IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 1, Issue 1, March, 2013
ISSN: 2320 - 8791
www.ijreat.org

Intelligent Cloud Mining for Decision Support System in Mobile Environment

Dhivya.P[1],Inder Singh Mahajan.S[2], Ravi Maran.S[3]

[1, 2, 3] Department of Computer science and Engineering
M.A.M College of Engineering,
Siruganur, Trichy, Tamil Nadu, India

Abstract

Cloud computing is the solution for a host of issues related to software and hardware up gradations and diversity. Clouds enable thin clients and hence uniformity is preserved. But this leads to the cloud being resource hungry and also in clouds data is stored in the cloud server causing data security problems. A majority of online data is private and requires various mechanisms for privacy preservation and control. But this results in increased processing time because of heterogeneity. Also because of diverse platforms the data is susceptible to security attacks. This results in inaccurate mining and privacy being violated. The objective of this paper is to improve web mining quality in mobile clouds intelligently by reducing processing time and enhance data security by privacy preservation.The proposed approach using webservices shares data intelligently across domains and retrieves relevant data securely thus building a better webmining analysis framework. Thus the proposed privacy protection in cloud based web mining using role back access control is effective in such a scenario.

***Key Words**: Mobile Cloud, Web Mining, DSS, Cloud Computing*

1. INTRODUCTION

Cloud computing provides a flexible, convenient and affordable way to remotely distribute processing and data. In the context of mobile devices, the ability to offload processing and data storage is highly desirable because mobile devices have limited processing, memory, network bandwidth and battery life. A mobile cloud infrastructure that remotely performs computing, manages data, and can back up wireless devices in the event of loss, power failure or network interruption, makes for a compelling use case.Computing requirements of a mobile cloud differ significantly from those of a regular computer cloud. The biggest difference is found in the diversity of supported mobile devices. There are four billion mobile phones, representing a vast array of mobile operating systems and hardware platforms. While mobile standards exist on large numbers of phones, there are significant variations that make it practically impossible to provide rich, usable mobile apps that support more than a small fraction of devices.

For example, people may want to access Gmail addresses on a wifi camera or e-book reader so they can email photos or an article. They may want to view a work or family calendar on a home refrigerator or vehicle screen, or they may want to post a photo from a camera phone to a corporate intranet or social network. A mobile cloud should provide the infrastructure to support these possibilities and more.According to the survey, mobile cloud computing is emerging as one of the most important branches of cloud computing, and is still in its infancy. Therefore it's highly relevant to clarify the confusion that has arisen around mobile cloud computing.

The primary purpose of a mobile cloud is to make it easy to sync mobile phones and devices with systems such as social networks, email systems, computers, and virtually any data store. The goal is to perform processing and to manage data in the cloud, to offload these functions from mobile devices.From a simple perspective, mobile cloud computing can be thought of as infrastructure where data and processing could happen outside of the mobile device, enabling new types of applications such as context-aware mobile social networks. As a result, many

mobile cloud applications are not restricted to powerful smart phones, but to a broad range of less advanced mobile phones and, therefore, to a much larger subscriber segment. From a Smartphone perspective in particular, mobile cloud computing opens up possibilities for a new class of applications by leveraging handset centric features and network related information, such as GPS and/or cell-based location information, etc.
Cloud mining automatically builds exploratory faceted search systems. Faceted search, also called faceted navigation or faceted browsing, is a technique for accessing information organized according to a faceted classification system, allowing users to explore a collection of information by applying multiple filters.Facets correspond to properties of the information elements.

Decision supporting systems include also decisions made upon individual data from external sources, management feeling, and various other data sources not included in business intelligence.The expected benefits of DSS that discovered are higher decision quality, improved communication, cost reduction, increased productivity, time savings, improved customer satisfaction and improved employee satisfaction.

Mobile computing means using portable devices to run stand-alone applications and/or accessing remote applications via wireless networks. Increasing the number of mobile applications demands greater resources and improved interactivity for better experience. Resources in cloud platforms such as Amazon EC2, Microsoft Azure and Google AppEngine can remedy the lack of resources in mobile devices. But what does mobile cloud computing really mean? Different people hold different views, and there are several existing definitions of mobile cloud computing.

In mobile cloud computing first referred to as an infrastructure where data storage and processing could happen outside the mobile device, enabling a new class of applications—especially context-aware mobile social networks. Mobile cloud applications move computing power and data storage away from mobile phones and into the cloud. This brings mobile applications and computing the problem of limited bandwidth.

The paper is divided into five sections; section two is a related work and it describes key advantages of cloud computing. Section three presents system architecture (i.e. Existing and proposed system). Section four presents conclusion and finally section five presents future work.

2. RELATED WORK

Cloud computing is introduced as a new and speedily growing and accepted way of providing better and efficient applications for mobile devices. [6] Provides mobile users with data storage and processing services on a cloud computing platform. In overall Cloud Computing revolve around two things one is Cloud Platforms (CP) and second is Cloud Services (CS).

