A Novel Approach in Designing Pantomime Pointer

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ABSTRACT

Our application is a platform to aid the people with severe disability. We have developed a system which uses a camera and tracks a feature on person’s face or hand or any part of their body which they can access easily. For example, the tip of the finger can also be selected and it can be tracked and papered on the screen as the reflection of the mouse pointer. Hence, the end user can get the access to the mouse pointer without using the mouse.

The tracking algorithm works well. This algorithm tracks a person’s finger tip for many minutes without the intervention or any adjustments. There is no certain setup for the lighting conditions of the application at our implementation area. We just used standard fluorescent bulbs. Occasionally, the selected sub image creeps along the user’s finger, for example up and down the finger moves, accordingly the mouse pointer moves in the monitor screen. Virtually Gestured Cursor provides a facility to the disabled people to access the computer easily.

Keywords: Dwell time, Feature, Gesture, lightening conditions, Sub image, Template, Tracking algorithm.

1.INTRODUCTION

Virtually Gestured Cursor is an application implemented under the Image Processing domain. Image Processing has a variety of co-domains like, Image Extraction, Image Analysis, Steganography, Pattern Matching etc. In our paper design, we have used almost all the co-domains of the Image Processing Domain.

The base for any application in the Image Processing Domain is to gather all the inputs and perform Image Analysis. Image Analysis is the extraction of the semantic information from the images; especially from the digital images by means of the digitalized techniques. Image Analysis tasks are so simple as reading bar coded tags.
After analyzing an image, the image has to be extracted to get the required output. Image extraction is sometimes called as feature extraction. Feature extraction begins with the initial set of measured data and builds derived values which are non-redundant and informative. Feature extraction facilitates subsequent learning and generalization steps, and mostly in some cases human interpretation plays an important role. Feature extraction is an dimensionality reduction process, where an initial set of raw variables are reduce to manageable features for processing with accuracy.

Fig.1.1 Block Diagram of Image Processing

Pattern Matching is considered as a task of verifying a given sequence of tokens for the presence of constituents of some pattern. The main advantage of pattern matching is its accuracy that is, “either it will or it will not.” The patterns are represented with two types: Trees or Sequences. The Sequence patterns are described using regular expressions and Trees are used in some special programming languages as a general tool to execute the data based on its structure.

2. IMPLEMENTATION

Changing the zoom of the camera, however, causes the vision algorithm to track the desired feature with either less or more detail.
If the camera is zoomed in on a feature, the feature will encompass a greater proportion of the screen and thus small movements by the user will display larger movements of the cursor. Conversely, if the camera is zoomed out, the feature will encompass a smaller proportion of the screen and thus larger movements will be required to move the cursor.

The correlation coefficient of the best match then drops, the standard deviation of the best match increases (see middle graph), and several insufficient matches are found (see bottom graph). To find good parameter values for window and template sizes that balance the trade-off between the number of frames examined per second and the sizes of the areas searched and matched, the time it takes to search for the best correlation coefficient is measured as a function of window and template widths.

A template size of 15x15 pixels is large enough to capture a meaningful body feature and small enough so that a 40x40-pixel window can be searched at a frame rate of 30 Hz.

![Average Frame Rate (frames/s)](image)

Fig:2.1: Search window Frame
3. MODULES

There are two modules in our paper. They are Pre-processing and Tracking respectively.

- **Pre-processing:**
  - Pre-processing is a mechanism where several tasks are performed by the user and some tasks are performed by the application.
  - The pre-processing phase begins with the opening of the application. This phase is called opening of an application.
Once, the application is opened, the entire setup will get ready.

Then, run the setup, there you will find a window for camera is opened and also you will find that the camera is started capturing the local visuals.

Later you get ready with the targets attached on both your fingers.

Place the targets in front of the web camera, then it starts capturing the target and crop that part and searches for the match of the pattern.

This is the end of the pre-processing phase, where the pre-requirements for the application to work are gathered.

**Tracking:**

- Tracking is a phase where all the core components of the paper will be seen. Hence, we can call this phase as Core phase.
- All the gathered requirements are assembled here in this phase.
- The distance between the attached targets will be calculated and will be displaced with the movement of the cursor.
- The mid-point is denoted with the red dot which ensures the position of the cursor.
- When we pinch off the two targets, our application will issue double click functionality. This feature can be functioned by the web camera’s capture of the two assigned targets to combine at a particular position.
- When we move the targets while they are pinched off, our application will issue dragging functionality.
- To achieve these, our application matches the pattern of the target movements with the coordinates of the cursor on the screen.
- The process of matching the slightest movements of the target with the coordinates of the cursor is called as Pattern Matching.
- Finally, tracing the cursor will be done by our application.

### 4. TESTING

The various activities performed as part of the Testing of Virtually Gestured Cursor’ application.

**In Scope:**

Functional Testing for the following modules is done successfully:

- Front-end
Core functionalities

- Out of Scope:
  Out of Scope testing deals with the performance of the application. Our application is also tested for performance issues and our application is up to the mark.

- Items not tested:
  Our application is tested only in Windows. It has to be further tested across various platforms like Linux, Ubuntu, MAC and Android etc.

5. CONCLUSION

The involvements with the Virtually Gestured Cursor system are very inspiring. They show that the Virtually Gestured Cursor can effectively deliver computer access for people with severe disabilities. It is a user-friendly communication device that is exclusively suitable for children. The application tracks many body structures and does not have any user-borne fixtures, so it is easily adjustable to aid the special requirements of people with several disabilities.

To meet the contemporary demand, additional Virtually Gestured Cursor systems are being installed. A single-computer version of the system is being developed. Future work will incorporate a detection component into the visual tracking algorithm.

6. REFERENCES