

Role of Agent Communication Language in WEBMINTEL System

Shakti Kundu and Madan Lal Garg

*Department of Computer Science & Engineering,
DIT University, Dehradun - 248009, Uttarakhand, India
shaktikundu@gmail.com, mlgarg2000@yahoo.com*

Abstract

Agents are the software entities that are having ability to extract information on behalf of user to provide correctness within the term. Agents are significant because they permit various software components the ability to exchange and use information in web content retrieval. To communicate and progress the request, Agents need a general Agent Communication Language (ACL). With JSP and WEBMINTEL architecture, it becomes easier to implement Agents. This paper highlights the Web Mining Intelligent Agents (WEBMINTEL) System, role of Agent Communication Language and approaches used for performing Web Mining with JSP.

Keywords: *Agents, Codes, Programming Languages, Systems, Web Mining*

1. Introduction and Motivation for Research

Web Mining is an approach for data gathering practices that assemble in the form of relevant information over the internet. Web Mining means extracting interesting or valuable information from a root level substance, such as gold mining. It is used in various domains of web activities like to recognize the behavior of user and to compute the overall performance of website.

Prototype in data can be examined via Web Mining taxonomy. Web Content Mining examine the gathered data by search engines and web spiders. Web Structure Mining inspect the assembled web content linked to the configuration of a specific web site. Web Usage Mining focus on various web happening activities in the form of relevant data and examine the web data related to user browsing activities.

One of the features of an agent is self-initiation. It not only performs in the reaction to its environment but also it disclose goal by its approach of beginning [1]. Multi Agent system (MAS) works with support of many agents which exchange information to the respective domain. The instructions are interchanged across network infrastructure. In MAS, the ability of single Agent is limited, but many Agents can bring complicated activity to an end through cooperation [2].

The Agent Communication Language major objective is to build up correct architecture that considers various software agents to communicate with important report which discuss relevant data about their domain [3].

There is tremendous demand for implementing the system in an intelligent manner. To achieve the factor of brilliant system, agent communication language plays an important act with their resourceful methods. These applications range from information retrieval and management to electronic commerce. All these applications have one thing in common i.e. Multi Agent system.

The deficiency in structure that fills the information sources on Web makes the preset detection of web based information troublesome. Traditional search engines such as Alta

Received (June 16, 2017), Review Result (September 28, 2017), Accepted (September 29, 2017)

Vista, Web Crawler, Aliweb [4] and others provides services to users but not efficient for providing structural information or filtering documents. Vernon H, Leighton et al. provides comparative study of most popular search engines [5].

Intelligent Search Agents is one of the Agent based approach. Several agents have been designed to find out the valuable skills by the profile of user and its domain. Harvest [6], FAQ-Finder [7], Information Manifold [8] and Parasite [9] projected agents that work on prior instructions of respective infrastructure. Some of the agents perform on different aspects *i.e.*, on source code platform in order to obtain the interesting documents. Other Agent such as ShopBot [10] regains product knowledge from range of vendor sites using only overall information about the scope of the product.

Information categorization is another Agent based approach. Several software Agents via information extraction techniques and hierarchical clustering techniques provides filter and categorical information [11-13]. Maarek *et al.*, created cluster of web contents on the basis of considered data for bookmarking [14] activity. HyPursuit [15] proposed by Weiss *et al.*, applies hierarchical clustering technique to extract hypertext documents.

Using various Web analyzer tools, it is possible to detect the number of accesses to the server and URL of users. Such tools provide knowledge about number of hits, files, page visited but they are having certain criticism also. For example, Webalizer [18] which cannot differentiate between the human user visit and robot visit. For pattern discovery and pattern analysis, log analyzers [16-18] are generally preferred.

For pattern discovery and pattern analysis, Cooley et al. planned Webminer system [19] which operates on SQL like query mechanism for selection of discovered knowledge. But there are two issues which are associated with Webminer. First, the identification of user is inappropriate. Second, the overall transaction activities were not upto the standard. More refined and stylish tools and techniques are now emerging for discovery and analysis of patterns.

