

Usability evaluation of software applications with the use of Usability Logger

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Abstract. This paper presents the main characteristics and capabilities of Usability Logger software tool, used in the usability evaluation of Human Computer interaction interfaces. Usability Logger can be employed to record the actions performed in workstations, with the use of the I/O devices. In this paper the tool is analyzed, compared with other similar tools and used in a case study involving the usability evaluation of two software systems according to predefined criteria.

Keywords. Software Quality, Usability Evaluation, Software Benchmarks

Introduction

Within the last years, a major shift has occurred in the development, design and deployment of software applications concerning usability. Nowadays usability is no longer a luxury, but rather a basic determinant of productivity and of the acceptance of software applications [1]. The usability of software applications is of great importance since it determines to which extent the provided features will be used by its users [2], [3]. Through time many definitions for usability have been published. Two of the most established definitions can be found in international standard for the evaluation of software ISO 9241-11 [4] and ISO 9126 [5]. ISO 9241-11 defines usability as “*the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use*”. In ISO 9126, usability is defined as “*the capability of the software product to be understood, learned, used and attractive to the user, when used under specified conditions*”.

As it becomes obvious, usability evaluation has turned out to be an essential process in the development of software applications. This process can be performed using established methods, suitably designed usability evaluation laboratories with specific equipment and various software tools. One of the usability evaluation tools that developed from the Software Quality Research Group of the Hellenic Open University is the *Usability Logger* [6]. *Usability Logger* can be integrated in a usability evaluation test and assist the process by recording the actions of a user while interacting with the interface of a software application. The tool records the use of the keyboard, the mouse and takes screenshots from the interaction of the user with the interface. A competitive feature of the *Usability Logger* is the easiness with which can be installed and used

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either in a usability evaluation laboratory or in any other place where the software application under evaluation is used.

The rest of the paper is structured in 5 sections and presents the *Usability Logger* tool and its use. In section 1, a reference to usability evaluation software is made and a comparison among these tools including *Usability Logger* is performed. In section 2 the *Usability Logger* tool is presented. Section 3, describes a case study that includes the usability evaluation of two software applications with the employment of *Usability Logger*. Section 4 shows the results of the usability evaluation. Finally, the conclusions drawn from the use of the software tool in usability evaluation tests are discussed.

1. Usability Assessment software

There are various software tools getting involved in the usability evaluation process and which are similar to *Usability Logger*. Some of them are freeware, but most of them are commercial. Table 1 presents software similar to *Usability Logger*. In this table, the name and version of the software tested is mentioned as well as the website that can be found. In the last column of Table 1 there is an indication whether the software is distributed for free (V) or not (X).

Table 1. Usability assessment software

| | Software Name | Website | Freeware |
|-----|--------------------------------------|--|-----------------|
| 1. | Mousotron Pro 5.0 | www.freedownloadcenter.com | V |
| 2. | Mouse Off-road 2.15 | www.tucows.com | V |
| 3. | Mini-Input 2.0 | www.filesrepository.com | X |
| 4. | Mouse Odometer 4.0 | www.introspectsoftware.com | V |
| 5. | Mouse Meter 1.51 | www.softplatz.com | X |
| 6. | My Mouse Meter 1.0.9 | www.softpedia.com | V |
| 7. | Mouse Clocker 1.0 | www.download.com | V |
| 8. | Exact Mouse 2.0 | www.softpedia.com | X |
| 9. | Usability Logger 2.3 | http://quality.eap.gr | V |
| 10. | 321Soft Screen Video Recorder 1.05 | www.filedudes.com | X |
| 11. | Screen VidShot 2.2.0.14 | www.filesrepository.com | X |
| 12. | ZD Soft Screen Recorder 2.6.4.0 | www.softpedia.com | X |
| 13. | Screen Video Recorder 1.5 | www.filesland.com | X |
| 14. | Screen Tracker 2.0 | www.bestsware.com | X |
| 15. | Advanced Key and Mouse Recorder 2.80 | www.freedownloadcenter.com | X |
| 16. | Action Mouse Mover 1.0 | www.supershareware.com | X |
| 17. | Adamant Key Mouse Pro 3.3 | www.softpedia.com | X |
| 18. | Axife Mouse Recorder 5.01 | www.soft411.com | X |
| 19. | ECTI 1.73 | www.freedownloadcenter.com | X |

| | | | |
|-----|----------------------------|--|---|
| 20. | Mouse Tamer 2.0 | www.supershareware.com | X |
| 21. | Smack 1.06 | www.filesrepository.com | X |
| 22. | Mouse Machine 1.1 | www.softpedia.com | V |
| 23. | Jitbit Macro Recorder 3.82 | www.filesrepository.com | X |
| 24. | Mouse Master 2.1 | www.tucows.com | X |
| 25. | Macro Wizard 4.1 | www.softpedia.com | X |

