XQuery Pattern Method for Semantic Web based Personalization Recommender Service

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Abstract

As the number of web pages increases dramatically, the problem of the information overload becomes more severe when browsing and searching the WWW. To alleviate this problem, personalization becomes a popular remedy to customize the Web environment towards a user's preference. In this paper, we presented a User XQuery method for personalization recommendation in semantic web that used in the domain of e-commerce and m-commerce based ubiquitous environment. Also, we designed personalization framework in ubiquitous environment based both e-commerce and m-commerce and presented the interaction of user profile including user keyword and XQuery pattern in semantic web.
Keyword: Personalization, User XQuery, Recommendation, User Profile, Semantic Web.

I. Introduction

The increasing large amount of services and data available in the World Wide Web has increased the need to help user to find the relevant many information. This has lead to a growing interest in personalization during the last several years. Personalization can be defined the use of technology and user information to tailor electronic commerce and mobile commerce interactions between a business and each individual user. The purpose of this information technology combined with marketing practices specialized for the World Wide Web is to as follows: i) Better serve the user by anticipating needs, ii) Make the interaction efficient and satisfying, iii) Build a relationship that encourages the user to return for subsequent purchases. In order to efficient personalization recommender, an efficient approach for improving the performance of user query is to discover frequent query on e-commerce and m-commerce. However, there has been lack of essential features as both efficient privacy management and ubiquitous presence. Also, electronic commerce and mobile commerce providing such kinds of services are still limited for personalization recommender. This paper proposes a solution to overcome these limitations. After presentation of structural approaches regarding user profile, we introduce personalized XML Query by using of user query. In addition, we also propose a summary structure, to keep track of the mining result, and to incrementally compute the frequent tree patterns over the XML Query stream. Then, we present the architecture of a Ubiquitous based Personalization Recommender Framework and illustrate its use in the domain of E-commerce and M-commerce. This paper is organized as follows: Section 2 described Content-based on Filtering System, Manual Decision Rule System and Collaborative Filtering System as related work. Section 3 described architecture of a Ubiquitous based

Personalization Framework using of e-commerce and m-commerce as Proposal System. Section 4 presented the interaction of User Profile and XML Query in Semantic Web as Implementation and Evaluation. Section 5 we propose conclusion.

II. Related Work

In general, recommendation systems manage information overload by helping a user choose from among an overwhelming number of possibilities.[1] These systems broadly fall into three classes based on the techniques they use to narrow the range of likely choices. Most recommended systems that operate in web-based divide by three classifications; Content-based on Filtering System, Manual Decision Rule System, Collaborative Filtering System, and Link based System is come hereupon.

Content-based Filtering System. Content-based filtering systems utilized machine learning techniques such as naïve bayes to analyze Web pages, Usenet News, E-mail, and other types of electronic content amenable to automatic textual analysis.[2] Also, in the content-based filtering system, the user profile and the document profile are represented as weight vector of keywords. In Recommender System to which content-based Filtering is applied, recommendations are made for a user based solely on a profile built up by analyzing the content of items that the user has rated in the past. InfoFinder and WebWatcher are the examples of such systems.[3][4] Content-based Filtering System has several defects. The first problem is that only very shallow analysis of certain kinds of content can be supplied. As well as characteristic of the content itself, there are many other aspects of the content, such as public quality and time consumed on loading content. The system ignores such factors. The second problem is Over-Specialization. When the system can only recommend items scoring highly against a user's profile, the user is restricted to seeing items similar to those already rated.

Manual Decision Rule System. Manual Decision Rule System describe rule base that web site operator are collecting static profile, user session history through user's registration instruction. Representative example of this system is Broad vision. Broad vision provides an array of business solutions that is Content Management Solutions, Personalization Solutions, Commerce Solutions, and Enterprise Portal Solutions and so on, to meet your greatest challenges, from the power of personalization to robust content management to leading edge applications and enterprise portals.[5] In this way, Rules are influenced in contents that are offered to particular users.