Neli *et al.*, [20] proposed Automated Data Mining using Perl Script from Web servers. The expected search tool prepared on the platform of Perl / CGI script. Armstrong et al. [21] projected the WebWatcher which focus on the structure and execution activities of an Agent. It support user either by advising them to select the best web links in finding the interesting information or by hunting independently.

Lieberman [22, 23] introduced an Agent Letizia that tracks the user's browsing behavior and tries to anticipate what items may be of interest to the user.

Lieberman *et al.*, [24] proposed Reconnaissance Agents with two examples: Letizia and Powerscout. Letizia investigate the neighbouring nodes of the latest page. It searches for the relevant information in limited or specific area. Powerscout explore the web by the help of search engine. It inspect the interesting data in widest or broader area.

1.1. Categories of Data used in Web Data Extraction

The four major categories which are part of web mining procedure that helps in extraction of web data are as follows [25]:

1.1.1 Content Data: It emphasize on various search based knowledge that contain web content as well as stored information. It contains discovery information from the various sources available across the World Wide Web.

1.1.2 Structure Data: It presents the web documents via hyperlinks. It linked the hypertext document to another location by clicking on a highlighted text, word or an image.

1.1.3 Usage Data: The information related to web page activities like number and time of visit or other session based tasks are part of usage data. It contains information related to user access.

1.1.4 User Profile: It consists of various user characteristics such as age, gender, location, *etc.*, used for analytical study and highlighting the gathered preferences that are either raw or perfect.

1.2. Roadmap

The manuscript is classified in the subsequent headings: Segment 2 describes architecture of Web Mining Intelligent (WEBMINTEL) Agents. Portion 3 describes the Agent Communication Language. Division 4 refers to Web Mining with JSP and finally some conclusions are provided in the Part 5.