A. Cloud Platform

Cloud Platforms are basically the hosts that provide the required resources (computational power, storage, Web access etc) to the client. It is an arrangement for executing software applications in a logically abstract environment comprising of various utility cloud services

B. Cloud Services

Cloud services are hosted services. Here a computer a group of computers working as internet server offers a part of or its whole required resources for use in exchange of certain rental fee. These are the cloud services which make it possible for different clients to access information, services and content located on any remote location or on to this server. Client uses internet to connect with the server and displays the desired content to the client. So we can say that *cloud service [6]*.

Cloud computing represents a convergence of two major trends in information technology [1]. (a) IT efficiency, whereby the power of modern computers is utilized more efficiently through highly scalable hardware and software resources and(b) business agility, whereby IT can be used as a competitive tool through rapid deployment, parallel batch processing, use of compute-intensive business analytics and mobile interactive

applications that respond in real time to user requirements.

The concept of IT efficiency also embraces the ideas encapsulated in green computing, since not only are the computing resources used more efficiently.

The key advantages of cloud computing

Specifically, cloud computing offers the following key advantages [1]:

1. It dramatically lowers the cost of entry for smaller firms trying to benefit from compute-intensive business analytics that were hitherto available only to the largest of corporations.
2. It can provide an almost immediate access to hardware resources, with no upfront capital investments for users, leading to a faster time to market in many businesses.
3. Cloud computing can lower IT barriers to innovation, as can be witnessed from the many promising startups, from the ubiquitous online applications such as Facebook and Youtube to the more focused applications like TripIt (for managing one's travel) or Mint (for managing one's personal finances).
4. Cloud computing makes it easier for enterprises to scale their services – which are increasingly reliant on accurate information –according to client demand
5. Cloud computing also makes possible new classes of applications and delivers services that were not possible before.

With the requirements for high performance results in the today's mobile, global, highly competitive, and technology based business world, business professionals have to get supported by convenient mobile decision support systems (DSS).[9]define Business intelligence (BI) as the activity or the process of intelligently gathering, integrating, aggregating, storing, processing and analyzing business data in order to extract or find out synthesized, pertinent and meaningful information and knowledge in a way that improves business decision making.

Context [9] as "an active process dealing with the way humans weave their experience within their whole environment, to give it meaning".

Context is the set of environmental states and settings that either determines an application's behavior or in which an application event occurs and is interesting to the user.

IR [5] involves retrieving desired information from textual data. The historical development of IR was based on effective use of libraries. Many universities and public libraries use IR systems to provide access to books, journals and other documents. To measure ad hoc information retrieval effectiveness in the standard way, we need a test collection consisting of three things: 1) A document collection 2) A test suite of information needs, expressible as queries 3) A set of relevance judgments, standard a binary assessment of either relevant or non relevant for each query-document pair.

Web log analysis software is also called a web log analyzer is a simple kind of Web analytic software that parses a log file from a web server, and based on the values contained in the log file, derives indicators about who, when, and how a web server is visited. [5] Present a preliminary discussion about Web mining, including the definition, Concepts, and the functions. There still remain many areas for further research, such as the design of efficient algorithms for Web Log mining for large document collections, and so on.

Today, huge amount of data available on the web in the form of unstructured, semi-structured and unstructured data. With the use of ontology[11] we can make structured data and use of knowledge mining. They discuss some issues of knowledge mining with the help of ontology and its use in cloud computing. Knowledge mining applications [11] are used to extract knowledge. The knowledge mining is used in many fields of study such as in science and medicine, finance, manufacturing and commerce. The data mining tools are used to extract data from decision support systems models and the related cases. The tools facilitate the analysis tasks. These tools include software tools that are powerful.Web Data Mining is an important area of Data Mining which deals with the extraction of interesting knowledge from the WWW.

It can be classified into three different types. Web content mining, web structure mining and web usages

mining.[15]presents a view about how to extract the useful and relevant information on the web using web mining and also give the superficial knowledge and brief comparison about data mining.

Here they introduce online resources for retrieval Information on the web i.e. web content mining, and the discovery of user access patterns from web servers, i.e. web usage mining that improve the datamining drawback. They also described web mining through cloud computing i.e. cloud mining.

3. SYSTEM ARCHITECTURE

3.1 Existing Architecture

The history of Decision Support Systems covers a relatively brief span of years, and the concepts and technologies are still evolving. Today it is still possible to reconstruct the history of Decision Support Systems (DSS) from retrospective accounts from key participants as well as from published and unpublished materials. Many of the early innovators and early developers are retiring but their insights and actions can be captured to guide future innovation in this field. It is hoped this web article leads to email and retrospective accounts that can help us understand the "real" history of DSS.

The Internet and Web have speeded-up developments in decision support and have provided a new means of capturing and documenting the development of knowledge in this research area. Decision support pioneers include many academic researchers from programs at MIT, University of Arizona, University of Hawaii, University of Minnesota and Purdue University. The DSS pioneers created particular and distinct streams of technology development and research that serve as the foundation for much of today's work in DSS.

