Using Dynamic Analysis for Generating End User Documentation for Web 2.0 Applications



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Motivation

Web 2.0 Applications have emerged as a new generation of Web applications offering greater usability and interactivity than traditional ones.

 Web pages have been transformed in complex GUIs with synchronous and asynchronous interactions with the user and with the resources

End User Documentation needs

The complexity and the variety of interactivity features provided by a modern Web 2.0 Applications may often confuse the user, so end user documentation is needed to improve the usability of the applications

User documentation definitions

- According to the IEEE 1063 standard:
 - Instructional mode
 - "Usage mode that is intended to teach the use of software in performing tasks"
 - Reference mode
 - "Usage mode that is intended to provide quick access to specific information for software users who are generally familiar with the software functions"
 - Procedure:
 - "Ordered series of steps that a user follows to do one or more tasks"
 - Step:
 - "One element of a procedure. A step contains one or more actions"
 - Action:
 - Element of a step that a user performs to complete a procedure.
 - Tutorial:
 - "Instructional procedure in which the user exercises software functions using sample data supplied with the software or documentation"

Some documentation examples

User management

Logging in

Connect to your Tudu Lists installation - if you have installed Tudu Lists on your computer (as explained in the "installation is http://127.0.0.1:8080/tudu/.

<u>documentation (our</u> <u>case study)</u>	Eichier Édition Affichage Historique Marque-pages Qutil 	is Aid <u>e</u> tudu/welcome.ac 🗇 🗸 🕞 Google 🔍 🤷
	Welcome to Tue	du Lists!
ner examples	Tudu Lists is an on-line application for managing todo lists.	Login
ASSP Web Application TravWeb	Tudu Lists is a very simple application, which you can start using in seconds - but with some advantages over your home-made Excel todo list: • Tudu Lists is web-based , and accessible from anywhere on the planet.	Login : admin Password : Remember me on this computer (30 days)
	 Tudu Lists can be shared amongst people: you can share lists with your friends, family or co-workers. Tudu Lists can be accessed with an RSS feed: if one of your shared lists is updated, your RSS aggregator will warn you. 	Log In Reset You are not a Tudu Lists user yet? Just register. It's completely free.
	 Tudu Lists is completely free! Just register and start using it. Even Tudu Lists' source code is free! If you want your very own install of Tudu Lists, or if you are a programmer and want to see how Tudu Lists is 	Did you forget your password? Click here to recover it.
	Terminé	

Once your user is created, log in using your user name and your password. If you select the "remember me" box, you will days.

Tudu list user

Other examples

TravWeb

ASSP Web Application

Web 2.0 applications

Web 2.0 applications have complex User Interfaces, with both client side and server side interactions

- Business criticality is related to their learnability, operability and usability
- The client side code is usually dynamically generated
 - Static analysis techniques can extract only a limited set of information

Benefits and effort of a good documentation

Learnability
Operability
Usability

Effort needed to write documentation
 Effort needed to maintain the documentation up-to-dated

User documentation generation

- Many tools available for the generation of internal documentation, usually based on static analysis of the source code:
 - Javadoc
 - Doxygen
- Some tools can generate tutorials from dynamic analysis:
 - Smart Tutor
 - DocWizards
 - JTutor
 - EpiDocX

Is it possible to support and partially automate the process of generation of end user documentation for a Web 2.0 application?

Our documentation generation approach

- Supports the automatic generation of some end user documentation items
 - Overall navigation Graph
 - Scenario execution tutorials
 - **End** user reference guide
- Three steps:
 - Web Application Dynamic Analyis
 - Generation of the Navigation
 Graph
 - End User Documentation Generation



Web Application Dynamic Analysis

- Use case scenarios of the Web application are navigated and described by the documenter
 - With the support of the CReRIA tool
- He has to give a name to any Interface Instance and to any Transition Instance
 - The tool suggests the reuse of identical names when it judges that the interface/transitions are "similar" to previously encountered and described ones
 - Different clustering heuristics are available



Web Application Dynamic Analysis

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Share current list	Description	Interface recorded of the current trace: 2 Suggest Me C1 % 100 C2 % 100 C3 % 100 C4 % 100
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Navigation Graph Generation

- Overall and scenario specific navigation graphs can be obtained
 - Automatically with the support of the CReRIA tool for generation and of the GVEdit tool for visualization
 - Graphs and documentation information can be furtherly edited
 - With the support of CReRIA

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A case study

 Tudu Lists
 10 KLOC in Java/JSP
 Rich Client Interfaces

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Existing user documentation (<u>http://www.julien-dubois.com/tudu-lists/user-documentation</u>) is limited to a list of the 8 main use cases, with 4 screen shots
 Often used as a case study for RIAs reverse engineering and testing

Process execution metrics

3 actors

- Generic User, Logged User, Administrator
- 23 use cases
- 120 scenarios
 - 120 collected execution traces
 - 42 Interfaces
 - By clustering together 425 Interface Instances
 - Clustering suggestions accepted 420 out of 425 times
 - 138 Transitions
 - By clustering together 306 Transition Instances
 - Transition clustering accepted 278 out of 306 times
- 120 generated graphs
- 120 generated tutorials

End User Documentation Generation

On the basis of the information extracted and abstracted in the previous phases, have been automatically generated:
Overall navigation Graph
Scenario execution tutorials and graphs
End user reference guide

Overall Navigation Graph



An example of scenario navigation graph

Classic Graph View





An example of scenario description

Quick Add

In this scenario a logged user can insert a tudu in a selected list of todos.



Event Sequences



Related Regular Scenarios Advanced Add Related Exception Scenarios Insertion of Wrong Data

Scenario Tutorials

Automatically generated as HTML hypertexts
 They can be included in the Web application itself

The tutorial template includes:

- Scenario name and description
- Involved Actors
- Use case name
- For each interface/transition composing the scenario
 - Interface name and description
 - Transition name and description
 - Input names and values
 - Triggering Event

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Possible extensions

Customization of presentation styles

Generation in textual formats
Choose between different styles

More detailed documentation
Use of collected traces in testing and reverse engineering processes

Use of collected traces for on-line replaying of tutorials

Assessment of documentation regression

Conclusions and Future Works

This paper introduced a process and a tool for the semi-automatic generation of end user documentation for Web 2.0 applications via dynamic analysis

In future works we plan:
 To increase the features of the tool
 To carry out experiments aiming at the tween documentation manually of

 To carry out experiments aiming at the comparison between documentation manually generated and semiautomatically generated with the support of the tool
 Quality of the documentation

Needed effort

Time is over ... Is there any (clarification) question?