2. Web Mining Intelligent Agents (WEBMINTEL) System

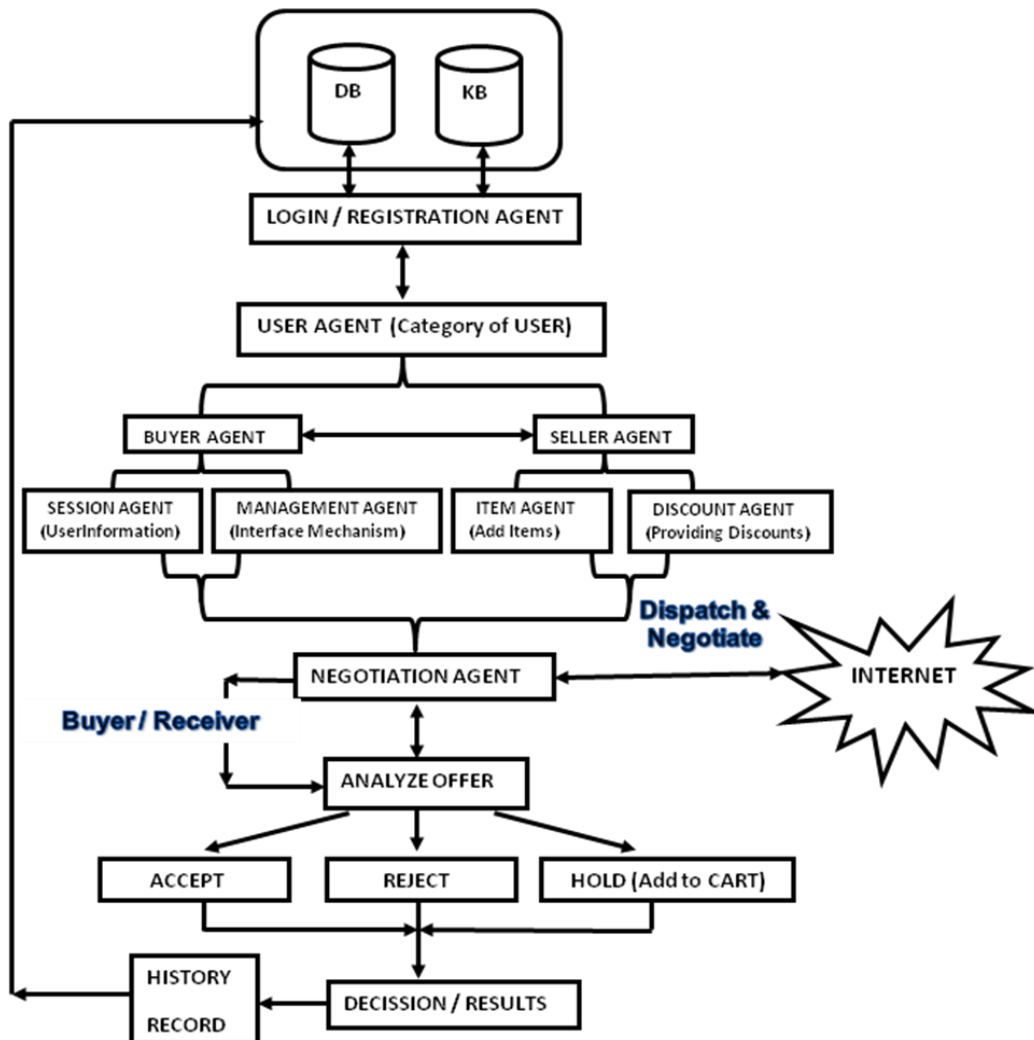


Figure 1. Web Mining Intelligent Agents (WEBMINTEL) System

2.1 Work Flow of Web Mining Intelligent Agents (WEBMINTEL) System as highlighted in Figure 1 is discussed as:

2.1.1 Registration Agent: The Registration Agent works for collecting information in cluster form. It translates or forwards information to its associated agent either from the database or knowledge base.

2.1.2 User Agent: It represents the category of user namely Buyer Agent and Seller

Agent. Moreover it performs a role of intermediate between Registration Agent and Buyer as well as Seller Agent.

- 2.1.3 Session Agent:** It is a software application that managed ignored contextual implementations. It focuses on the user information which is further preceded to the management agent.
- 2.1.4 Management Agent:** It deliver information to the manager and share as well as support the necessary details to the Negotiation Agent for preceding any further steps.
- 2.1.5 Item Agent:** It searches the relevant information for negotiation both from buyer as well as seller standpoints.
- 2.1.6 Discount Agent:** It provides discount details related to the percentage on maximum retail price of various listed products on the web page.
- 2.1.7 Buyer Agent:** It takes steps related to the various buying activities of customers or users.
- 2.1.8 Seller Agent:** Seller Agent highlights the overall environment of e-commerce.
- 2.1.9 Negotiation Agent:** It performs two important tasks namely communication and negotiation. It analyzes the offer of Buyer and Seller on the basis of communication through prior Agents. The offer was analyzed on three outcomes. Either it will be accepted or give up but if it is rejected, then no further message will be passed. The History Record is finally stored in the related database.

3. Agent Communication Language

An Agent Communication Language (ACL) is a collection of speech act like messages, with agreed upon meanings, which delivers the knowledge and information exchange between Multi Agent system. From Knowledge Query and Manipulation Language (KQML) to Foundation for Intelligent Physical Agents (FIPA), ACL's have been a cornerstone for the development of Agent based systems. The ACL revolved around establishing the meaningful environment and standardized communication among Agents.

Agents understand each other by means of common thinking. Thinking is composition of Agent's knowledge base that explains what kind of things an Agent can share with and how they are associated. The design of structure that executes a standard Agent Communication Language (FIPA-ACL) is Java Application Development Environment (JADE). The future internet will use JSP and JDBC to encrypt information and services with expressive configuration and meanings that people can readily understand.

