Disconnection and Transparency: Interactive Media Art Using Motion Detection

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Abstract: This paper presents an interactive artwork that describes the suffering of human life caused by disconnection from other people. The audience will perform as a disconnected person via a motion detection algorithm using a webcam. The proposed artwork attempts to cause the renewal of connection in the real world and to remind the audience of the value of bonding. The audience's interactive actions are depicted as the struggles of an abandoned person.

Keywords: Interactive Media Art, Disconnection, Motion Detection, Invisible Object

1. Introduction

Information is the most important thing needed to live. As the result of accumulated science information, new technologies have brought people comfortable lives. In addition, the internet makes it possible to connect all over the world. For these reasons, the extent of the relationships between people has expanded during this generation. However, people feel a sense of alienation because they spend more time with media and social networking services (SNS) rather than their families or neighborhoods. As the result, they are isolated from real communication, but they keep trying to find their identities the Internet.

Art has been used as one of the ways to express the issues of the times and communicate with people. Previous artworks had only expressed this through drawing or painting. According to the development of digital imaging technology, a new type of art that combines with media has been generated. Media art provides an effect of realistic expressions that interact with participants [1].

This paper presents a work of interactive media art to express the disconnected issue to the audience directly. The audience is represented as an invisible person who is surrounded by apathetic people in the city. The invisible person is not noticed by the people in the video yet exists in the same space.

To reflect the audiences in the artwork, information about the audience's actions is essential. Therefore, a motion detection algorithm is widely used as a powerful tool to create interactive media art. Authors can let audiences engage with the artwork by including them in [2].

The proposed artwork is performed using some image techniques. The audience movements are detected and transformed to the invisible person and then combined with output videos and shown on the screen. From this artwork, the audience can recognize the important of face-to-face communication in the real world and have a moment to consider how strongly SNS influence our lives.

2. Concept of Performance
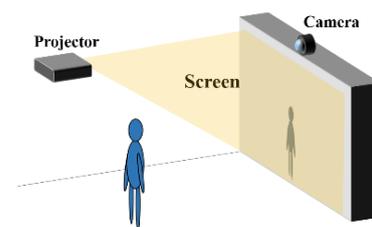
Fig. 1. The concept of proposed interactive media art: the appearance of audience is presented on the screen after transformed to invisible man.

The proposed artwork is performed using concept shown in Fig. 1. A webcam is installed on the top of the screen that stands in front of an audience. A projector is also installed far from the screen, at a distance of 1.5m. When the audience stands in front of the screen, the computer combines the audience's movement with the video, which has a background of the city view that is displayed on the screen using the projector. The audience on the displayed video is transformed into the invisible man. To implement this artwork, an OpenCV library is used that is written in C language.
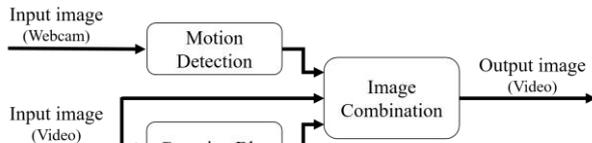
3. Creation Process and Fabrication Technology

Fig. 2. The block diagram of the proposed media artwork.

To perform the proposed artwork, all procedures are performed in real-time. As shown in Fig. 2, the proposed artwork has two input videos. A captured image is obtained from the webcam that includes the audience, and the other one is the output video of the city view. The movements of the audience are acquired using motion detection and combined with the output video using the Gaussian blur.

For object detection with image sequence, Mashak's method is modified to detect audience movement. Mashak et al. found intervals of intensity for each of the R, G, and B channels through pre-experiments that can detect motion in the various environments [5].

Since this artwork is using a fixed-camera angle, the background scene of the input video is also fixed. With this advantageous condition, moving objects are easily detected using Mashak's intensity intervals. Therefore, the performance of this motion detection algorithm is suitable for application to interactive artwork that must be operated in real time.

Fig. 3. The result of motion detection with the modified method by Mashak [5] : (a) an input video frame including a moving object, and (b) the detection result.

The proposed artwork detects motion using images transformed to gray-level, and a certain intensity interval is used for movement estimate. In addition, the amount of the intensity interval represents the sensitivity of detection. Figure 3(b) shows the result of the motion detection from an input image sequence including a moving object in Fig. 3(a). The result shows the dense edges of the detected object.

For implementation of the transparency effect in the output video, the result of the detected object image is used as a combination map. The output video is convolved with the Gaussian blur kernel only at the detected area as shown in Fig. 3(b). The Gaussian blur is normally used for noise reduction. According to similar principle, the proposed artwork uses Gaussian blurring to generate the smooth, transparent effect. As a result, the motion-detected area has

a different degree of blur, and the audience can notice the transparent, moving object as the movements are accrued.
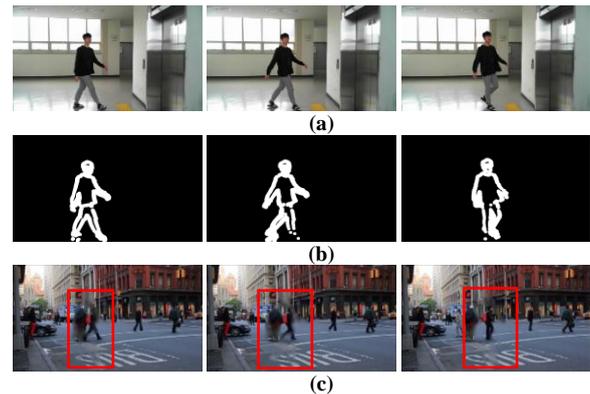

Fig. 4. The proposed media art: (a) the input image sequence including the audience, (b) the movement detected images, and (c) the final image sequence with invisible effect.

Figure 4 shows the performance of the proposed interactive media artwork. The captured scenes include the participator via webcam, and the detected movements are shown in Fig. 4(a) and 4(b), respectively. The region of detection is represented with an invisible effect on each frame of the output video. The participator's detected movements are naturally combined as shown in the region of red boxes in Fig. 4(c). The whole algorithm performs in real time. Since the proposed algorithm requires two frame images, the speed of this process is around 15 FPS.

4. Conclusion

This paper presents a work of artwork that focuses on interaction with the audience. The proposed artwork is incomplete until a participator's movements are expressed as an invisible man in the output video. As a result, this artwork attempts to convey two meanings. The first is to have the participant notice the problem of disconnection in the offline world. The participator can feel the neglect and loneliness caused by the people in the video who are indifferent in the real world but vice versa of the issues with the internet experienced in this generation. The second is the desire to have one's identity in this world. The people of this generation are overwhelmed by competition in which they get behind. The proposed artwork is designed so that the participant is only shown when he or she is moving. The participant's image becomes invisible, and disappears if there is no movement. He or she must keep moving to exist and survive.

References

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Biography

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