# Interactive Product Catalog for M-Commerce

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## INTRODUCTION

We propose a product catalog where browsing is directed by an integrated recommender system. The recommender system is to take incremental feedback in return for browsing assistance. Product appearance in the catalog will be dynamically determined at runtime based on user preference detected by the recommender system. The design of our hybrid m-commerce catalog-recommender system investigated the typical constraints of m-commerce applications to conceptualize a suitable catalog interface. The scope was restricted to the case of having a personal digital assistant (PDA) as the mobile device. Thereafter, a preference detection technique was developed to serve as the recommender layer of the system.

## BACKGROUND

M-commerce possesses two distinctive characteristics that distinguish it from traditional e-commerce: the mobile setting and the small form factor of mobile devices. Of these, the size of a mobile device will remain largely unchanged due to the tradeoff between size and portability. Small screen size and limited input capabilities pose a great challenge for developers to conceptualize user interfaces that have good usability while working within the size constraints of the device.

In response to the limited screen size of mobile devices, there has been unspoken consensus that certain tools must be made available to aid users in coping with the relatively large volume of information. Recommender systems have been proposed to narrow down choices before presenting them to the user (Feldman, 2000).

### Catalog Browsing

In one study, a new user behavior, termed *opportunistic exploration,* has been identified, where users have multiple, ill-defined overlapping interests (Bryan & Gershman, 1999). Throughout the course of browsing, exposure to items affect interests, and interest may evolve due to exposure or whim. In Tateson and Bonsma (2003), the emphasis was that the paradigm of online shopping is fundamentally different from that of information retrieval.

Despite the importance of having a well-designed online catalog that supports the shopping behavior of users, the challenge of including such browsing capabilities in m-commerce is great, given that the small screen size of mobile devices severely limits the number of products that may be presented on-screen.

The predominant strategy of organizing products into narrow categories has many problems (Lee, Lee, & Wang, 2004). The alternative solution of interactive catalogs (Tateson & Bonsma, 2003) allows for fluid navigation of the product space, whereby users are given the freedom to redirect the browsing process as and when their interests change.

### Recommender System

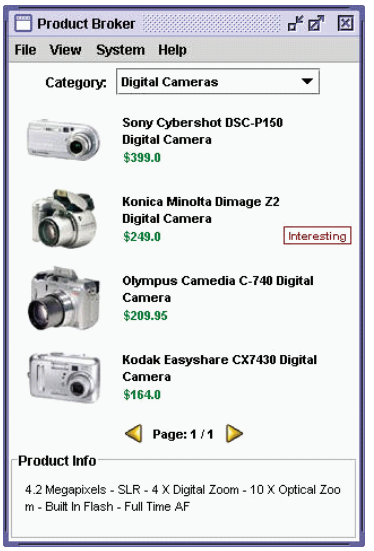
Recommender systems perform the role of sales agents by first understanding a user's preferences through querying and profiling, and subsequently presenting information or products of relevance to the user (Schafer, Konstan, & Riedl, 2001). Recommender systems have long been regarded as a highly desirable feature of e-commerce.

Currently there are numerous ongoing studies to improve recommender technology in the context of e-commerce (Konsten, 2004; Montaner, Lopez, & Lluis, 2003). However, the approaches of such studies are seldom directly applicable to the domain of m-commerce. With respect to the m-commerce constraints, a "best effort" recommender system that makes do with whatever information is available will serve as an interesting alternative to the "best quality" emphasis of current recommendation technology.

## DESCRIPTION OF INTERACTIVE CATALOG

The interface of a catalog is divided into three components: visual presentation, browsing process, and feedback mechanism.

*Figure 1. Screenshot*




## Presentation

Given the constraint of a PDA screen, the main concern of our design is to maximize emphasis on product presentation while simplifying the control elements. Human cognition is more adapted to the processing of visual images as compared to textual information (Lee et al., 2004). Visual elements are thus useful mechanisms to improve the usability of a catalog. To save space while facilitating easy examination of products, we incorporate a product information panel. Figure 1 shows a screenshot of the implemented user interface.

## Browsing Process

Browsing naturally induces a sense of flow, which may be imagined as a navigation process through the product space. The main challenge in the design of such a navigation system is to define the relation of products with respect to one another. Differing standpoints of people dictate that each individual sees the product relations from a different perspective. One method of custom defining product relations doing so is through interactive critiquing of products (Burke, 2002). Interactive critiquing involves allowing a user to express the goals that are not satisfied by current items. Another method to understand the preference of a user is through clustering. In our case, clustering may be used to group items that receive similar feedback from a user in an attempt to identify the underlying pattern that matches the preference of the user.

While the sharp focus on a single point in the product space, a feature of interactive critiquing, makes it unsuitable for expansive browsing, in our catalog, one desirable feature is to have an adaptable focus that allows the user to glance at the entire product range as well as zoom in on a few products of interest. We define two parameters in our browsing: breadth and preference. Breadth is a measure of diversity in the product presentation, whereas preference is the inferred interest of the user.

Breadth needs to be changed according to the state of browsing. As the user increasingly grasps some understanding of the available choices, breadth should be narrowed down to focus on recommended products based on the user's preference, allowing the user to discover products of increasing interest and at the same time facilitate a comparison of close alternatives to aid in the purchase decision. At any time, should a shift be detected in the user interest, breadth has to be relaxed accordingly to allow the user the possibility to explore again products of differing nature.

To implement such a mechanism, we divided each page of the catalog into two portions, the first containing products recommended based on the detected preference of the user and the second containing randomly sampled products. Breadth is defined as the size of the latter portion.

## Feedback Mechanism

In our case, we note that the most intuitive and compact feedback method is for a user to comment directly on the products on display, as proposed by Burke, Hammond, and Young (1997), in this using a case-based critiquing approach and adopting a bipolar rating system for simplification.

Using the bipolar rating system, we obtain a set of selected products and its complement. The selected set is derived through explicit feedback by the user. This establishes it as a strong indicator of user interest. The converse however is not necessarily true for the complementary set of non-selected products.

The usefulness of non-selected products is the relativistic nature of product selection. A user initially selects what appears to be the best available option. With greater exposure to relevant products, it is natural for a user to become more discerning in making a choice. It is thus inaccurate to conclude that non-selected products are disliked by the user. In view of the ambiguity in interpreting the set of non-selected products, the approach adopted in this article is to analyze only the selected set.

## Prototype

A prototype of the catalog was developed for testing purposes. Though fully implemented in Java, the interface was designed to be easily presentable in HTML format. In an actual implementation, the catalog software is intended to reside on a Web server and be remotely accessed via PDA.