Data mining techniques on Mobile computing Management and Service Oriented Architecture of web Services

Sayyada Sara Banu, Mohammed Waseem Ashfaque, Dr.Perumal Uma, Quadri S.S Ali Ahmed

College of computer science and information system, Jazan university, Saudi Arabia
Department of Computer Science & IT, College of Management and Computer Technology, Aurangabad, India
College of computer science and information system, Jazan university, Saudi Arabia.
Department of Computer Science & IT, College of Management and Computer Technology, Aurangabad, India.
Email: sayyada.sara@gmail.com, waseem2000in@gmail.com, prmluma@gmail.com, aliahmedquadri@yahoo.co.in

Abstract—Data mining is a technique which is responsible to extract required piece of data and information within a large data bases or data sets by passing a specific query on large data sets and particular pattern of data is separated and that is place in new column. Data mining has varieties applications, either in business, education, medical and science and research and developments in this paper the commercial application of data mining is focused in terms of mobile computing and its management’s services. And hence its is being brought into the consideration that the focusing of data mining techniques and its applications in mobile computing. Now a days tracing the location of mobile is quit vital and important so this problem can be overcome through writing a appropriate algorithm and application development so it can be helpful to trace and capture smoothly and easily mobile computing management by applying Data management techniques and its approaches. According to the application and algorithm mobile location is traced out through mapping depending upon their classes and category and identified mobile network denoted as mobile reporting map and then mobile devices gives their current position.

Keywords — Location Management; Genetic Algorithm; Mobile computing Management; Data mining;

I. INTRODUCTION

1.1 Mobile Data Mining

The goal of mobile data mining is to provide advanced techniques for the analysis and monitoring of critical data from mobile devices. Mobile data mining has to face with the typical issues of a distributed data mining environment, with in addition technological constraints such as low bandwidth networks, reduced storage space, limited battery power, slower processors, and small screens to visualize the results [1]. The mobile data mining field may include several application scenarios in which a mobile device can play the role of data producer, data analyzer, client of remote data miners, or a combination of them. More specifically, we can envision three basic scenarios for mobile data mining. Data mining is emerging as a promising topic in mobile computing environments. We have defined a distributed architecture in which mobile devices cooperate in a peer-to-peer style to perform a data mining process, tackling the problem of energy capacity shortage by distributing the energy consumption among the available devices. An energy-aware (EA) scheduling strategy assigns data mining tasks over a network of mobile devices optimizing energy usage. The main design principle is to find a task allocation that prolongs the network residual life by balancing the energy load among the devices. The wide availability and growing computing power of mobile devices has opened the way for data analysis and mining in mobile scenarios [2]. Mobile applications exploiting data mining techniques have appeared on the market in recent years. Examples include smart phone-based systems for body-health monitoring, vehicle control, and wireless security systems.

![Fig:1 Mobile data Mining concept](image)

- The mobile device is used as terminal for ubiquitous access to a remote server that provides some data mining services. In this scenario, the server analyzes data stored in a local or distributed database, and sends the results of the data mining task to the mobile device for its visualization. The system we describe in this chapter is based on this approach.
- Data generated in a mobile context are gathered through a mobile device and sent in a stream to a remote server to be stored into a local database. Data can be periodically analyzed by using specific data mining algorithms and the results used for making decisions about a given purpose.
Mobile devices are used to perform data mining analysis. Due to the limited computing power and storage space of today’s mobile devices, currently it is not realistic to perform the whole data mining task on a small device. However, some steps of a data mining task (i.e., data selection and preprocessing) could be run on small devices.

Mobi Mine [3] is an example of data mining environment designed for intelligent monitoring of stock market from mobile devices. Mobi Mine is based on a client server architecture. The clients, running on mobile devices such as PDAs, monitor a stream of financial data coming through a server.