Collaborative Filtering System. Collaborative Filtering System, items are selected for a particular user when they are also relevant to similar user. Also, Collaborative Filtering System provide predicted information's that suitable with user's preference degree through correlation engine based on clarified information that equipped user's estimation or type of preference degree. A recommendation System, which utilizes collaborative filtering system, does not analyze an item at all. The system recommends items for a user solely based on similarities to other users. GroupLens and Ringo are examples of such systems.[6][7] Such a collaborative recommendation system solves problems of content-based recommendation system. Using other user's ratings allows us to deal with any kind or content and receive items with dissimilar content to those seem in the past. Since other user's feedback influences what is recommended, there is the potential to maintain effective performance given fewer ratings from any individual user. Nevertheless, this system has some problem. The first problem is that the coverage of ratings could be very sparse yielding insufficient recommendations. The cases that new items are inserted into the database or that the number of users is too small relatively to the volume of the items in the system cause the problem. The second problem is that there will not be any like-minded user for a user whose tastes are unusual compared to the rest of the users.[9][10]

III. Proposed System

3.1 Personal User Profile Management

The solutions proposed e-commerce and m-commerce and process personal user profile in one of the as following locations:

Locally, on the user device: Today, this raises security concerns, due to the lack of confidentiality mechanism provided by PDA and Handheld device available. As long as it's stored on a disk, and processed in an unprotected memory, there is a risk of unauthorized copy or modification of user information. Furthermore, the user profile is physically attached to one device, reducing its presence to one context.

Remotely, on the service provider site: Knowledge of the user is mostly historical. But the user profile is then restricted to the service offered by the provider as site, which does not fulfill our ubiquitous requirement. Because of a user profile is complex information, built from the collection of data originating from many sources such as user action, behavior monitoring, and so on.[12][13]

3.2 Ubiquitous based Personalization Framework

The personalization process consists of transforming a general incoming flow into a personalized outgoing flow. The flow data may consist of put together of actions, static information, and real-time stream. In order to perform its task, the personalization process would have a description of the flow data, which will allow it to understand the semantic of the information. This information can either be computed from the data for instance the e-commerce and m-commerce can be obtained from its user query keywords, or be expressed data as shown by a user profile. We call this information metadata in semantic web.[11] As metadata in semantic web, the personalization process relies on the user profile module, which manages information such as: i) name, email, cell-phone number and so on as nominative data. ii) age, sex, location, language etc as anonymous demographics by user profile. iii) preferences degree, applications' configurations, persistent state as application data. iv) user behavior. We shown as follow in Fig. 1.

