AR Whiteboard: Handling Written Contents as Digital Information Using Tools for Whiteboards

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ABSTRACT

The purpose of this study is to improve operations on whiteboard environments. To do this, we focus attention on digital copy and paste functions on a whiteboard. Using these functions, the contents and drawing data on a whiteboard can be moved, reproduced, and reused easily. The features of our proposed enhanced whiteboard system include a projective AR (Augmented Reality) and a high affinity for the working styles on a whiteboard with magnets, erasers and pointing sticks.

Index Terms: H.5.1 [Information Interfaces and presentation]: Multimedia Infor mation Systems—Artificial, augmented and virtual realities, Evaluation/methodlogy; H.5.2 [Information Interfaces and presentation]: User Interfaces—Screen design, Input devices and strategies

1 INTRODUCTION

Recently the use of electronic whiteboards has spread in school and office. However, their user interface is mostly based on computers, so working styles with them are based on computers rather than blackboards.

In related studies[1][2], the functions of computers are enhanced so that they can be applied to working environments with whiteboards. In such cases, users might feel they use computers while using these whiteboards. On the other hand, we have developed an enhanced whiteboard system which has a user interface based on existing operations on whiteboards. The concept of this system is that it enables users to carry out enhanced operations which are founded on the operations on whiteboards, not on computers.
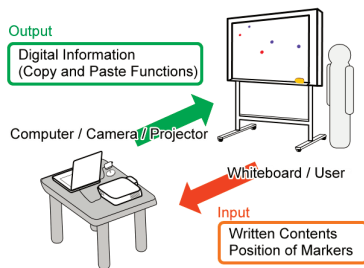

Figure 1: System concept

2 IMPLEMENTED SYSTEM

The implemented system is illustrated in Fig. 1. The system is based on projective AR technology: the surface of a whiteboard

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is captured by a camera, and then digital information on a whiteboard is projected by a projector. Our AR whiteboard system has copy and paste functions for written contents and drawing data on a whiteboard.
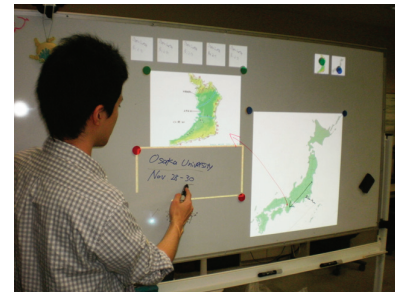

Figure 2: Copy and paste for written contents on a whiteboard

Users can use these functions with magnets. The magnets play a role of markers. Their positions define rectangle regions to be copied and pasted. Other tools like erasers and pointing sticks are used in this system too. They are detected by their colors or shapes.

3 FUNCTION

The main function of this system is to copy and paste written contents on a whiteboard. When users put two magnets on a whiteboard, they get an image of a rectangle region formed by two magnets. Then the image is stored on a whiteboard as a thumbnail. Users use three magnets when they paste. To set a paste position, users put two magnets on a whiteboard. By putting them, users define the size and position of a pasted image. Next, users put a magnet on a thumbnail. The magnet serves to select a thumbnail which users want to paste. The selected thumbnail appears on a rectangle region formed by two magnets. In addition to reusing written contents, users can also utilize images which they prepared beforehand. By employing these copy and paste functions, users can save written contents on a whiteboard, and then they can reuse and reproduce the contents on a whiteboard. When thumbnails increase, you may think you want to erase them. This system has a function of data deletion. By erasing thumbnails with an eraser, users can clear the image data of unnecessary thumbnails.

Furthermore, when rooms are large and there are many people, some people may think it is difficult to see what is written on a blackboard or a whiteboard. The pointing sticks have a function of expanding an area which lecturers point at.

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