The software listed in Table 1 was tested according to some basic features that are essential for the expected functionality of logging software and a comparative evaluation was produced. The functions took into consideration are:

1. Distance covered by mouse cursor
2. Use of keyboard
3. Use of mouse buttons
4. Total time of user activity
5. Storage of user activities in log files
6. Creation, storage and implementation of macros
7. Screen captures
8. Video captures
9. Speed of cursor

The results of the comparative evaluation are presented in Table 2, where with “v” is marked a function included in the software and with “x” not included.

Table 2. Comparison of usability evaluation software features

| Software Name | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|--|---|---|---|---|---|---|---|---|---|
| 1. Mousotron Pro 5.0 | V | V | V | V | V | X | X | X | V |
| 2. Mouse Off-road 2.15 | V | X | X | V | X | X | X | X | V |
| 3. Mini-Input 2.0 | V | V | V | X | V | X | X | X | X |
| 4. Mouse Odometer 4.0 | V | V | V | X | V | X | X | X | X |
| 5. Mouse Meter 1.51 | V | V | V | V | V | X | X | X | V |
| 6. My Mouse Meter 1.0.9 | V | V | V | V | X | X | X | X | X |
| 7. Mouse Clocker 1.0 | V | X | X | X | X | X | X | X | X |
| 8. Exact Mouse 2.0 | V | X | X | X | X | X | X | X | X |
| 9. Usability Logger 2.3 | V | V | V | V | V | X | V | X | X |
| 10. 321Soft Screen Video Recorder 1.05 | X | X | X | X | X | X | X | V | X |
| 11. Screen VidShot 2.2.0.14 | X | X | X | X | X | X | V | V | X |
| 12. ZD Soft Screen Recorder 2.6.4.0 | X | X | X | X | X | X | X | V | X |
| 13. Screen Video | X | X | X | V | X | X | X | V | X |

| Recorder 1.5 | | | | | | | | | | |
|--------------|--------------------------------------|---|---|---|---|---|---|---|---|---|
| 14. | Screen Tracker 2.0 | X | X | X | V | X | X | V | X | X |
| 15. | Advanced Key and Mouse Recorder 2.80 | V | V | V | X | V | V | X | X | X |
| 16. | Action Mouse Mover 1.0 | X | X | X | X | V | V | X | X | X |
| 17. | Adamant Key Mouse Pro 3.3 | X | V | V | X | X | V | X | X | X |
| 18. | Axife Mouse Recorder 5.01 | V | V | V | V | X | V | X | X | X |
| 19. | ECTI 1.73 | V | X | V | V | X | V | V | X | X |
| 20. | Mouse Tamer 2.0 | V | V | V | X | X | V | X | X | X |
| 21. | Smack 1.06 | V | V | V | X | X | V | X | X | X |
| 22. | Mouse Machine 1.1 | V | X | V | X | X | V | X | X | X |
| 23. | Jitbit Macro Recorder 3.82 | V | V | V | X | X | V | X | X | X |
| 24. | Mouse Master 2.1 | V | V | V | V | X | V | X | X | X |
| 25. | Macro Wizard 4.1 | V | V | V | X | V | V | X | X | X |

Considering Table 2, it is obvious that *Usability Logger* has the advantage that can record the use of the keyboard and mouse buttons, the distance covered by mouse cursor, the total time of user activity and store these data together with screenshots, from the interaction with the interface, in the database and display this information in one form. Furthermore, *Usability Logger* has a feature not mentioned in Table 2. It can measure the distance covered by the mouse cursor in specified time slots, thus calculating mouse movement for specific instances. This property is useful in quantitative evaluation.

