InkAnnotation: An annotation tool for e-learning environments

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Abstract - e-Learning environments are applications that use the Web infra-structure to support teaching and learning activities; they are designed to have good usability using a desktop computer with keyboard, mouse and high resolution medium-size display. Devices equipped with pen and touch sensitive screen have enough computational power to render Web pages and allow users to navigate through the e-learning environments. But, pen-based or touch sensitive devices have a different input style; decreasing the usability of e-learning environments due the interaction modality change. To work on mobile contexts, e-learning environments' interface must be improved to consider the interaction through pen and touch and to get the benefits of these modalities. In this paper, we present the InkAnnotation, a tool for review documents, pictures and sketches by handwrite comments using a pen-based tablet or computer.

Keywords: Human-Computer Interaction; Electronic Learning Environment; Mobile Devices; Interaction Styles.

1 Introduction

Mobile devices, such as smartphones and tablets, are becoming increasingly popular; most of them have touch screen displays, Internet access and enough computing power to process Web pages and turn possible mobile users access e-learning environments. But, it is important to consider that these environments are developed to be accessed by desktop computers equipped with keyboard, mouse and a medium size display.

So, we believe that e-learning environments need to be improved to be easier to use in mobile devices and other contexts, e.g., areas which need sketches or drawing such Mathematics. In our previous work, we developed the InkBlog tool to easily write handwrite or sketched posts in pen-based devices by adding features to manipulate electronic ink into a blog tool from Ae, an e-Learning environment. In this paper, we present a tool to allow mobile users use pen to review a document inside the e-learning environment, the InkAnnotation tool.

This paper is being submitted as a poster. Section 2 presents a literature review about electronic ink technology and e-Learning environments. Section 3 presents the InkAnnotation, describing how the technologies are employed to allow users handwriting reviews and comments using pen-based devices over a document. The Section 4 presents the final considerations and future work.

2 E-Learning Environments and Interaction Styles

e-Learning environments, such as Moodle, SAKAI, Ae [1], are applications that use the Web infra-structure to support teaching and learning activities. The e-Learning environments are designed to support a variety of users and learning contexts, but they are designed to conventional computers, usually equipped with keyboard and mouse as input and a medium screen and speakers as output; a limited set of interaction styles for nowadays devices. These modalities, and the technology that support them, shape the teaching and learning activities done in the e-Learning environments; they focus on reading and writing skills. In your previous work we described when a user interface designed for a set of interaction styles is accessed by a different set of interaction styles the users face interaction problems [2]. Another problem is not possible to take advantage of the interaction style features; for example, in a desktop computer, users use the keyboard to typing the post text. In a pen-based computer without handwrite recognition, users need to type each letter pressing the pen in the respective key in a virtual keyboard. This way of writing texts takes a lot of time, make boring the writing task and do not take the mainly pen purpose: handwriting and do sketches easily.

HyperText Markup Language (HTML) is used for any web application to describe the page interface and its content. The HTML have some improvement defined in the last version, the HTML5, related with support multimedia, keep it easily readable by humans and consistently understood by computers and devices [3]. HTML5 adds the new <video>, <audio> and <canvas> tag elements, as well as the integration of Scalable Vector Graphics (SVG, a vector image format for two-dimensional graphics based on eXtended Markup Language - XML). These features are designed to easily include and handle multimedia and graphical content on the web without having proprietary plugins and Application Programming Interface (APIs) installed. Another evolution in HTML is standardizing how the browser must handle events from touch
and pointer inputs [4]. Having different event types for input data generated by each modality gives flexibility for the developers define the actions to be trigger for each modality.

In pen-based devices when the user moves the pen in the screen, the pen trace should result in electronic ink that must be treated by the application to be rendered and stored. But, desktop applications, that running in the Tablet PCs, do not treat electronic ink, so it is necessary to incorporate special applications to treat the electronic ink to have benefices of the pen interaction style. Desktop applications that do not manipulate the electronic ink loose the Tablet PC potential because the pen is used just as a pointer device. This is valid for web applications.

3 The InkAnnotation Tool

Based on your experience in develop the InkBlog and analyzing open-purposed application to do handwrite annotations [5] we specified and develop the InkAnnotation for the Ae e-learning environment [1]. InkAnnotation is a tool for review documents, pictures and sketches by handwrite comments using a pen-based tablet or computer. The first use is trigger the tool as another environment tool, in this case, the InkAnnotation will be similar as a whiteboard, here the user can handwrite or sketch in a blank space.

Another use is trigger the InkAnnotation inside another e-learning tool, e.g., the Portfolio tool. Portfolio is a space where each user can typewrite an item or do files upload, e.g., PDF files, Word files, and pictures. When the user wants to handwrite a Portfolio item to review it, the user trigger the option “Do Annotation with Ink”, and a new window will be open with the document in the background. This document will be draw in a canvas tag, allowing user to handwrite or do sketch over it (Figure 1).

To treat the data generated by a pen, we reused the InkBlog’s components: InkRenderer and InkController. When the user touches the interface within the pen and draws a trace, the InkController will listen to the user actions, getting the dots that compose the trace. Each dot is recorded and a line connecting the preceding point to the new point is drawn until the user releases the pen. After the pen is released, the InkController will generate the InkML’s trace node for the new trace. The user can draw as many traces she wants, all them will be stored and will compose the InkML data. When finished handwriting the review, the user will click in the Confirm button and the generated InkML data will be sent to the server to be stored. Since we used HTML5, any browser that support it can render the electronic Ink draw by the InkRenderer.

4 Final Considerations

This paper presents an annotation tool for e-learning environments that allow mobile users to review documents, pictures and sketches doing handwrite annotations with a pen. The user can trigger the tool as a whiteboard tool or can trigger the tool to review a file, doing handwrite or some sketch. For future works, we will finish to implement the InkAnnotation and integrating it with another e-Learning environment tools, such as, support material and lectures.

5 References


