USING TABLET COMPUTERS FOR PRESENTATION OF SLIDES IN THE PROCESS OF TEACHING

Matej Juríkovič, Peter Pištek, Katarína Jelemenská, Ondrej Bereš, Martin Fülöp, Viktor Dúcky, Peter Piš, Michal Tanko

Faculty of Informatics and Information Technologies, Slovak University of Technologies in Bratislava, Slovak Republic
jurikovic@fiit.stuba.sk

Abstract

During the teaching process teachers often use presentation of prepared slides. The most common is the projecting of slides with data projector. Several fields of study require a presentation of examples and illustrations as well as to adjust the presentation based on audience reactions. This type of presentation needs the support of additional handwriting notes in various parts of the presentation. Nowadays Tablet PCs are often used for presentations, since they can combine the advantages of traditional presentation along with the above mentioned needs. The contribution of this work is the development of software that enables easy and quick creation of presentations using Tablet PCs. In addition, it allows interactive editing of slides during the presentation. This software is developed for Windows 7, taking the advantage of the benefits this operating system offers. One of the major benefits is the capability of learning various handwritten styles and their conversion into a digital form.

Key words: Tablet PC, Presentation, Digital Ink, Layers.

1 INTRODUCTION

Nowadays, the technology of Tablet PC is more and more spreading. It becomes popular thanks to its control flexibility through touch screen. Present models support control by a stylus and even by a finger of a user. In the past, Tablet PC control was possible by single touch technology. This means that a user could touch a screen only in one spot. Of course, nowadays multi touch technology is quite spread. Tablet PC find its application in various areas (from a process management through a teaching process to fun and many others). We have good experiences of Tablet PC integration to a teaching process. Our previous approaches [11] and [12] were mainly focused on testing students by Tablet PC.

There are many methods used in teaching process. The most wide-spread solution is conventional connection between a computer and a projector. A lecturer will start his presentation, which was prepared previously. It is impossible to add a new own note to a slide because this technology does not support addition of handwriting text. The next approach is e.g. an interactive board, which supports addition of handwriting text but only within the area of table. This means that text which is written on a table does not have any connection with slide or figure which is projected on it.

If a projector is connected to a Tablet PC then it becomes a useful tool for improving teaching process. This is why we see a good opportunity to improve teaching not only in our faculty but also in similar branches because it combines advantage of classical connection between computer and projector and the advantage of handwriting on interactive table.

Creation of presentation is the next area which we were interested in. In nowadays, there are large amount of software for creation of presentation but most of them do not support using of Tablet PC. The phrase “do not support” should be understood as those systems are not optimized for Tablet PC. Control these systems via touch screen is not comfortable and in some cases even not possible. Tiny sizes of individual parts of program system such as icons, menu items and various buttons cannot be precisely hit and this makes system control ineffective.

For these mentioned reasons, we decide to develop program system TabletPC Presenter for creation of presentation. It combines advantages of classical computer presentation with advantage of handwriting. This is inspired from interactive board and simultaneously it makes control easier thanks to touch screen by finger or stylus. The whole system was implemented and tested on Tablet PCs [13] and it will be used in courses in computer engineering.
Our system not only allows the creation of presentations, but also its subsequent launch in presentation mode. Our software can be used in the learning process to facilitate the work of teaching. We expect it to facilitate the work of both teachers and students to help in understanding the curriculum.

1.1 Related Work

As we mentioned, there are many approaches which have similar functions as our solution. Microsoft PowerPoint [1], OpenOffice Impress [2], Classroom Presenter [3] are probably the most well known program solutions but there are many other approaches. An early system that integrated slides along with student and instructor writing was Lecturers Assistant [14]. Golub [15] has independently developed a system for presenting material from a Tablet PC. PowerPoint and Impress are focused on presentation creation. The last version of PowerPoint contains virtual ink functionality. Special function “Presenter View” is included in this version. This is the function which allows two different views on a presentation. One is for the lecturer and contains actual slide, miniature of slides, notes and other features which make presentation easier. The other view is for audience and contains only actual slide of presentation. In the case of Impress, support of virtual ink has not been implemented yet. The Classroom Presenter is designed primarily for use on Tablet PCs. It serves to facilitate the work of teachers and students. Its main idea is an interactive presentation on several Tablet PCs. In principle, it is "drawing" to the presentation. It can open the whole presentation or individual pages of a presentation and hand sketch own notes of lecturer or students. Writing entries is done via a touch screen of Tablet PC. At this writing it is obvious change font color, change font etc. A teacher can communicate with students' workstations. Typical example can be specified by an assignment on the lesson. A teacher enters an assignment for students. The assignment is defined on one particular slide of a presentation. Since they can see this presentation on their work stations, students as well as a teacher can now elaborate this assignment with the stylus. Then the final work of students (one page of presentation with their solutions) is sent to the teacher workstation. Teacher can control accepted solutions on his or her workstation or save them for later analysis.

