State Chart-based Context-Awareness in Mobile Gaming

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1 Introduction

The current development of powerful smartphones fosters the dissemination of mobile gaming. The first wave of these mobile games represents the typical console games, not considering the special situation of smartphones. But, besides these mainstream mobile games, some games already try to take into account information of built-in sensors of the smartphones like one's position and additional aspects. Our state chart-based LOMOTAIN system [2] is one of theses games. It uses several innovative aspects in smartphone gaming – the most important one is the interaction with the environment rather than with the keyboard and is based on RFID tags, 2D barcodes, and gestures. Another aspect fosters the reusability of application logic representing the game, which is based on commonly known UML 2.2 state chart diagrams. The system consists of a client and a server part, whereas the server enables the designer to define the game logic (and additional information) with the help of Eclipse in form of UML state chart diagrams. These diagrams are then serialized and transferred in form of a XML file to the client, which rebuilds the application logic. In this paper we present an additional feature to this LOMOTAIN system – the integration of context-awareness in the state chart-base application logic.

The rest of the abstract is structured as follows. First a very short overview of the commonly used concepts to achieve context-awareness in different systems is given. After that our own approach is described. First results and future work are presented at the end.

2 State of the art

There are currently two main trends on the behalf of modeling context-aware behavior. One of the most commonly used mechanisms is the use of user profiles in combination with information filtering and selection [4]. The other one is the use of rule based mechanisms, whereas these rules are sometimes coded inside the application [3] and sometimes dynamically loaded [1]. In addition to these two, there are a few different other approaches such as the use of ontologies [5], layered architectures or so called feedback-based approaches. State chart diagrams to define resp. model context-aware behavior have – to our knowledge – not been used so far.

3 Approach

As already mentioned, our approach is based on the use of state charts representing the application/game logic. In order to integrate context-awareness, we

had to alter the current system and extend the existing diagrams concerning their states, transitions, and guards. We analyzed several different forms of integrating context-awareness into the state chart diagrams, depicted in Figure 1.

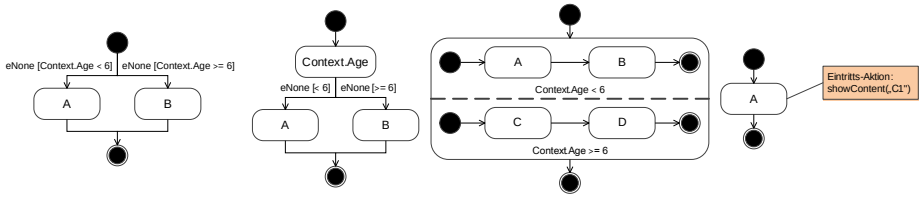

Fig. 1. Different approaches to integrate context-awareness into state chart diagrams

One approach was the use of context conditions inside the guards of the transitions, the next fostered the integration of so called context states. The third approach used the mechanism of sub regions of states and a forth approach took advantage of context-aware conditioned state entry functions. After a thoroughly analysis, we came to the conclusion that a combination of two different approaches would be best suited. The use of transition guards with context conditions in combination with context-aware conditioned state entry functions has shown the most promising results within our tests.

4 Conclusion

Through the use of state chart-based modeling of context-awareness we present an innovative new way to deal with the challenges to integrate/model context-awareness in today's mobile applications. The utilization of the Eclipse Modeling Framework to define the state chart diagrams resp. the application logic of the mobile games made things a lot easier and effective. Our prototype is currently based on J2ME and has been tested on different Nokia smartphones such as the N93 or simpler (but RFID equipped) models like the 6131 NFC and the 6212 NFC. First tests had been promising and we plan to examine the system in a real life scenario in the near future.

References

1. Dürr, F., Palauro, J., et al.: Ein kontextbezogener Instant-Messaging-Dienst auf Basis des XMPP-Protokolls. In: 5. GI/ITG KuVS Fachgespräch Ortsbezogene Anwendungen und Dienste. pp. 23–28. Nürnberg, Deutschland (September 2008)
2. Krösche, J., Scheuchenegger, M., Drab, S., Selinger, S., Jakl, A.: Location-based Mobile Gaming and Entertainment im Tourismus – Lomotain. In: Georeferenzierung im Tourismus. pp. 57–76. Krems und Kitzbühel, Austria (Mai 2008)
3. Poppinga, B., Pielot, M., Boll, S.: Tacticycle: A Tactile Display for Supporting Tourists on a Bicycle Trip. In: Proc. 11th Int. Conf. on HCI with Mob. Devices and Services (MobileHCI '09). pp. 1–4. Bonn, Deutschland (September 2009)
4. Schwinger, W., Grün, C., Pröll, B., Retschitzegger, W., Schauerhuber, A.: Context-Awareness in Mobile Tourism Guides – A Comprehensive Survey. In: Handbook of Research on Mobile Multimedia, Second Edition, pp. 298–314 (2008)
5. Stahl, C., Heckmann, D., Schwartz, T., Fickert, O.: Here and Now: A User-Adaptive and Location-Aware Task Planner. In: Proc. Int. Workshop on Ubiquitous and Decentralized User Modeling (UbiDeUM '07). pp. 52–63. Korfu, Greece (Juni 2007)