4. Web Mining with JSP

4.1 What is JSP?

JSP is an abbreviated form of Java Server Pages. It focuses in making dynamic web pages. It help programmer to create web pages. The semantics or source code considered for implementation is similar to the syntax of HTML.

Most of the objects that are deal with for creation of web pages are static. So to handle the development part of web creation in flexible manner, JSP is the right approach. To write the source code as Java, JSP scripting elements is the correct practice. The relevant way to achieve the objective is to use various elements and tags of JSP to achieve the

appropriate execution. Try to avoid such views in Servlet which was unattractive and fitted for originating an error.

One of the favorable aspects via working with JSP Pages is that containers work in bringing the resources into effective action. To make necessary changes in JSP page and using update page in place of old page; container will weigh the latest (new) JSP page. Compiling our project code or restarting server is not required in JSP. To make more effective functioning, it is mandatory that active methodology should be followed for smooth operation of system.

4.2 Working of JSP Pages

A JSP page on the whole is a web page with conventional HTML code and little of Java code. The JSP page file extension is .jsp which relates the server that this page requires management that will be achieved by a server extension.

On calling JSP page, JSP engine brought together it into a Servlet. During this phase, the Servlet is controlled by the Servlet engine. It weights the class using a class loader and implements it to generate html source code which is to be sent to the browser. The Servlet produce writes the entity as a thread and forward it to the browser's output stream. Request and Response Flow calling JSP has been highlighted in Figure 2.

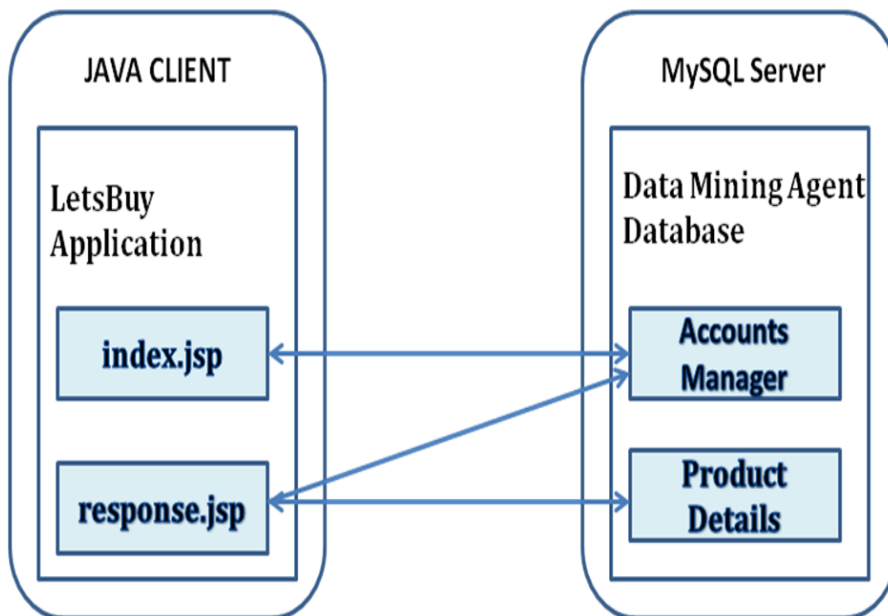


Figure 2. Request and Response Flow calling JSP

The JSP technology which summarizes Servlets to an upward hierarchy is an open source; obtainable specification developed by Sun Microsystems. To develop server-side applications such as Servlets and JSP, J2EE can be used which is one of the editions of Java Development Kit. IBM WebSphere, Live JRun, Orion, etc., are the various commercialized application servers which support JSP technology.

