the project, however moving towards the illustration of the detail, in the first picture the operator tries to connect and wishes to use the system. Few features are supported being utilized by the user as start Feed, Update base Image. And you can clearly see the augmented Feed and the subtracted feed.

In the above screen you can see the information retrieval related snippets and in below format the Menu panel is being displayed.

Discussion:

Augmented Reality is the future of human computer interaction. Our application is an attempt to utilize the power of augmented reality to bring life to interactions and bring the concept into very basic things that we do on our computer. This application allows user to interact with the computer by using his hands only. The user can also access the internet and retrieve feeds by just using his hands. It provides flexibility to the user.

Summary:

The application is a perfect way to get augmented reality into lives of end users. It allows them to experience augmented reality on their personal computers. Adding to that it provides an easy way of interaction with the computer. Humans find it very easy to use their hand. They find it more comfortable and reliable than keyboard or mouse to interact with the computer. This application uses this concept and merges it with augmented reality to change the way a person interacts with a machine.

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