A growing number of companies have to process huge amounts of data in a cost-efficient manner. Classic representatives for these companies are operators of Internet search engines. The vast amount of data they have to deal with every day has made traditional database solutions prohibitively expensive.Instead, these companies have popularized an architectural paradigm based on a large number of commodity servers. Problems like processing crawled documents or regenerating a web index are split into several independent subtasks, distributed among the available nodes, and computed in parallel. So lack of intelligent Decision Support Systems cause huge loss in both in computing time and resources. When agents are sensitive to risk, can choose not to interact, Agents can become 'paralyzed'; without interactions, evidence cannot be gathered, Trust cannot be formed, and interactions may not take place.

This can occur when the risks associated with interactions are high, but trust relationships between agents are weak. High recall & low precision – too many documents retrieved. Low/no recall – no relevant documents found Results sensitive to vocabulary – similar words not considered. Results are single web pages – "distributed" information not retrieved.Human needed for interpretation, no other software tools use the result. The DSS system fails in case of mobile users and cloud because of the mobile movement of the nodes and limited resources. Also the trust levels cause deficiency due to lower agents and no rating systems being present.

3.2 Proposed Architecture

The Semantic Web Based Agent based on DSS request is introduced. This agent can increase Efficiency, Productivity and Profitability in all areas of E-Business both directly and indirectly. It has the ability to automatically retrieve exchange and process information without compatibility issues.

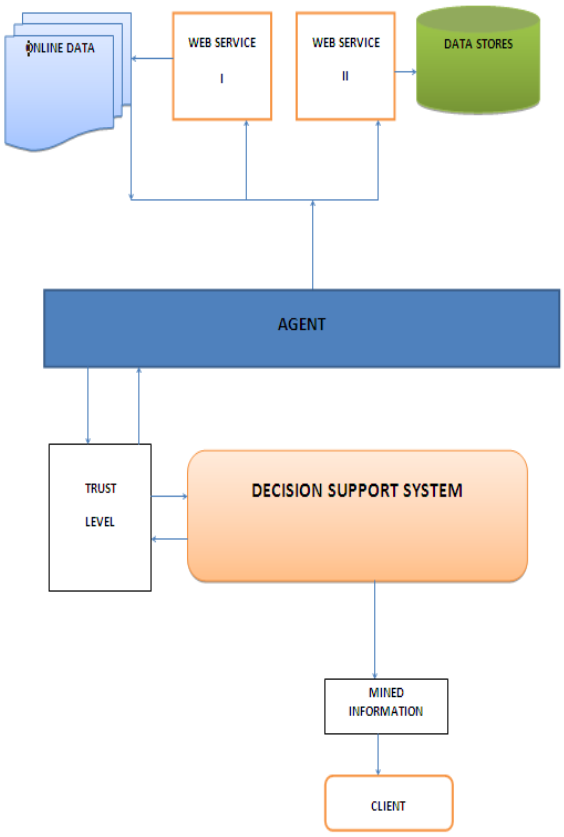

Figure 1: DSS Architecture

A W3C Recommendation is used for determining Trustworthiness on the Semantic Web Agents can navigate the www by following semantic links.

Data from different sources can be combined .Machines can meaningfully use the www and perform tasks on our behalf and thus intelligent results based on agent ratings are produced.

The privacy is preserved and not compromised. Role Based Access is used.

From fig:1Client is any web or mobile client who initiates the transaction request. Agent is the intermediary who receives the request and allocates the appropriate web service to complete the requested data. Decision Support System is the system which chooses the resources, time, agent and protocol for apt completion of the request in a phased and timely manner. The DSS integrates the client, web service and the agent. Trust Level is the addition of points to increase the agent's worthiness about a particular domain or topic. Higher the trust, better the agents prospects for choosing by the DSS.

DSS can increase the search efficiency based on mobile cloud and also increase the personal efficiency, speed up the process of decision making, and increase the organizational control.

DSS includes a body of knowledge that describes some aspects of the decision maker's world that specifies how to accomplish various tasks, that indicates what conclusions are valid in different circumstances. The expected benefits of DSS that discovered are higher decision quality, improved communication, cost reduction, increased productivity, time savings, improved customer satisfaction and improved employee satisfaction.

Mobile cloud computing extends cloud computing by providing enhanced service availability and by exploiting information about a user's location, context and network intelligence, thereby considerably improving user experience. Leveraging the mobile device storage, sensing and processing resources for optimizing cloud-based application also adds to better user experience.

Advantages

- decision making is faster
- data mined is fast and secure
- lower operating costs
- faster performance
- wider Sphere of operations
- less error & better decisions
- Privacy preserved.

4. CONCLUSION

The proposed architecture is designed to run data analysis jobs on a large amount of data in the mobile cloud model, which is expected to be stored across a large set of share-nothing commodity servers. Once a user has fit his program into the required map and reduces the pattern, the execution framework takes care of splitting the job into subtasks, distributing and executing them

5. FUTURE WORK

The proposed approach using web services shares data intelligently across domains and retrieves relevant data securely thus building a better cloud mining analysis framework. In future implement semantic web mining in parallel distributed environment in all tiers for decision making, and increasing speed and efficiency.

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