4.3 Approaches used for performing Web Mining with JSP

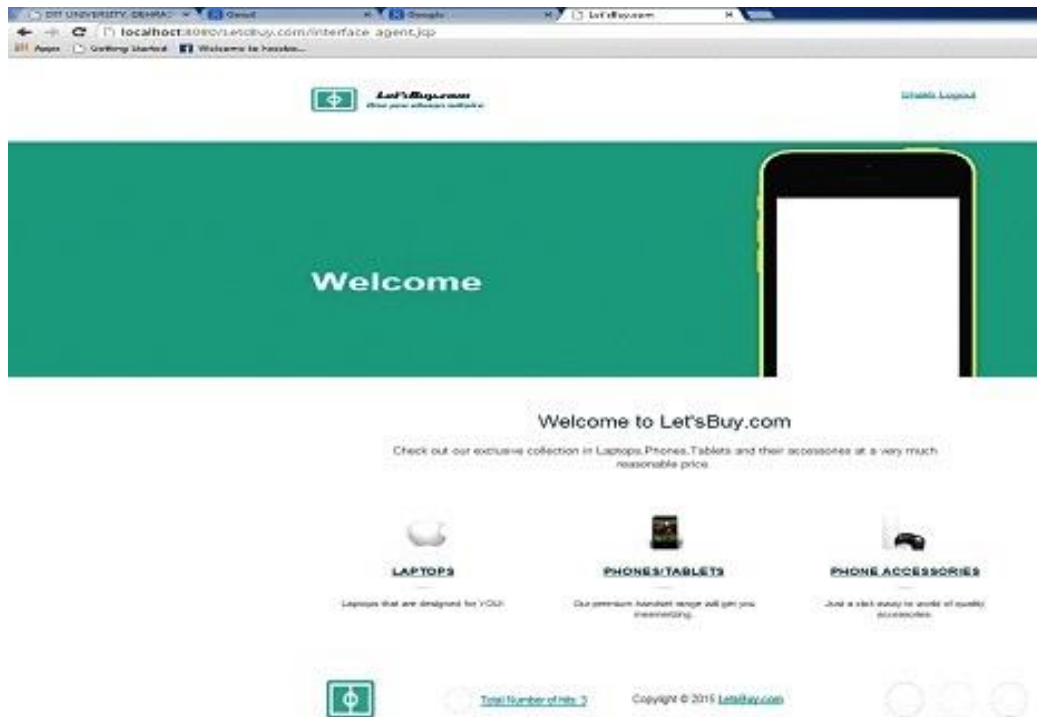


Figure 3. Snapshot of LetsBuy Web Application

Snapshot of LetsBuy Web Application has been highlighted in Figure 3. In this paper we will include some of the JSP modules which will be used to accomplish the above said tasks. A segment of index.jsp is as follow:

```
<% @page contentType="text/html" pageEncoding="UTF-8"% >
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1">
    <meta name="description" content="">
    <title>Let'sBuy.com</title>
  </head>
  <body>
    <%
      Integer hitsCount = (Integer) application.getAttribute("hitCounter");
      If (hitsCount== null || hitsCount==0){
        hitsCount=1;
      }else{
        hitsCount+=1;
      }application.setAttribute("hitCounter", hitsCount);
    %>
    <section class="main">
      <% @include file="header_file.jsp" %>
    </section>
    <section class="promo">
      <div class="wrap">
        <div class="promo-text">
          <div class="promo-title">Welcome</div>
        </div>
      </div>
    </section>
  </body>
</html>
```

```

</div>
</section>
<section class="simple">
  <div class="wrap">
    <h1>Welcome to Let'sBuy.com</h1>
    <p>Check out our exclusive collection in Laptops, Phones, Tablets and their accessories
at a very much reasonable price.</p>
  </div><!-- wrap -->
</section><!-- simple -->
<section class="features">
  <div class="wrap">
    <div class="features-columns clearfix">
      <div class="feature">
        <div class="ico-help"></div>
        <a
href="buyer_agent.jsp?action=viewByCategory&type=Laptops"><h4>Laptops</h4></a>
        <p>Laptops that are designed for YOU!</p>
      </div><!-- feature -->
      <div class="feature">
        <div class="ico-like"></div>
        <a
href="buyer_agent.jsp?action=viewByCategory&type=Phones"><h4>Phones/Tablets</h4></a>
        <p>Our premium handset range will get you mesmerizing.</p>
      </div><!-- feature -->
      <div class="feature">
        <div class="ico-present"></div>
        <a href="buyer_agent.jsp?action=viewByCategory&type=Phone Accessories"><h4>Phone
Accessories</h4></a>
        <p>Just a click away to world of quality accessories.</p>
      </div><!-- feature -->
      <div class="feature">
        <div class="ico-present"></div>
        <a href="buyer_agent.jsp?action=viewByCategory&type=Laptop Accessories"><h4>Laptop
Accessories</h4></a>
        <p>Buy your favroite laptop accessories at an unbelievable price.</p>
      </div><!-- feature -->
    </div><!-- features-columns -->
  </div><!-- wrap -->
</section><!-- features -->
<section class="simple">
  <div class="wrap">
    <h2>Discover. Give. Impact.</h2>
    <p>We would be always happy to help you.</p>
  </div><!-- wrap -->
</section><!-- simple -->
<section class="subscribe">
  <div class="wrap">
