**CHAPTER 1: INTRODUCTION**

In this chapter, we present the research context, problem statement and challenges, the research objectives, and thesis contributions that we have proposed to address these issues. We conclude with the structure of this report.

* 1. **Research context**

Adaptive user interface is a relatively new direction of research which has been increasing in the recent years. It considered as an important issue of research to improve human computer interaction.

Nowadays, human computer interactions become a complex task because software applications, devices, and user’s needs are diverse as well. Users were diverse by their skills, their fields of expertise, their experience and education level, their age, their tasks and goals, their motivation, and their intellectual and physical capabilities. When, user interface offered much functionality like menus, toolbars, dialogue boxes, etc. Also, interaction varying in terms of devices which the invention of computers, netbook, Smart phone, PDA, etc. So, the “one design fits all” approach becomes unable to support all these cases of variability in the context-of-use.

Therefore, AUIs have been promoted as a solution for context variability. It improves interaction between system and users and adapts itself to suit the context of use. The idea is to facilitate the user activity when using system. In fact, adaptation of user interfaces has become a necessity to facilitate the interaction between user and interface.

Adaptive user interface is defined as interactive interface that adapts their display according to the profile of user by monitoring human computer interaction. In other word, it changes its layout and rearranges the screen elements based on user needs. Adaptivity of interface is given by considering the context of use. Where, the context is modeling by three main dimensions: User (U), Platform (P), and Environment (E).

Many examples of AUIs were appeared in the literature during the recent years. Also, today there exist many established approach and frameworks for the design and implementation of AUIs. But, a few number of assessment approach was proposed to evaluate it. In fact, evaluation also considered as an important and challenging research issue in the area of AUIs.

* 1. **Problem statement**

In spite of the growing importance of adaptive user interface, they still exist critical issues in its development such as the lack of appropriate evaluation method. Evaluating AUIs need an appropriate method that assessing “dynamic” user interface. It aims to evaluate the adaptation of interface to their context of use. In fact, it is a complex task because it takes into account the variability of interface according to the current user, the platform, and the environment.

Proposed an automatic evaluation method to detect the problem of AUIs is a complex task and has many constraints and issues that should be considering:

* **Problem 1:** evaluating of AUIs need to take into account user characteristics. It is an important dimension that helps to verify the effectiveness of interface. But, users have a large number of characteristics such us age, motivation, education level, interest, gender, experience, etc.
* **Problem 2:** the variety of platform characteristics also should be considered in the evaluation method. For example each platform can be characterized by its screen size, operating system, screen type, memory, etc.
* **Problem 3:** also AUIs considering the variety of environment, it adapts their interface according to the current location, time, luminosity, etc.
* **Problem 4:** one other problem is that the adaptation of AUIs should be evaluated basing on some quality criterion. In literature there are many quality criteria as defined as the key of effectiveness of AUIs. For example, we quote these criteria: usability, guidance, compatibility, coherence, adaptability, learnability, etc. These criterions should used to evaluate AUIs and detect problem.
* **Problem 5:** another issue with AUIs research is that evaluation have focused on the benefit of adaptation, while problems have been ignored. And there is no consensus on the problem that caused negative impact on the effectiveness of AUIs.
  1. **Research objectives and main contributions**

This master thesis seeks to evaluate adaptive interface and detect automatically its problem. The following sentence is the question of this research:

*How to evaluate adaptive user interface and detect its problem*

*basing on the context of use?*

While there are number of challenges to adaptive user interfaces development, we focus on those challenges that are pertaining to evaluate adaptive user interface and detect its problems.

* + 1. **Objectives**

Basing on, the later studies of evaluation techniques of user interface design for non-adaptive interface and the specification of AUIs that addresses to considering the context of uses, we aims to propose an automatic evaluation tool that allow to detect problems of adaptive interface, and to check if the adaptation decision making by the AUIs systems are meaningful and success to satisfy the special needs of users.

* + 1. **Contributions**

In order to accomplish the previous objectives, this master report has used to present an automatic method to detect the defect quality of adaptive interface that we propose the two following contributions:

1. To automate the detection of problem of AUIs we propose firstly a search-based approach using multi-objective evolutionary algorithms to automatically generate evaluation rules. These evaluation rules will used to detect problem. This first contribution aims to generate a set of evaluation rules based on combination of context, quality metrics, and problem.
2. The second contribution is considered on building an automatic tool to detect problem of AUIs. This tool is an Eclipse plug-in that takes as input the source code of adaptive system and generate as output the problems detected in its interface. This contribution divided into two parts. The first part is considered on adjustment process that update the threshold using in the evaluation rules according the measurement of quality metrics of current interfaces to be evaluated. The second part is considered on the detection of problem.
   1. **Report structure**

The rest of this report is divided into three chapters. In chapter 2, an overview of the state-of-art about adaptive user interface, and existing tools used to evaluate it is presented. Chapter 3 details the development of the optimization problem used to generate evaluation rules and the proposed tool that used to automate the problem detection process. Finally in chapter 5 we discuss the result of proposed solution and providconcluding remarks and perspectives.