2. The Usability Logger tool

As already mentioned, *Usability Logger* is a software tool that is used in usability evaluation process. It records the actions performed with the use of I/O devices like keyboard, mouse and screen, during the interaction of a user with the interface of a software system, in order to evaluate its usability. This evaluation can take place in various environments where the software application under evaluation is installed. Such a place can be a usability evaluation laboratory, or any other place where the application is used. The usability logger can be installed and used easily in every working environment. It can be also used in cases that usability evaluation tests include simultaneous use in more than one workstation. In such cases *Usability Logger* can be installed in as much workstations as needed, which belong in the same Local Area Network (LAN), start the recording of the I/O devices of each one at the same time with the others and store the data collected in a server that is situated in the LAN.

The current version of the software tool is *Usability Logger v2.3* and in its interface the language used is Greek. In the future, it will be created a version including English interface.

Usability Logger comprises of two parts. The *Recording Tool* and the *Database* in which data collected from the recording tool is stored and analyzed.

2.1. Recording Tool

The *Recording Tool* is recording the movement and the distance covered by the cursor in the screen as well as the use of the mouse buttons and their combinations (e.g. double click), the buttons pressed in the keyboard and screenshots that reveal the actions of the user during the usability evaluation. All the functions mentioned in the previous paragraph are carried out in the background so as not to be visible by the user and interfere in the process. In order to start the observation, the main form of the *Recording Tool* that is presented in Figure 1 has to be completed. In this form the user selects the scenario which will execute and inserts the username and the password with which is registered in the database, in order to start the usability evaluation.

The recording of the screen, takes place in short time intervals which are selected according to the needs of the usability evaluation. The choice of the time intervals can be selected from a drop down menu in the *Recording Tool* interface, which has three choices as it is shown in Figure 1.

Important characteristic of the *Recording Tool* is that it can be installed and used at the same time in more than one workstation. This attribute gives the flexibility to run usability evaluation tests at the same time in a usability evaluation laboratory for example and collect the data of the recordings simultaneously in the database, which can be installed in a server within the local network.

2.2. Database

The second part of the *Usability Logger* tool is its *Database*. The *Database* is used to store information regarding the scenarios from usability evaluation tests, the users participated in each scenario and data from the actions of users during usability evaluation tests like recording of I/O devices.

The form of the *Database* that presents data relevant to the I/O devices is shown in Figure 2. In this form screenshots from the interaction with the workstation, for every time interval that we have selected, are presented and for every screenshot relevant information is presented.

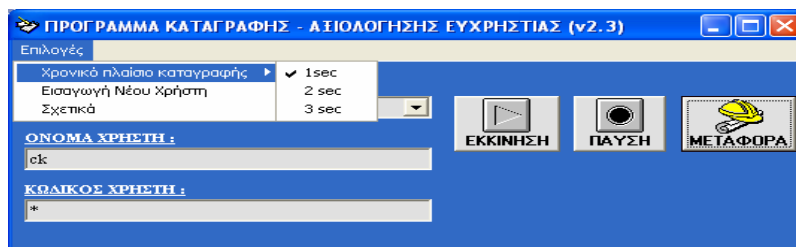


Figure 1: Starting form of the *Recording Tool* including time interval choice menu

