Evolving Mobile Prototypes towards the Best-Suited Design and Interaction Schema Using the Genetic Algorithm

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ABSTRACT

The recent advances in the mobile environment, such as multi-touch gestures paradigm, introduce new challenges for the interaction designers in producing the best-suited final prototype. Moreover, the short delivery-time pressure of the current mobile market makes it harder to perform the detailed evaluations for selecting the best prototype amongst the created ones. In this vision paper, we propose an approach for evolving the created prototypes towards the final prototype with the best-suited design and interaction schema. Our approach is based on using the Genetic Algorithm for searching the best solution (prototype with the best-suited design and interaction schema) from the set of created prototypes during the design phase. The proposed approach suits the mobile application development and would enhance the interaction designers’ ability of producing the final prototype of the target mobile application in an efficient and effective way.

Keywords: Designers, Evolutionary Prototyping, Genetic Algorithm, Interaction Design, Mobile Environments, Prototype

1. INTRODUCTION

Recently, we witness a large acceptance of using the mobile applications (commonly abbreviated as mobile apps or just apps) for performing different tasks, both in business processes and also in our daily life (Lin, Newman, Hong, & Landay, 2000). This is because of the simplicity of these mobile apps for specific tasks and the availability of mobile devices in most of our daily routine. The current single-task focusing paradigm (Davis, Saponas, Shilman, & Landay, 2007) of these mobile apps makes them suitable for performing different activates – e.g., finding train timings, weather forecast, etc. – while in mobility. The impact of this is the users’ growing requests for the availability of these mobile apps in short time. Due to this,
software companies face the stress of launching their products in short time in order to fulfill the users’ demands and also to compete with their market competitors.

The recent advances in the mobile interaction paradigm as well as the availability of a number of operating systems and mobile devices makes the designing process of these mobile apps an increasingly challenge for the interaction designers. During the design phase, interaction designers normally build a number of candidate prototypes, sometimes through involving end users in focus groups kind of meetings (Lin, Newman, Hong, & Landay, 2000). Evaluating and selecting the final prototype amongst these created ones is a time-consuming and efforts-taking process. Due to the short delivery-time pressure, normally the interaction design teams lack the time and resources for performing detailed evaluation in order to select the final prototype amongst the created ones. While even if the final prototype has been selected after the detailed evaluation, it is possible that few design elements or the attached interaction schema may not be the best-suited ones. It is also possible that the selected final prototype may provide better design and interaction for some parts while less for the remaining parts compared to the other prototypes. This may cause a revision in the design in later stages, which could make the development more costly and time consuming. Hence, selecting the final prototype with the best-suited design and interaction schema is a critical task for the current mobile application development world and plays an important role for the success of the end product.

To tackle this challenge, we propose an approach for evolving the created prototypes towards the final prototype while choosing the best-suited design and mobile interaction schema from all of the created prototypes through evolutionary steps. Our approach is based on using the Genetic Algorithm (GA) (Banzhaf, Nordin, Keller, & Francone, 1997) for searching the best solution (prototype with the best-suited design and interaction schema) from the set of created prototypes. The genetic algorithm is based on search methods that employ processes found in natural biological evolution. These methods search or operate on a given population of potential solutions to find out a particular solution against some specification or criteria (Levin, 1995). We propose to use the GA approach for generating the final prototype (the best solution) while checking against the required mobile app’s functionalities, the design and interaction elements, and the target mobile environment. The best solution in our context means that the final prototype contains the best-suited design and interaction elements aiming at providing the users a better solution for performing their tasks in efficient and effective manners. The proposed approach would enhance not only the interaction designers’ ability to produce the best-suited final prototype in an efficient and accurate way, but also decreases the time and cost for reaching to this final prototype.

The remainder of this paper is structured as follows. In Section 2, we highlight some related work to show the application of genetic algorithm in different domains and in user interface designing. In Section 3, we explain briefly the idea of the genetic algorithm. In Section 4, we introduce our approach for generating the best-suited final prototype through applying the genetic algorithm. We conclude in Section 5.

2. RELATED WORK

In the past, the genetic algorithms have been applied in many applications during the designing phases. In this section, first we give a brief overview of the GA usage in different domains. Then we highlight its application in user interface designing.

According to a survey by Renner and Ekárt (2003), the genetic algorithm has been used in different domains for the system designing. For example, the survey highlighted its usage in the conceptual designing. In this case, the designer of the system follows a creative method either through combining known components of the system in a creative way or through using the
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