    <div class="subscribe-title">Subscribe to our newsletter</div>
    <div class="subscribe-form clearfix">
      <form>
        <input type="email" placeholder="Your email address" class="subscribe-email">
        <input type="button" value="Subscribe" class="subscribe-button">
      </form>
    </div><!-- subscribe-form -->
    <div class="subscribe-note">If you want to receive monthly updates from us just pop
your email in the box.<br>We think that spam is for jerks and jerks we are not.</div>
  </div><!-- wrap -->
</section><!-- subscribe -->
```

```
</section><!-- subscribe -->  
<% @include file="footer_file.jsp"%>  
</section>  
</body>  
</html>
```

5. Conclusion

To describe the communication language and its action, Agents play a vital role on the platform of Java Application and Development Environment (JADE). JSP and Web Mining Intelligent Agents (WEBMINTEL) system can successfully raise the intelligence of the system. WEBMINTEL system performed satisfactory to understand the browsing behavior and interests of web user. Moreover, it provides sharpness and exactness in discovering the web documents as per user attention. The objective to provide efficient and intellect environment in web mining system has been accomplished but some more knowledge need to be gain for the upgrading of system.

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Authors



Shakti Kundu received his M.Tech. in Computer Science & Engineering from Guru Jambheshwar University of Science & Technology, Hisar, Haryana, India in 2010, M.Phil. in Computer Science from Chaudhary Devi Lal University, Sirsa, Haryana, India in 2008, M.C.A. from Kurukshetra University Kurukshetra, Haryana, India in 2006. Presently he is pursuing his Ph.D. in CSE from DIT University, Dehradun, India. The author current research interests are Web Mining, Knowledge Management and Web Testing. He is life member of CSI, ISTE, IAENG, AIRCC and IAEME.



M L Garg, presently Professor, Department of Computer Science & Engineering at DIT University, Dehradun, India, has obtained his Ph.D. degree in Computer Science & Engineering from Thapar Institute of Engineering & Technology (Deemed University), Patiala, India with collaborative research work at IIT Delhi, in the year 1992. He has a total experience of about 37 years out of which 16 years is in academics and 21 years is in Punjab State Electricity Board. Three researchers have completed and 4 others are pursuing their Ph.D. under his supervision. His area of research includes Fuzzy Logic Genetic Algorithms & Knowledge Representation and Reasoning. He has published about thirty research articles in peer reviewed International and National Journals and Conferences. He is on the Editorial Board of the International Journal of Cloud Computing and Super Computing (IJCS), Canada.