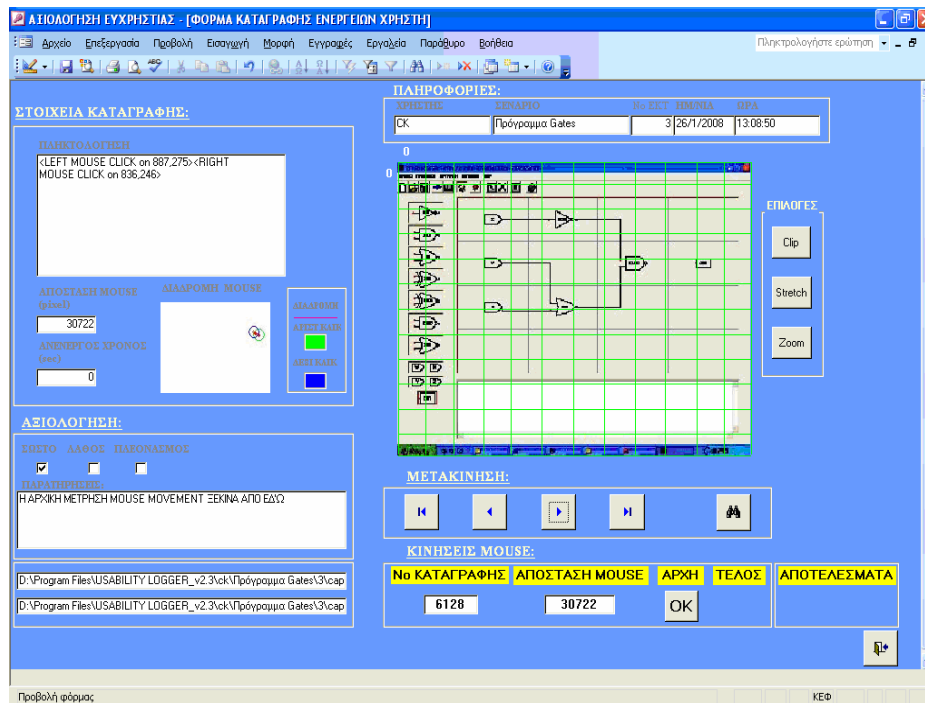


Figure 2: Data stored in the Database relevant to the I/O devices

As we can see in Figure 2, on the top right of the form there is information that presents the name of the user, the name and the number of the scenario performed in the usability test, the date that the test took place and the time started. On the top left of the form, information of the mouse clicks, the distance covered by its cursor and the idle time as well as a picture of the cursor movements are presented. Just below, the usability expert can add comments on every action taken during the usability evaluation. These comments can be made on a wrong or right action, if an action is not necessary and for any other reason that might be useful in the analysis of the results. Finally, on the bottom right corner there are buttons that control the presentation of the screenshots and just below that, there is the area that measurements concerning the distance covered by the mouse cursor for specified duration are recorded.

Using the database the usability evaluation expert can perform a number of actions which can be selected from the interface presented in Figure 3. Using this interface, usability evaluation expert can visualize the use of the I/O devices (Figure 2), export statistical data regarding the use of the I/O devices and especially the mouse movements create scenarios of usability evaluation tests and register users that participate in these tests. The database can be installed either locally in the workstation that is used for the evaluation or in a server that is part of a Local Area Network.

The screenshots that are collected during the recording of the users' actions are all stored in the Database and they are categorized in different files, depending on the user, the name of the evaluation scenario and the number of times each scenario is implemented.

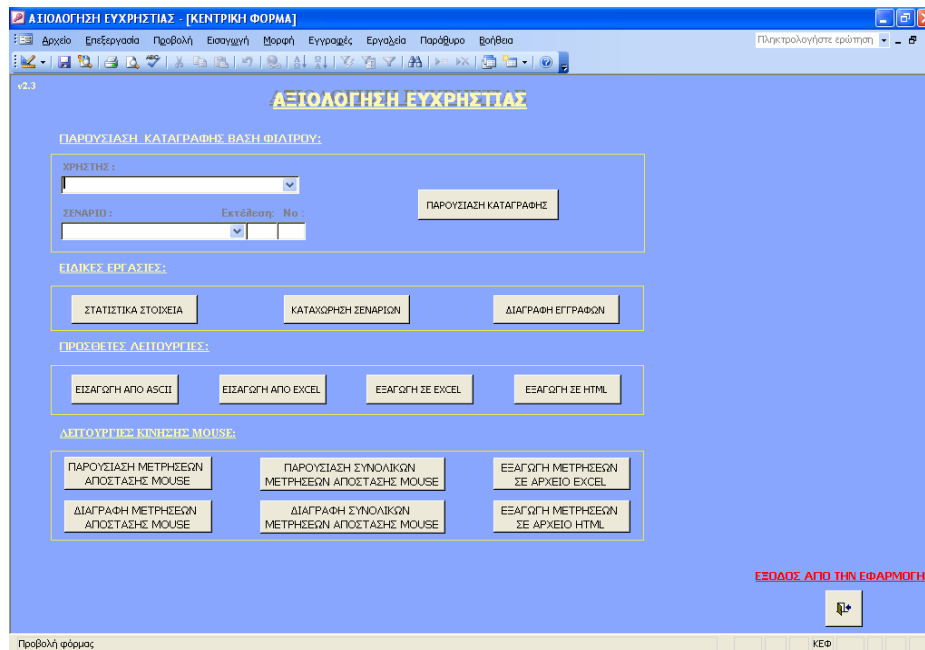


Figure 3: Main form of the Database

If the *Database* is installed in a server then the files created are maintained locally, in the workstation, during the time of the recording. At the end of the process these files are automatically erased from the workstation and transferred to the server. The screenshots are saved in jpeg format so as to keep the size of the file as small as possible, since after extensive use of the *recording tool* it can become very big.

