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Sharon - Agent based service middleware for E-governance: A systematic web examination based approach using Christina ontology

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Over the past few years, semantic web service and multi agent approach has been used successfully in the development of E-governance. Such a hybrid approach can be considered as an effective approach for the development of predictive modeling in complex E-governance systems. This paper describes a novel approach for the advanced semantic web service and multi-agent based middleware to solve the problems in like Sharon MIS advanced integrated system interoperability.

Key words: E-government, interoperability, web services, Sharon web services.

INTRODUCTION

E-governance is the advanced application of Information and Communication Technology (ICT) to achieve more stabilized efficiency, effectiveness, transparency and accountability of information and transactional exchanges between government to government (G2G), government to employee (G2E), government to citizen (G2C) and government to business (G2B).

E-government enables citizens, customer civil servants and members of the public party and private and some sectors with security and systematic and more advantage of all automated administration processes accessible online. The updated present E-governance is suffering from lack of interoperability, resource sharing, all the system operation integration and concept of collaborative work. As a result, a citizen has to wait for a long time to fulfill all the particular requirements from the present E-government system.

In addition to that, the electronic transaction of information as it is at present is a time consuming and tiring process. On the other hand all the data standards of the E-government are not adequate and comprehensive; web services are software modules that describe a collection of operations that can be accessible through all systematic standardized XML messaging. Middleware layer acts as an interface between the service requestor and service provider. The core component of the present Semantic-web service (SWS) based middleware is ontology.

The rest of the paper is organized as follows: 1) introduction to the motivation for multi agent and SWS based middleware in E-governance; 2) description of the details of the proposed framework of middleware based on semantic web service and multi- agent.

SHARON SWS AND MULTIAGENT BASED M. WARE

Middle ware in E-governance scheme

The SWS technology solves the semantics problems of middleware in present E-government system. There are several types of problems in e-Governance like i) interoperability and service integration in E-government web information system ii) semantics differences related to the scattered, heterogeneous data. iii) Lack of sharing of existing data iv) lack of knowledge base system in the middleware. The ability to aggregate and re-use diverse information resources relevant to a given situation in a cost-effective way and to make this available as a basis for transparent interaction between community partner organizations and individual citizen, is a key benefit that SWS technology can provide to E-government SWS technologies can be an ideal platform to achieve the vision of a knowledge-based, user-centric, distributed, interoperable, and networked E-government.
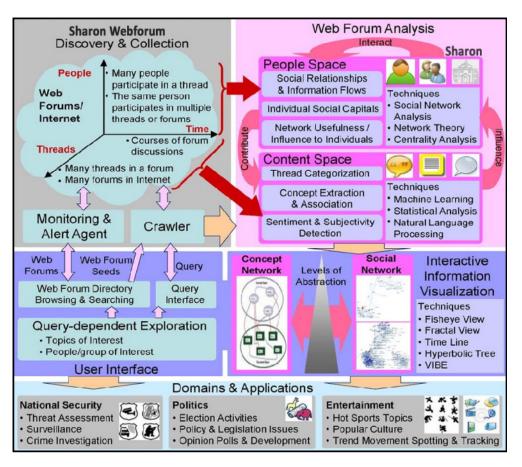
Figure 1. Sharon framework of the web opinion analysis and understanding project.

ANALYSIS AND INTERPRETATION IN SHARON–SWS

Multi agents can be used to solve problems that are too large for a centralized agent to solve because of resource limitations and/or to avoid a one point bottleneck or failure point (Joshuva and Herzog, 2009; Rose and Flores, 2009; Sharon et al., 2009). Second, agents are capable of independent actions on behalf of a user or owner and can act, capture and manage information automatically when it is necessary. Thirdly, agents can interact with other external systems and can be used to manage both distributed and local knowledge. Agents can learn from their own experience. This is particularly important in the field of data mining as the data is constantly modified and updated. Finally, agents have the autonomy and social ability, and multi-agent system is inherently multithreaded for control. Therefore, multi-agent approach is very effective for tackling the complexity of e-governance systems and therefore is suitable for illustrated here a typical example of e-governance where the same phrase can give different results from various governmental agencies.

