

Chapter 8.14

Adaptive Interaction for Mass Customisation

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ABSTRACT

The popularisation of mass customization and the need for integration of the user needs into the design, production and marketing phases has called for more innovative methods to be introduced into this area. At present the continuous growth of the world wide web and its rapid integration into people's everyday lives and the popularisation of new technologies such as ubiquitous computing making possible the computing everywhere paradigm, offers a more desirable alternative for vendors in reaching their customers using more innovative techniques in an attempt to provide each customer with a one-to-one design, manufacturing and marketing service. The integration of ubiquitous computing technologies with machine

learning and data mining techniques, which has been popular in personalization techniques, will serve to bring about innovative changes in this area. In future years this may revolutionise the way in which vendors can reach their customers offering every customer a tailored one-to-one service from design, to manufacturing, to delivery. This chapter will present the state of the art techniques to enable the combination of machine learning, data mining and ubiquitous computing technologies which will serve to provide innovative techniques applications and user interfaces for mass customization systems. This is currently a field of intense research and development activity and some technologies are already on the path to practical application. This chapter will present a state of the art survey of these technologies and their applications.

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INTRODUCTION

The notion of integrating user needs into the production and design process has had great importance in mass customization. This idea is a promising strategy for companies being forced to react to the growing individualization of demand (Franke & Piller, 2002). In mass customization concepts, goods and services are made to meet individual customer's needs produced with near mass production efficiency (Tseng & Jia, 2001). Mass customization embarks a new paradigm for manufacturing industries (Pine, 1993). It recognises each customer as an individual and provides each of them with tailor made features that can only be offered in the pre-industrial craft systems (Jiao & Tseng, 1999).

Mass customization (Shafer, Konstan & Riedl, 1999) was first popularised by Pine in 1993 (Pine 1993). In his book Pine argues that companies need to shift from the old world of mass production where "standardized products, homogeneous markets, and long product life and development cycles were the rife, to the *new* world where the variety and customization supplant standardized products." Pine argues that building one product is simply not adequate any more. Companies need to be able to at a minimum, develop multiple products that meet the multiple needs of multiple customers.

With the ever increasing popularity of the World Wide Web in recent years Rheingold (Rheingold, 2002) states that Web software holds the promise of mass customization and further states that a software's ability to fulfil an individual's needs necessitates the application to be aware of several factors such as, the user's profile, his/her current task or goal, and additional factors such as location, time or device used. The combination of all relevant factors can be termed *context* and thus a web application which takes them into account is a context-aware application (Kaltz, Wolfgang, Ziegler & Lohmann, 2005).

In this paper we present an overview of how the different techniques in personalization, data mining and ubiquitous computing in particular context-sensitive systems can be integrated with mass customization of services and products to bring innovation in this field of research.

BACKGROUND

Web Personalisation and E-Commerce

The World Wide Web has created a challenging arena for e-commerce: with on-line shops, products and services offered to on-line customers. In this context, two specific strategic goals must be addressed (Meirer & Werro, 2007). First, to attract new on-line customers, or lost customers that have to be re-acquired, these customers have attractive market and resource potential. The second strategic goal is to maintain and improve customer equity, this can be achieved by cross-selling and up-selling, and through programs aimed at lifetime customer retention (Blattberg, Getz, & Thomas, 2001). Managing on-line customers as an asset requires measuring them and treating them according to their true value. With the sharp customer classes of conventional marketing methods this is not possible.

In recent years web personalization technologies have revolutionised e-commerce, enabling the one-to-one marketing practice. Personalisation technologies are an important tool to the service provider/vendor and to the end user the customer. Web personalization tools are able to assist in the complex process of information/product discovery. There are numerous benefits to the vendors these include attracting new visitors, turning visitors into buyers increasing revenues, increasing advertising efficiency, and improving customer retention rate and brand loyalty (Kobsa, 2001). Nielsen (Kobsa, 2001) reports that e-commerce sites offering personalised services convert signifi-

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