3. Case studies of Usability Logger tool

In this section there will be a presentation of the utilization of *Usability Logger* in a usability evaluation process of the software applications “*GATES*” and “*Electronic Lite*” [7].

The usability evaluation of the two software applications mentioned earlier, took place in the Software Quality Assessment Laboratory (SQAL) of the Hellenic Open University. The SQAL is a suitably equipped laboratory, in which experiments concerning the quality of various software applications take place. This laboratory consists of two rooms, one designated as the experiment room, in which the users are sited and a second designated as an observation and control room, in which the usability experts are sited. The observation room is separated from the experiment room by one-way mirror so that evaluators can watch participants performing, but not vice versa.

The number of users participated in the usability evaluation was eight. In the beginning, participants received a short presentation introducing the software under evaluation, through a demo presentation. The purpose and objective of the experiment was also presented, as well as some indications about what they are expected to do. Participants were also assured and reminded that the purpose of the evaluation is the usability of the software and not their personal performance. Hence, they were encouraged to act in a way that is typical and comfortable to them. Finally, participants were informed that they are being observed and all their actions are recorded.

After the orientation, the usability evaluation took place, during which the participants were asked to perform a number of predefined tasks. The scenario stood as follows:

- The participants were asked to enter the experiment room of the Software Quality Assessment Laboratory (one at a time) and sit down at a desk where a PC was placed with the software under evaluation installed.
- Participants were asked to start the software and perform a number of predefined tasks which were written in a piece of paper that was situated on the desk.
- After all tasks were completed the participant should leave the test room.

Each user participated in the usability evaluation of the two software applications. First was performing the evaluation of the “GATES” and then of the “*Electronic Lite*” software. “GATES” is educational software that helps students of Electronics to get a better understanding on “*gates*”. “*Electronic Lite*” is educational software that can be used in high school courses related to Electrical and Electronic Engineering.

One of the tools used for the recording of the participants’ actions was the *Usability Logger*. The two parts of the tool were installed in different locations. The *Recording Tool* was installed in the workstation that the participant was using for the interaction with the software and the *Database* was installed in a server placed in the control room of the laboratory. The *Recording Tool* was started each time a participant was beginning the interaction with the interface of the software under assessment and stopped when all the tasks were completed. With the completion of each scenario the *Recording Tool* was sending all the recorded data to the *Database* in order to be analyzed by the usability experts at the end of the entire process.

4. Results

At the end of the usability evaluation process described in section 3, usability evaluation experts studied the data collected. This data was stored in the *Database* that was installed in a server situated in the control room.

In the first face of the data analysis, usability experts went through the forms like the one presented in Figure 2. Using this type of forms they were focusing on specific aspects that were presented and which are mentioned in subsection 2.2.

In the second face they used the form presented in Figure 3, in order to get general statistics about the performance of all the participants in both experiments. In Figures 4 and 5 are presented Tables that show the actions of all users in the usability evaluation of “GATES” and “Electronic Lite” software respectively.

| ΕΜΦΑΝΙΣΗ ΣΤΑΤΙΣΤΙΚΩΝ ΣΤΟΙΧΕΙΩΝ ΓΙΑ ΤΟ ΣΕΝΑΡΙΟ Πρόγραμμα Gates | | | | | | | | |
|---|--------|-----------|---------------|---------------|-------------|-------|-------|----------------|
| ΟΝΟΜΑ ΧΡΗΣΤΗ | Νο ΕΚΤ | ΗΜ/ΝΙΑ | ΜΗΚ. ΠΛΗΚ/ΣΗΣ | ΑΠΟΣΤΑΣΗ ΠΟΝΤ | ΑΔΡΑΝΗΣ ΧΡ. | ΣΩΣΤΑ | ΛΑΘΟΣ | ΣΥΝΟΛΟ ΣΧΟΛΙΩΝ |
| User 1 | 2 | 15/2/2008 | 2721 | 32452 | 34 | 0 | 0 | 214 |
| User 2 | 1 | 15/2/2008 | 2890 | 33923 | 313 | 0 | 0 | 282 |
| User 3 | 1 | 15/2/2008 | 3613 | 50307 | 153 | 0 | 0 | 339 |
| User 4 | 1 | 15/2/2008 | 2270 | 41414 | 72 | 0 | 0 | 272 |
| User 5 | 1 | 15/2/2008 | 4451 | 52757 | 311 | 0 | 0 | 450 |
| User 6 | 1 | 15/2/2008 | 3433 | 40113 | 214 | 0 | 0 | 334 |
| User 7 | 1 | 15/2/2008 | 2996 | 51637 | 179 | 0 | 0 | 300 |
| User 8 | 1 | 15/2/2008 | 2534 | 31068 | 65 | 0 | 0 | 211 |