A cultivator needs to know the types of primary jute and paddy seeds and its entire systematic cultivation methods West-Bengal climate as he misguided repeatedly by the local vendors. For the reason he requires the actual type of seeds suitable for cultivation in the West-Bengal climate and he searches with the phrase of words 'Type of Jute t-seeds are suitable for cultivation in West-Bengal'.

Details of proposed framework of Sharon–SWS

The proposed multi-agent based middleware of E-governance cooperation work based on semantics and multi-agent ensures that work together smoothly, the transaction of information effectively and enhance the sharing of resources, operation integration of sectors, and data, and increases throughput of E-services. The middleware is divided into three layers: User interface layer, agent based middleware layer and service provider agency layer. Semantic-web service and multi-agent-based middleware has been illustrated in Figure 1.

Here we proposed the conceptual architecture of the SWS based middleware for developing the system E-governance infrastructure as well as the interoperability,
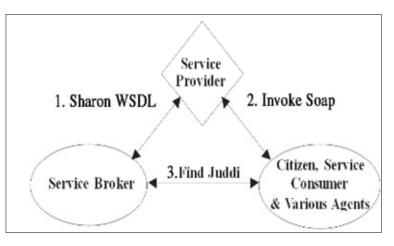
Figure 2. Service interaction cycle of agent and agencies in Sharon WSDL architecture.

integration of the web services and agent interaction. From the point of theory the SWS based middleware makes the semantic content of web services more clear and perfect and enables computers to understand more accurately.

The open source internet reasoning services version3 IRS-III framework Francis et al. (2008) has been used to automate and to discovery, composition, and execution of web services. It is based on a distributed architecture consists of three components, IRS-III Server, IRS-III Publisher and the IRS-III Client which communicates through the SOA based protocol simple object access protocol (SOAP). The system server handles ontology management and the execution of knowledge models defined for web service modeling ontology (WSMO).

System analysis structure with Sharon module

In Figure 2 in our proposed middleware, we have used open source java based service registry although IRS-III has its own published capability. Since universal description, discovery and integration (UDDI) does not directly support semantic discovery that is why Sharon onto models have been used for semantic information. Systematic module is used to assure the semantic uniformity between the interior and exterior system to afford other the semantic aids to other components. Sharon agent management component manages to insider agents and their information exchange foreign agents. Domain expert (DE**)** will collect the unexecuted query for their testing and checking so that next time DE can add the tested query. Middleware layer acts as an interface between the service requestor and service provider. The core component of the present SWS based middleware is ontology's (Sharon et al., 2009; Shariish, 2010). The service ontology consists of Sharon goal

ontology, web service ontology and mediation ontology.

First, ontology can provide the grounding data model of the integrated model, thus describing the structure and content in a coherent manner. Second, the information items in a model can be semantically annotated using Sharon ontology-techniques with more secure and no-flaw with efficient information management. Third, ontology's enable automated information exchange over the web which allows user system interoperation model and all other semantic web applications. OWL-S, WSDL, Protégé-2000, Apache Axis2 has been used to develop the middleware for ontology, web service management semantically. Regional based domain ontology has been used for local E-services.

AGENT AND SERVICE PROVIDER SCHEMA IN MIDDLE WARE

The registry returns a list of suitable services along with their endpoint addresses, and the client selects one and passes a request message to it, using any mutually recognized protocol (Elisa et al., 2008). The service may respond (Francis et al., 2008) either with the result of the requested operation or with a fault message. Here, we proposed each service via web services description language (WSDL), service broker augment UDDI broker registries with agencies in which service agents can collaborate and share data. In a real world setting, such as a commercial application, the process may be significantly more complex protocol configuration, user authorization, interaction patterns and transaction control are only a few of the issues that may arise and need to be resolved.

In Steps 1 and 2, after initialization multi-agent based middleware with IRS-III (MMI-3), it sets up all the

configured agencies. Provider stores services implementations with MMI-3 by configuring each service in terms of WSDL, uniform resource identifier (URI), and service domain. Request of WSDL for each interface citizen invokes the agent service operation. The agent uses its policy and its configuration to load and execute its script once per citizen-to-agent interaction. The citizen invokes the agent's service operations to get all the appropriate datum, since MMI-3 itself is a framework, it provides basic structure for agents and agencies that can be extended for various purposes is an SOA solution.

