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Project Proposal

“Touchable Object Models”

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Abstract

The proposed diploma thesis describes the design, implementation and evaluation of a CASE tool for the collaborative design of UML diagrams. The tool called “Touchable Object Models” (TOM) will use multi-modal interaction methods to enable composing diagrams of predefined model elements, free-hand drawings and hand-written text. It’s aim is to bridge the gap between early design phase diagrams and formal CASE tool diagrams. Following a tornado approach we will design a solution that allows for generalization to arbitrary diagram types and exemplarily implement this solution for Class and Use Case diagrams.

Problem description

A typical software engineering design process usually starts with the modeling of the application domain. This activity most often embraces the hand-sketching of diagrams using pen and paper or whiteboards. The resulting early-stage diagrams tend to mix informal free-hand drawings, depicting application domain elements, with formal UML elements. HCI studies observed that preserving flexibility during this phase of the design process encourages experimentation with design and is essential for successful collaboration [1]. The diagrams are later digitized and formalized through the use CASE tools, which can be a very time-consuming part of the engineering process. Especially in projects based on an iterative approach this places a considerable burden on the designers.

Throughout the last years several research projects tried to eliminate or ease this step through the use of Electronic Whiteboards and Tablet PCs, whereas stroke recognition algorithms transform free-hand drawings into formal model elements [2] [3]. These approaches adopt the whiteboard metaphor and thus are highly intuitive. Unfortunately, because of the technology they are based on, they also possess some major drawbacks.

First of all, acceptable recognition rates are mostly achieved through the use of special gestures [2] or restrictions to the kinds of elements recognized [3]. As these tools allow for both free-hand drawings and model elements the rate of model elements recognized as drawings is quite high.

Secondly, most tools require different modes to distinguish between free-hand drawing, gesture drawing, element layout and diagram navigation [2] [3]. Switching between these modes greatly decreases user experience and working speed and leads to a poor utilization of these tools [4].

Thirdly, text input is constricted as even good recognition algorithms found on Tablet PCs have to be trained to reach an acceptable recognition rate. A collaborative scenario with multiple designers working on one diagram doesn’t simplify this matter.

TOM’s goal is to find suitable interaction methods and gestures for the creation of Use Case and Class diagrams. Multi-modal input should be used to ease the creation, arrangement, manipulation and navigation of model elements. Although it should find ways around the usual limitations of contemporary pen-based tools. The models created need to be exportable as XMI files.

Research questions

1. What are the drawbacks of existing pen-based diagramming applications?
2. What are possible interaction methods and gestures for the use in TOM? Which interaction methods and gestures of pen-based applications could be applied to TOM?
3. How could TOM be generalized to be used as a multi-purpose diagramming tool?

Research methods

The research questions will be answered by utilizing the following research methods:

1. Question:
 - Literature Research
 - Case studies of Software Engineering student courses
2. Question:
 - Literature Research
 - Evaluation of existing pen-based applications
3. Question:
 - Modeling

Literature

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