2 SYSTEM DESCRIPTION

Tablet PC Presenter is described in detail in this chapter. As a platform for our application we have chosen the latest operating system Windows 7. Older versions of Windows do not contain such expanded support for Tablet PCs as Windows 7. It also includes very useful ability for us and it is the opportunity to learn different styles of handwritten fonts. This means that the system is teaching itself during recognizing of the text. If the system failed to recognize the characters correctly, it will ask the user to enter the exact text or propose some alternatives. Another useful feature is a support for different languages. If the recognizer does not support text in the specific language, corresponding language pack should be downloaded from Windows Update.

2.1 Handwritten text recognition

So called recognizer in Tablet PCs type of computers is used to recognize handwritten text. They can be either object based (they recognize musical notes, gestures, mathematical formulas) or text based (they recognize written text). One word recognizer can recognize only one language or group of languages which are similar to each other. This means that for every language which we want to recognize there is a need to install the proper recognizer to the system. Before analyzing of hand written text, the language or scheme of characters is first entered to the recognizer. Programmers can choose more detailed settings of transformation. If it is selected, for example e-mail address then recognizer knows that there is no character “*”, but text has to contain “@”. During the analysis of the handwritten text, this text is first divided into individual segments and then transformed to the digital form of text. Recognizers of the English language return in addition the transformed text and value of an accuracy for the given text transformation. To make the accuracy as good as possible, dictionaries (system, user and application) are used during the analysis phase.

System dictionary is the basic type of dictionary, which contains vocabulary used in common in specific language. Each installed recognizer includes one of these dictionaries. This dictionary can be replaced by another dictionary, but it is not possible to uninstall it. When we remove alternative dictionary then the system dictionary becomes active again.

User dictionary is a dictionary created by the user interaction with the Tablet PC input panel, or by voice commands. Words which will be added are stored here. User dictionary can be switched off.
Software dictionary is a type of dictionary which is used in software. If the software is written for a specific branch, it is possible to create a list of words which will be taken into account for the transformation of handwritten texts only in this application. By activating a software dictionary a user dictionary is turned off and vice versa.

In our software a user writes his or her text by hand on a screen, which has all the features that we need in writing. If the user writes some text in one move the canvas registers it. A so called stroke is created, which represents the movement of a stylus (or hand) from the time when the stylus touched the screen to the time when the contact is interrupted. Then it analyzes the recognized text. Individual strokes are saved to the front and in regular intervals are all analyzed. The final analyzed text will then replace handwritten on the screen.

2.2 TabletPC Presenter

As already mentioned, the result of our efforts is software for creating of slides and their projecting with data projector. Software was built for Windows 7 operating system and it combines the positive characteristics of Microsoft PowerPoint (usage of slides) and Adobe Photoshop (working with layers). The functions contained in the Windows Software Development Kit 7 and Windows Presentation Foundation were used.

To control user interface, an open source Windows Forms component Ribbon was implemented [6]. It is a menu bar (Fig. 1) as we know from the Microsoft Office environment, especially its newest version. The entire system is divided into separate classes. Usage of tables, tables on panels and components for the panels are supported. Of course it is possible to adjust the size of these tables, panels and components. We changed the size of each button from 16 x 16 pixels to 48 x 48 pixels. This dimension is suitable for use on Tablet PCs, and if necessary it can be easily pressed by finger.

![Figure 1. Menu Bar](image)

Not only menu bar is used to control user interface. The individual components can be moved, rotated, enlarged, and shrunk by underpinnings that are visible and easy to grab by finger or stylus.

Other software components are shown in the Fig. 2. These components include Layer panel on the left side and slide bar on the right side of the window. Layer panel is used to control layers in the specific slide. Through the panel, new layers can be inserted, moved up or down, deleted or, if necessary, can be locked or hidden. Locked layer can not be moved upward or downward. If the layer is hidden, it is not visible during the projection of slides. All these actions with layers can be controlled by buttons located on the bottom of the layer panel. The settings button is used to set the layer properties such as transparency and background color.

The slide panel is used to control slides (pages) of the presentation. At the bottom of this panel are two buttons, the add button and the remove button. By pressing the add button, new slide is added to the bottom of the list. On the other hand, the remove button deletes current slide. If the slides are removed, the other slides are renumbered. Buttons which are illustrated as arrow up and down is used to toggle slides, either to the next or previous slide. This is also possible with a mouse. The orange, the blue and the yellow frame border is used. The color of the border means the actual slide (orange), outdated slide (blue) and slide over which the mouse cursor is located (yellow).
In the Fig. 3 a simple slide that is created in our application is shown, together with other elements of developed system. On the left side in the layer panel the different layers are shown. Especially, this example contains three layers. The bottom layer (background) in this case is covered with a picture (desert) that is on the second layer. The third layer presents a picture with penguins. If we move downwards the layer with penguins, it would overlap with the layer with image of the desert, so penguins would not be seen. Number beside name denotes the layer transparency. Hundred percent means that the layer is completely opaque, zero percent on the contrary, indicates that the layer is completely transparent. In this case this layer in the layer panel is highlighted in blue. This means that the layer is selected and can be adjusted. The center image shows that the image of a penguin is rounded with five gray rings. The four rings are positioned to allow the image resizing. It should be noted that the inserted image is always resized to 4:3 dimension (actual size depends on screen resolution). If you change the image size, the size of the rings remains unchanged. This feature enables convenient change of size in case of small images. The fifth ring which is located in the center of the image is used to rotate the image in both directions.
Fig. 4 shows a preview of the presentation of slides at a time when the presentation started. On the screen is shown the part of the screen that we saw in the middle of previous figure (just as in PowerPoint or Impress). Three simple buttons are also used in the figure. Arrows in the bottom right side help when switching between slides and the icon above allows close of the presentation and returns to the presentation design.

It may seem that the application is controlled only by touching the screen, but it does not. In our system, we also support the so called flickers. Flickers are the gestures that the user is doing on Tablet PC screen and a system adequately response to it. For example, if the presentation is running and the user pulling a pen from the right side to the left side of the screen, presentation moves to the next slides. When pulling from left to the right, the presentation is switched to the previous slide. In the design mode, you can also do cross over the active layer and the system interprets this gesture as a command to delete the layer.

We implement lossless type of file, which allow us to store and restore created presentations without i.e. resizing of figures. Of course, support of traditional file formats (i.e. pptx) will be necessary for the future development.

![Figure 4. Running presentation](image)

3 CONCLUSION

In the process of teaching is still space for improvements. With the development of new hardware has become necessary to develop new software. Especially in presentations in the courses have to take the audience in the simplest form and illustrate them the necessary information. The contribution of this article is software that allows lecturers easier and more flexible form of creating slides and their subsequent presentation to students in the teaching process. Teachers have the possibility to modify the slides of the presentation by adding either handwriting text or sketching, depending on the needs of the audience. Comments can then be converted to text and saved, making them easier to later usage by students. The software takes advantage of Windows 7 operating system as well as the benefits of Tablet PCs. In the process of development, the greatest emphasis was given on maximum utilization of touch screen and the associated adjusting control tools. The stylus can be used for comfortable software control and also to insert new layers, images, videos and text in either the preparation or presentation mode.

Currently, the software is still in development, and we aim to increase the usability and we are implementing the comments of teachers and students. Future work shell focus on supporting of the commercial formats of presentations, improve the comfort of the user interface as well as extensive testing during the teaching process.
ACKNOWLEDGMENT

This work was partially supported by Slovak Science Grant Agency (VEGA 1/0649/09 “Security and reliability in distributed computer systems and mobile computer networks”).

REFERENCES