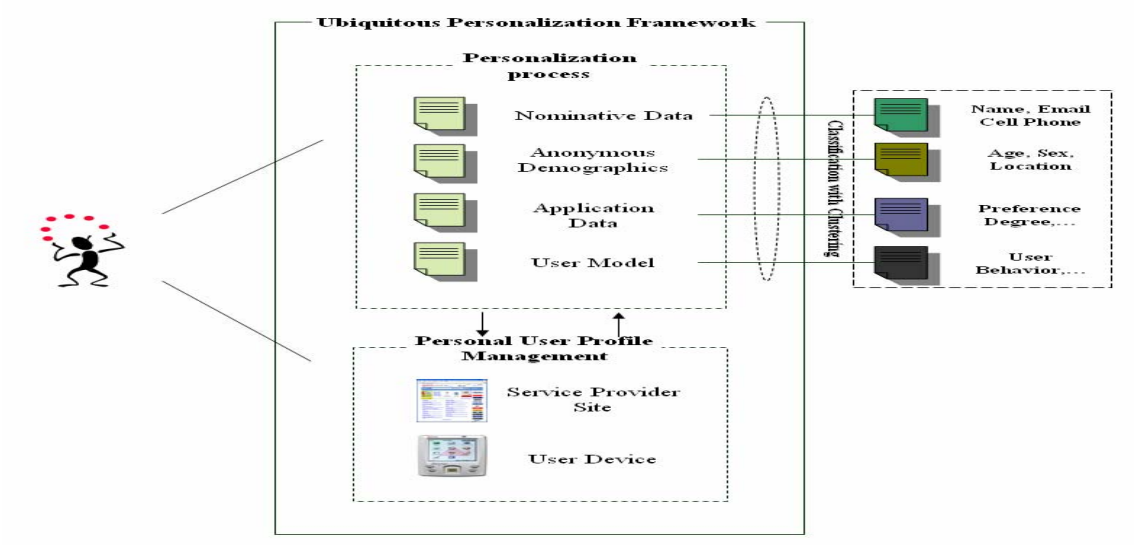

Fig. 1. Ubiquitous based Personalization Framework Environment

3.3 XML Query in Semantic Web

Semantic web data is often explained as “schema” or “self-describing”, terms that indicate that there is separate description of the type or structure of data. Typically, when we store or program with a piece of data, we first describe the structure(type, schema) of that data and then create instances of that type the schema. In semantic web data, we directly describe the data using syntax. We are used to represent recordlike or tuplelike structures: {name: “JHKim”, E-mail: “ziro@yahoo.com”, Cell No: “2907211”}. This is a set of pairs such as name: “JHKim” consisting of a label and a value. The values may themselves be other structures as in {name: {first: “Kim”}, {last: “JH”}, E-mail: “ziro@yahoo.com”, Cell No: “2907114”}. Also, we are used to represent structural Category in e-commerce and m-commerce.: {ShoppingMall Name: “NateShop”, Great Classification: “Computer”, Bisection Kind: “Notebook”, Subdivision Kind: “Samsung”}. In this way, the syntax makes it easy to describe sets of tuples as in semantic web. XML queries can be modeled as query pattern trees by XPath. In addition to element tag names, a query pattern tree may also consist of wildcards “*” and relative paths “//” by Equivalence Classes Tree(ECTree). The wildcard “*” indicates the ANY label, while the relative paths “//” indicates zero or more labels. We assume the query pattern tree doesn’t contain sibling repetitions, that is, the siblings in a query pattern tree have distinct labels. Formally we define as follow, that is, XML Query Pattern Tree: A query pattern tree is a rooted tree XQPT=<V,E> is denoted by root(XQPT). For each edge e=(V1, V2), node V1 is the parent of node V2. Each vertex V has a label, denoted by v.label, whose value is in {“//”, “*”} U tagSet, where the tagSet is the set of all element and attribute names in the schema. Mining XQuery Stream: As XML queries stream into the system, a sequence of query pattern trees(XQPT) is formed. Let S = XQPT1, XQPT2, … , XQPTN where N is the length of the current stream, that is, the number of query pattern trees seen so far. Mining the frequent query patterns in S implies discovering the frequent rooted subtrees(RST) in the current sequence. A rooted subtree matches a query pattern tree XQPT in S, or we say, rooted subtree occurs in S, if it exist a XQPT that includes the rooted subtree. Consider the query pattern trees and an n-edge rooted subtree in Fig. 2.