Figure 4: Statistical Analysis for “GATES” software usability evaluation

| ΕΜΦΑΝΙΣΗ ΣΤΑΤΙΣΤΙΚΩΝ ΣΤΟΙΧΕΙΩΝ ΓΙΑ ΤΟ ΣΕΝΑΡΙΟ Πρόγραμμα Ηλεκτρονικός Lite | | | | | | | | |
|---|--------|-----------|---------------|---------------|-------------|-------|-------|----------------|
| ΟΝΟΜΑ ΧΡΗΣΤΗ | Νο ΕΚΤ | ΗΜ/ΝΙΑ | ΜΗΚ. ΠΛΗΚ/ΣΗΣ | ΑΠΟΣΤΑΣΗ ΠΟΝΤ | ΑΔΡΑΝΗΣ ΧΡ. | ΣΩΣΤΑ | ΛΑΘΟΣ | ΣΥΝΟΛΟ ΣΧΟΛΙΩΝ |
| User 1 | 1 | 15/2/2008 | 1356 | 11946 | 147 | 0 | 0 | 170 |
| User 2 | 1 | 15/2/2008 | 1101 | 9000 | 222 | 0 | 0 | 143 |
| User 3 | 1 | 15/2/2008 | 1313 | 14937 | 361 | 0 | 0 | 284 |
| User 4 | 1 | 15/2/2008 | 2065 | 19198 | 109 | 0 | 0 | 263 |
| User 5 | 1 | 15/2/2008 | 1765 | 14550 | 109 | 0 | 0 | 226 |
| User 6 | 1 | 15/2/2008 | 2187 | 15718 | 142 | 0 | 0 | 231 |
| User 7 | 1 | 15/2/2008 | 1832 | 23762 | 450 | 0 | 0 | 335 |
| User 8 | 1 | 15/2/2008 | 1343 | 11243 | 203 | 0 | 0 | 190 |

Figure 5: Statistical Analysis for “Electronic Lite” software usability evaluation

In these figures, the tables depicted present information concerning the name of the participant, the date that the experiment took place, the total length of the string typed using the keyboard and the mouse buttons, the total distance covered by the mouse cursor, the idle time and finally the number of general comments and comments on wrong or right actions.

5. Discussion

In this paper *Usability Logger* v2.3 software tool is presented and its use in a case study concerning the usability evaluation of two software applications discussed. From the analysis, the distinguishing characteristics of the software tool mentioned are relating to the easiness with which the software can be used in different working environments, the recording and calculation of the distance covered by the cursor and finally the form that displays all data collected together with screenshots.

As aforementioned, *Usability Logger* can be employed in various environments where the software application under evaluation is installed. This easiness of use is very convenient for usability evaluation tests since such tests can be performed in usability laboratories, as well as in environments where the software application under evaluation is used. Furthermore, the tool can be used at the same time in more than one workstations employed in a usability evaluation test.

Another feature worth mention is the recording of the cursor movements. This is a feature that is included in most of the software mentioned in Table 1. *Usability Logger* can measure the distance covered by the mouse cursor in specified time slots, thus calculating mouse movement for specific instances and present the total distance covered. This feature is very useful in quantitative analysis and more specific in cases where the exact distance covered by the mouse during particular tasks is required.

Finally, an important characteristic is the presentation of all the data collected in a form (Figure 2). In this form, screenshots from the interaction, for every time interval that we have selected, are presented and for every screenshot, relevant information together with comments from the usability expert is presented. This is a very convenient presentation in the phase of the analysis.

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