Implementation of proposed middleware

At present, the proposed middleware is under development however the user access interface agent has been implemented using the JAVA technology in local application server such as Jakarta Tomcat. SOAP based web services have been created and stored in the open source registry with respect to jUDDI (Java UDDI). The jUDDI registry has been used as UDDI and modified its content by making changes to its attached service access agent.

The entire system handler module redirects with user queries that require semantic features to the broker agent in jUDDI. This agent accepts messages in SOAP format using SOAP protocol and determines whether the request is for new service registration or to search a service. After getting this the agent activates its respective component. Each component fulfills its tasks by interacting with the underlying data structure and application programming interface (API) of jUDDI.

The fundamental goal of UDDI is to enable service provider agencies to register information about the services they provide, in order for prospective citizen to locate them easily and to track by consulting a repository datum. The following incorporates a UML sequence diagram to illustrate a typical citizen-to-agent interaction and their control flow. Web forum content and link analysis, we utilize machine learning and social network analysis techniques to extract useful knowledge.

Christina ontology for content clustering

The value of performing content clustering on a forum's interactive discussions is twofold. The first is to identify and group similar threads together and, hence, to abstract the topics or themes from all clusters. The overall clustering result is to provide a high level content summarization of the underlying threads in forums. It is a typical content clustering value to all document sets. The second value is to unveil the ideological topic similarity between forum participants who may or may not have direct interaction. The value of discovering semantic

linkage between participants is unique to the content analysis in online virtual communities. From the perspective of forum participants, it may be useful for them to identify other participants whom they have never interacted with but share with similar ideologies.

From the perspective of online community analysts, it may be useful to examine the possibility of some participants bearing multiple screen names and participating in multiple threads across different forums. The objective of content clustering in forum discussions is to cluster similar threads without any predefined cardinality and at the same time without forcing any rare topic or noisy threads to be clustered. This process is somewhat different from hierarchical or partition-based document clustering, where each document is assigned into at least one cluster. For example, the partition-based differential evolution algorithm determines the optimal number of partitions to cluster all data in a data set (Francis et al., 2008). In forum discussions, any participant is able to post a thread and start the discussion on its topic. Because of this self-interest-oriented posting mechanism, it is possible that the topic of a thread may be unique among all other threads in forums. Later all the identity aspects to be functioned with the systematic analyzer.

PERFORMANCE EVALUATION

In Figure 3 we calculated sum sample Middleware system with the samples of E-governance data. We calculate the different sequence of actions with the IRS Architecture. During the development periods several problems were encountered which are illustrated here- i) A WSDL based web service describing semantically using ontology's is a very complex and a tiresomely long ii) It is a difficult job to understand perceive the meaning of described semantics There are large number of information redundancy, inconsistency involved in the development of the middleware using web ontology language (OWL). Other ontology based frameworks suffer from the same fundamental flaw. This system has been identified as the reason because of which semantic web and web services have not gained wide acceptance. A regional based semantic web service based approach in E-governance has also been discussed with systematic graphical snaps.

CONCLUSION

In this paper we have presented service interoperability architecture for agents and semantic web services using IRS-III framework environment. This paper mainly discusses how to resolve the problem about public service management and co-operation between
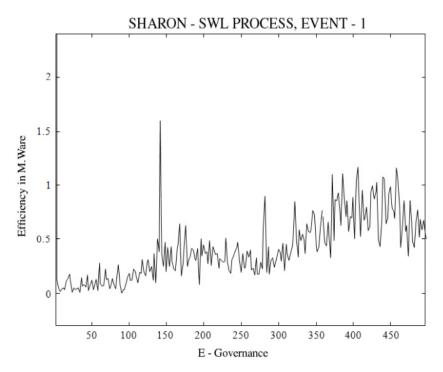
Figure 3. Different sequence of actions among the agent, service provider and IRS-III framework.

government organization by introducing Web services, Multi-agent, Ontology and so on in internet environment.

We tried to exploit the advantages of mediator based and middleware approach.

We are going to develop a prototype of Regional SWS and multi-agent based middleware in E-governance using IRS-III framework for the creation and execution of the semantic web services for the livelihood of rural development in our local block level. In addition to that our main concentration will be on the development of regional based web services using WSDL and one-stop, citizen focused, multiple viewpoint access and graphical user interface (GUI) for the local government portals. In future we are trying to make the system intelligent enough, so that it could manage dynamic message buffering for graceful lossless communication over weak communication link.

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