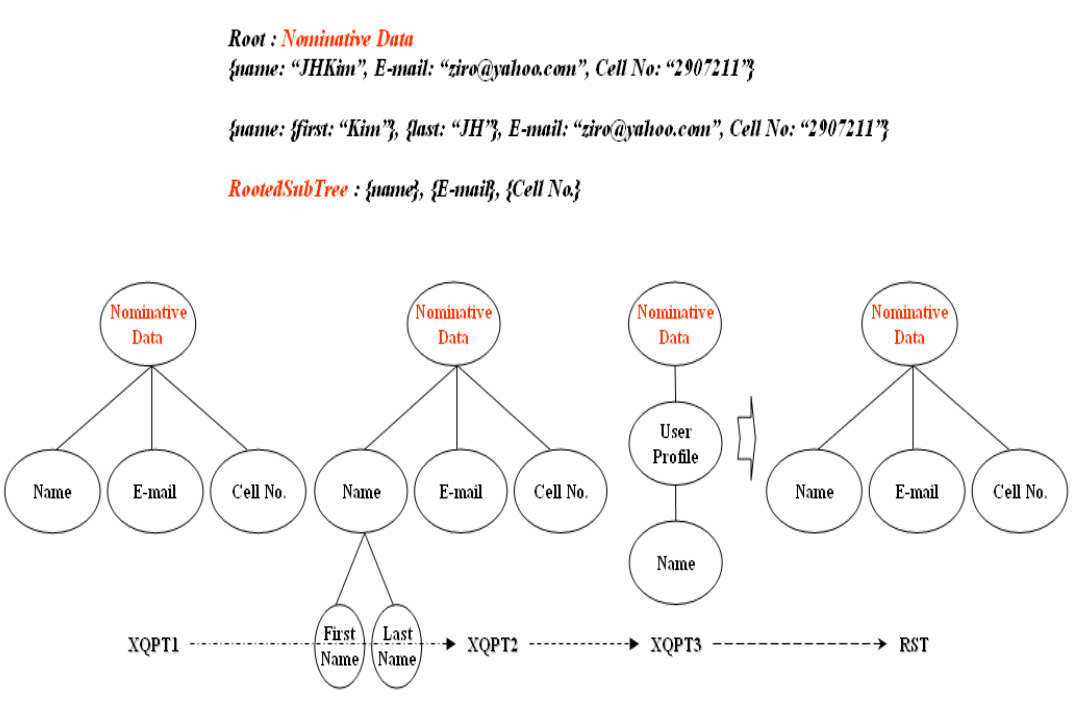

Fig.2. XML Query Pattern Tree applied for Mining XQuery Stream

IV. Implementation and Evaluation

Our implementation environment is as follows:

i) Server side: IIS Web Server based on Windows 2000

ii) Client side: XML Programming(XML, Schema and RDF) in Semantic web.

4.1 Ubiquitous based Personalization Process Module

Personalization process module (PPM) is consisted of four sub-module as follow in Fig. 3 : i) Nominative Data(ND), ii) Anonymous Demographics(AD), iii) Application Data(AD), and iv) User Model(UM). Achievement processing of PPM is as following: First, perform Structural by XML in order to express correlation XSchema and RDF in Semantic web. Second, by using of Schema, we offer that description and constraint of documents using XML Syntax, support for data types, description of content models and the reuse of elements via inheritance, extensibility, ability to write dynamic schemas, and self documenting capabilities when a stylesheet is applied. Third, as raise on XML document and XSchema, we are intended for situations in which this information needs to be processed by applications. Also, we provide a common framework for expressing this information so it can be exchanged between applications without loss of meaning. In this way, it result that personalization process module by XML Schema and RDF for Semantic web, we was capable of operating not only on multiple documents, but also on document fragments.

Fig.3. Personalization Process Module for Dynamic Interaction in Semantic web

4.2 XQuery in Semantic Web

XQuery is a powerful way to search XML document for specific information. It is based on XPath and has the Schema statements. Also, XPath supports complex queries and complex result constructions with nested clause. We now introduce a new set of syntax rules called XML Query Pattern Tree, which is a generalization of XTree based XPath. It has a tree structure like the structure of XML Schema and RDF. In the querying part of an XQuery(User Query), this is based on User Profile information for personalization and Product Data(Transaction Data, Action Data) related on Ontology in XML Database.[8] We define XML Query Pattern Tree and Mining XQuery Stream. Also, Table1 gives XPath expressions, according to the XML document in ShoppingMall based XDB with Ontology.

Table 1. XPath expressions by Shopping Mall

XQuery by XPath Expression	Description
/Cat/SMName/@GC	Get attribute "GC" of each ShoppingMall Name.
/Cat/SMName/BK	Get element "BK" of each ShoppingMall Name.
//BK	Get all elements named "BK", regardless of their absolute paths.
*/Cat/SMName/**	Get all subelements of each ShoppingMall Name.
*/Cat/SMName/@**	Get all attributes of each ShoppingMall Name.

Cat: Category, *SMName: ShoppingMall Name, *GC: Great Category, *BK: Bisection Kinds

From the description logic point of view by Table 1, our pattern method classified with XQuery by XPath related on RDF schema in Semantic web.

Query 1 : Class Query with PPM

Typeof : Typeof(rdf:SchemaLocation="ND.xsd")
document("rdf_Nominativedata.xml")
//rdf:Description[@rdf:about="rdf:SchemaLocation"]/rdf:type/@rdf:resource

SuperClassof: SuperClassof(rdf:SchemaLocation)
document("classHierrarchy.xml") //NS:Nominative Data
Domain:Domain(URI="ND.xsd")
document("propertyHierarchy.xml")//NS:Nominative Data .....

