Ambient Displays of User Mood

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Main Features:

- **Training** – The ambient display is equipped with a training portion which is run prior to the display determining user mood. This process shows the user all the pictures he will see, and the user responds by pressing the appropriate key for that mood. This information is stored in the mysql database.
- **Motion Gathering** – *Motion* is the basis for obtaining the information relating to movement. The threshold for determining movement is set to 1000, and total amounts of movement over that limit are added up over the five minute period. At the end of five minutes, the total movement value is entered into the database.
- **Keyboard and Mouse Gathering** – This information is gathered from the /proc/interrupts file on the user's computer. The app uses an expect script to remotely log in to the user's computer and gather the necessary data. Like the Motion Gathering, the change in each of these values over a 5 minute period is put into the database.
- **Learning Component** – This part looks at the most recent data entered into the database by the 3 sensors. It translates a raw data value into relative value on the scale from 0 to 5. Each sensor has different cutoff values for each scaled value. Data gathered prior to this 5 minute period is sent to c4.5 to generate rules. The current data is then ran through c4.5 as the test data. Whatever mood c4.5 thinks this test data corresponds to, is the type of picture that will be shown to the user. A picture with that mood is chosen at random from all the pictures with that mood.
- **Viewing Component** – A modified version of QIV is used to display the picture determined by the Learning Component to the user. If the user thinks this picture is not reflective of the current mood, he pushes the red button which will cause the Viewing Component to select a picture of the other mood type, and update the database to reflect the change.

Pictures
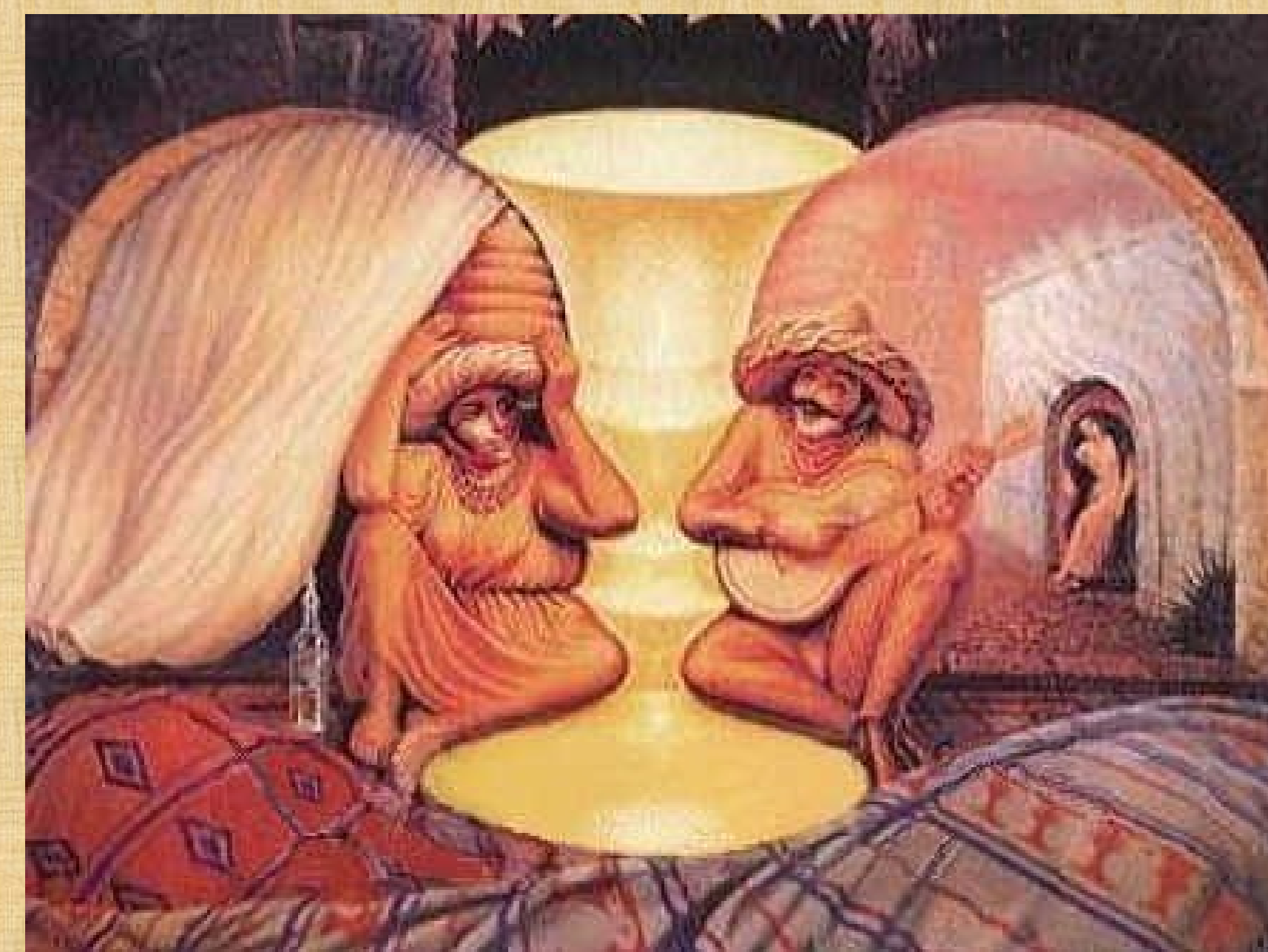
This picture represents confused. For me, when I am confused, the best thing I can do is to get my mind off whatever I am thinking about. So for my confused state, I used a bunch of pictures with optical illusions.

This picture represents happy. For me, when I am happy, I like to be outside. So for pictures that represent me in the happy state, I chose pictures that are of nature.

Abstract:

Determining a user's mood can be a very intrusive process. Wires attached to a person can cause that person to act or feel differently. Using an ambient display as the only method of feedback, the users mood is determined by analyzing movements in the area around the user and computer usage statistics. This information is obtained by the user just acting normal. The information is gathered, and then, through a decision tree, the current user's mood is determined based on current information.

General Description:

The ambient display is actually a PC equipped with a video camera, and network card running linux. The movements in the user's area are gathered by the video camera and processed by the program *Motion*. The ambient display is connected to the user's computer and gathers data relating to the total amount of mouse and keyboard movements. These three sensors are given a ranking from 0-5. 0 meaning no activity for the sensor, and 5 meaning the sensor was very active. The statistics are gathered every 5 minutes. At that time, the data is fed through c4.5 to determine the user's current mood. A picture is displayed that matches the calculated mood. If the user feels the picture does not correctly represent his/her mood, the red button is pressed which will present the user with another picture. Through this correction process, the ambient display will hopefully learn to correctly predict the user's current mood.

Results:

The results show that the ambient display is somewhat accurate in determining a user's mood based on the 3 sensors of Motion, Keyboard Activity, and Mouse Activity. It was 69% accurate for the bas case. It was 96.25% accurate in predicting confused, and 58.3% accurate in predicting Happy. This shows that there is a potential to determine a user's mood using a non-invasive approach. Future research should collect more data. Data from more sensors, and data collected and analyzed more often during the 5 minute period are possible improvements that will make the ambient display more accurate.

Goal:

The major goal of this project is to show that there exists a potential to determine a user's mood through non-invasive techniques. For this project, two moods were selected – Confused and Happy. If there is some indication that these two moods can be separated, it should be possible to determine more than 2 moods.

High-Level Design: