SPEED DATA VALIDATION WITH TOBII EYE TRACKER

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INTRODUCTION

During the last decade, eye tracking technology has undergone rapid development and growth that has increased its popularity amongst practitioners and researchers from a wide variety of disciplines. In this mini project for the future user interfaces class, we plan to use this technology with Tobii eye tracker in order to develop a prototype of an application that can help tax authorities to process and quick the scanning process of the taxes documents and – in some cases - spot the errors and lead the user to correct it.

The alternative model would be using the mouse for the moment, so our evaluation would be with Tobii eye tracker and with a normal computer mouse both in combination with the keyboard.

IDEA

Tax offices in Switzerland use a software that receive a large amount of tax documents on daily bases, scan them and verify them manually by different employees.

The software normally presents the scanned document with a layer that contains the recognized text as well as some form of colorizing that indicates when business rules are not met. Business rules cannot always tell if input is correctly recognized but it can detect incorrect recognition.

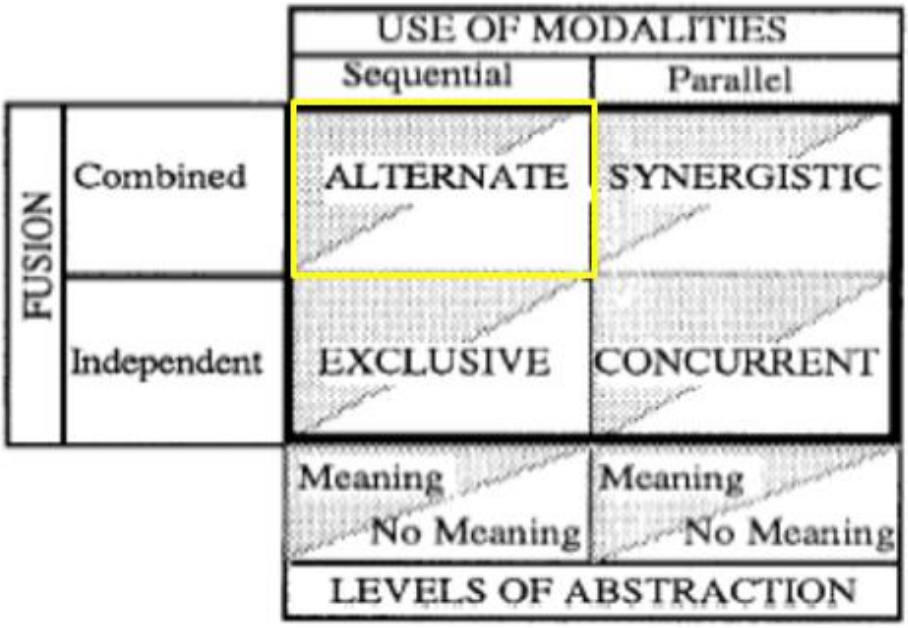
Normally, whenever there is an error the employees must spot it and compare it with the existing original layer, which takes time to move the mouse to the right field to change its value.

With this application, we let the user use the eyetracker to select the fields.

MODALITIES

CASE, CARE

Our application applies the case model within the machine itself, so basically, this application with Tobii would be alternative, with moving the pointer to the correct field. We also can mark it as a concurrent since it will abbreviate the time of the correction for the employees and the entire department. While the care modality in this application is complementarity in terms of fusion since the user must just look at the hover colored field and the activated correction begins, we also considered an equivalence modality to using the existing normal mouse.



INPUTS AND OUTPUTS FUSION

The Eyetracker is used to select the fields that are to be corrected. In all cases the user could use the mouse to achieve the same task.

TECHNOLOGIES

We had to use C# for development since the only publicly available SDK for the eye trackers is written in C#. This posed a challenge since none of us had used C# before. XML has been used to describe the values of the forms. Our IDE's of choice were both Visual Studio and the more novel Rider IDE from Jetbrains. Version controlling, and code distribution was done using git and a bitbucket repository and Nuget as the package manager. The application was created using WPF and .NET.

IMPLEMENTATION

The application consists of three main classes. The XMLReader class will parse the XML files with the values of the used field in a specific form. The FormRenderer uses these values to create the textboxes on the screen and set the scanned image in the background. All this is held together by the MainWindow class. This class is also the main starting point in the application. Interaction with the User Interface also must be dealt with in this class.

HYPOTHESIS

We state our hypothesis as follows

H_a: The average time required for the data validation process is lower than with the traditional mouse and keyboard input.

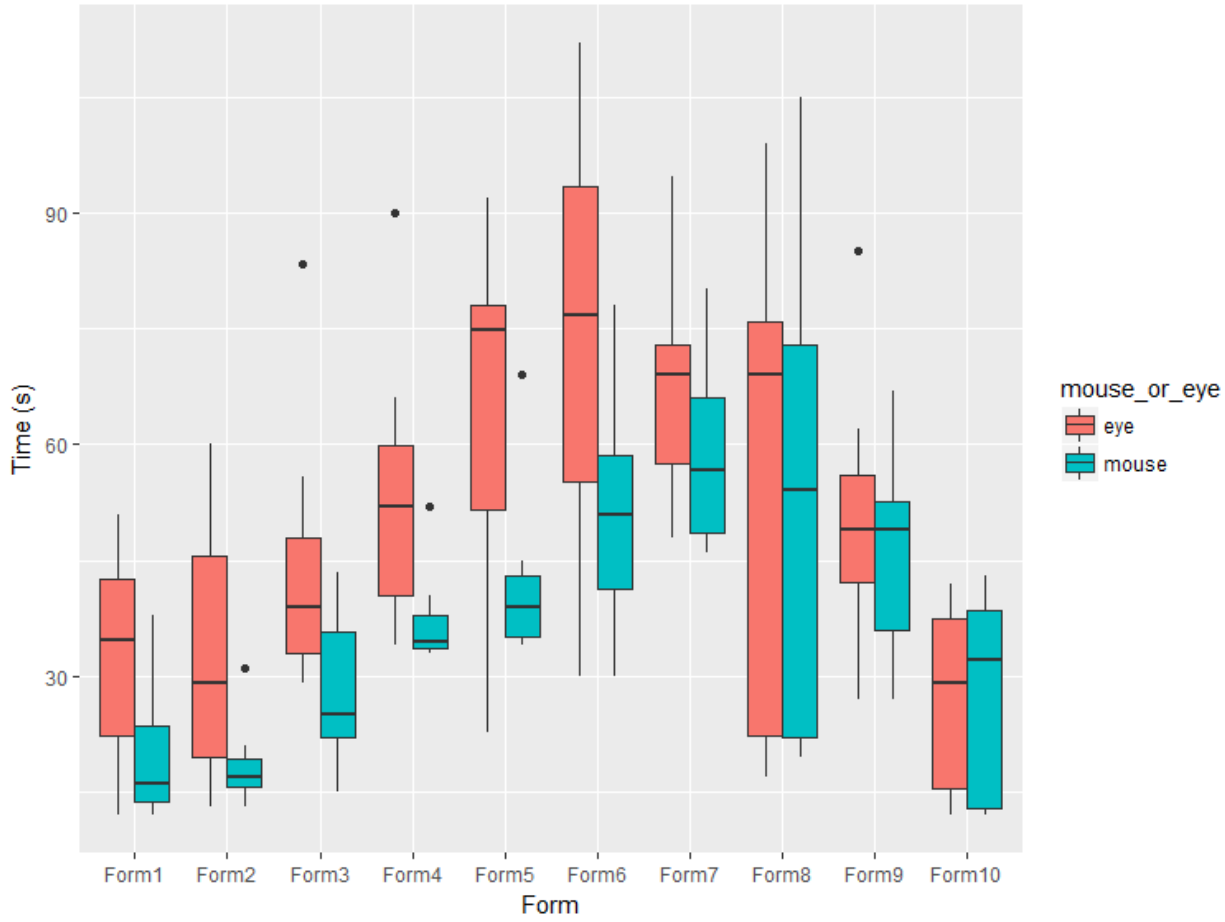
H_0: In average no improvement in the time required for the data validation process can be observed when using Tobii.

EVALUATION

SETUP

We evaluated the stated thesis with 7 people. We prepared 10 forms with different number of fields to be checked and corrected. Each subject corrected the forms with the eyetracker in one round and by mouse in another round whereby the forms were always presented in the same order. Group 1 (4 people) used the eyetracker in the first round and the mouse in the second round, group 2 (3 people) used the mouse in the first round and the eyetracker in the second round. We clocked the time required to fulfill all business rules using the given modality for each form. The subjects were aged between 19 and 63, have not used the eyetracker before and are not familiar with the document validation process.

RESULTS



The above forms shows that the mouse was the faster modality for correcting the forms. Therefore we have to reject our hypothesis H_0. It is however remarkable that the superiority of the mouse was vanishing towards the end. This may be attributed to the characteristics of the errors so that in these forms the eyetracker is more

suitable. Another reason might be that the subjects have learned to better use the eyetracker towards the end of the test round. More extended tests with a random form order might reveal more insights.

FEEDBACK

One subject believed more training with the eyetracker would lead to better results with the eyetracker. There have been problems with another subject that has a vision problem (only one eye properly functioning). Additionally a majority of the subjects preferred the mouse over the eyetracker.

CONCLUSION and FUTURE WORKS

In this project we implemented a prototype of a tool to test document validation with eye tracking. We tested the tool with several novices to both eyetracking and form validation. Our tests concluded that the mouse is the superior modality for the task.

Out tests could be extended to professionals in document validation and more extensive, enduring tests. Further our software can be extended to better filter noise and more reliably selects the correct fields.