Query2 : Class Query with XQuery(User Query)

Typeof : Typeof(rdf:SchemaLocatioin="Category")
document("rdf_Category.xml")
//rdf:Description[@rdf:about="rdf:SchemaLocation"]/rdf:type/@rdf:resource
Domain:Domain(URI="GC.xsd")
document("propertyHierarchyGC.xml")//
NS:Great Classification
SubDomain : subdomain(URI="BK.xsd")
InstanceOf :document("rdf_Category.xml")
//rdf:Description[@resource="(SchemaLocation="GC.xsd")"]…….

The XQuery Execution: In order to demonstrate the XQuery management of implementation for the cokas provider, a cokas local network was set up with provider peer configured with the RDF knowledge base depicted in Fig. 4. As before, "co:" is an abbreviation for the cokas based URI localhost://cokas.skku.edu/rdf/. The XQuery states, we find all resources that have a type and a domain.

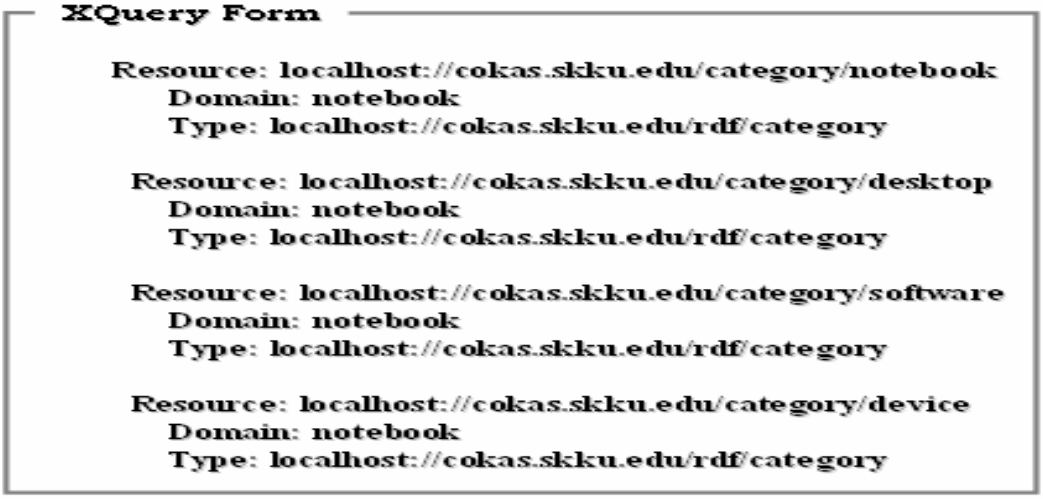

Fig. 4. RDF knowledge base for the cokas provider, XQuery Form and Recommend-Category

4.3 Evaluation

Our experiments have intended to show the followings: one is to show the possibility of using XML syntax and dynamic schemas. Another is to show the possibility of personalization recommendation for commerce world and ubiquitous environment. We proposed each of modules existing on Personalization Process Module and using of XML Schema and RDF on the basis of this. Our paper provides that evaluation about personalization policy in ubiquitous framework has advantages as follow:

i) User Adaptation. This integrated end-user support for system building, composing, and user feedback. Also, This involves a process of gathering user-information during interaction with the user, which is then used to deliver appropriate content and services, tailor-made to the user's needs.

ii) Context Awareness in commerce world. Context awareness drives adaptability of pervasive computing systems in commerce world. Also, discovering, extracting, interpreting and validating context will make a significant contribution to increasing efficiency, flexibility and feasibility of pervasive computing systems.

iii) Efficiency of Recommendation. We can improve personalization recommendation in efficient. That is, Personalization Process Module is a personalized document category as user query used in the design of a user experience based web history.

V. Conclusion

In this paper we presented a User XQuery based Personalization Recommendation Web Service Pattern. User XQuery provide an important Recommendation service that help E-Commerce and M-Commerce by creating personalized Document on Retrieval System. In order to provide these service effectively, User XQuery should be "User Oriented Query Pattern". Also, as described in this paper, this is achieved through the utilization of a XML based E-Commerce and M-Commerce by Semantic Web including XML Query Pattern, Mining XQuery Streaming, Personalization, User Profiling and XML based technologies.

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