The server collects the stock market data from different Web sources in a database and processes it on a regular basis using several data mining techniques. The clients query the database for the latest information about quotes and other information. A proxy is used for communication among clients and the database. Thus, when a user has to query the database, she/he sends the query to the proxy which connects to the database, retrieves the results and sends them to the client. To efficiently communicate data mining models over wireless links with limited bandwidth, Mobi Mine uses a Fourier based approach to represent the decision trees, which saves both memory on mobile device and network bandwidth. Another example of mobile data mining system is proposed in [4]. Such system considers a single logical database that is split into a number of fragments. Each fragment is stored on one or more computers connected by a communication network, either weirdly or wirelessly. Each site is capable of processing user requests that require access to local or remote data. Another promising application of mobile data mining is the analysis of streams of data generated from mobile devices. Some possible scenarios are patient health monitoring, environment surveillance, and sensor networks. The Vehicle Data Stream mining (VEDAS) system [4] is an example of mobile environment for monitoring and mining vehicle data streams in real time.

1.2 Mobile Web Services

The Service Oriented Architecture (SOA) model is widely exploited in modern scientific and business oriented scenarios to implement distributed systems in which applications and components interact each other independently from platforms and languages. Currently Web Services are the most important implementation of the SOA model. Their popularity is mainly due to the adoption of universally accepted Internet technologies such as XML and HTTP. The use of Web Services fosters the integration of distributed applications, processes, and data, optimizing the deployment of systems and improving their efficiency. In particular, integration represents an important competitive factor in Business to Business (B2B) scenarios, where information systems can be very heterogeneous and complex. Recently, a growing interest on the use of Web Services in mobile environments has been registered. Mobile Web Services make it possible to integrate mobile devices with server applications running on different platforms, allowing users to access and compose a variety of distributed services from their personal devices.

1.3 The Service Oriented Architecture

The Service Oriented Architecture (SOA) is a model for building flexible, modular, and interoperable software applications. Concepts behind SOA are derived from component based software, the object oriented programming, and some other models. The SOA model enables the composition of distributed applications regardless of their implementation details, deployment location, and initial objective of their development. An important principle of service oriented architectures is, in fact, the re-use of software within different applications and processes. Service oriented architecture is essentially based on a collection of services. A service is a software building block capable of fulfilling a given task or business function. It does so by adhering to a well defined interface which specifies required parameters and the nature of the result (a contract between the client of the service and the service itself). A service, along with its interface, must be defined in the most general way to allow utilization in different contexts and for different purposes. Once defined and deployed, services operate independently of the state of any other service defined within the system. However, service independence does not prohibit having services cooperating each other to achieve a common goal. The final objective of SOA is to provide for an application architecture where all functions are defined as
independent services with well defined interfaces, which can be called in sequences to form business processes [5].

II. LITERATURE REVIEW

2.1 Web Services

Web Services are an Internet based implementation of the SOA model. Basically, Web Services are software services that can be described, discovered, and invoked by using XML formalisms and standard Internet protocols such as HTTP [6]. The use of XML as basic language permits to share data independently from underlying platforms and programming languages. Web Services differs in many respects from classical distributed architecture based on remote components such as RMI, CORBA and DCOM. While Web Services use a platform independent formalism for message exchange, classical architectures use low level binary communications, thus data encoding completely depend from specific technologies.

2.2 Mobile tracking

The goal of mobility tracking or location management is to balance the registration and search operation, to minimize the cost of mobile terminal location tracking. Two simple location management strategies known are the always-update strategy and the never-update strategies. In the always-update strategy each mobile terminal performs a location update whenever it enters a new cell. As such the resources used for location update could be high. However no search operation could be required for incoming calls. On the other hand in the never-update strategy, no location update is ever performed.

2.3 Location Management Cost

The total cost of the two cost components (location update and cell paging) over a period of time $T$, as determined by simulation can be averaged to give the average cost of a location management strategy. The following simple equation can be used to calculate the total cost of a location management strategy [7].

$$LMC = K \times X_{LU} + X_P$$

Where $LMC =$ location management cost,

$X_{LU}$ = the number of location updates with respect to time $T$

$X_P$ = the number of paging with respect to time $T$ and $K$ is a constant representing the cost ratio of location with respect to updated paging Scenarios, Web Services can be exploited in mobile environments to which makes integration with server applications.

2.4 Offers of Web Services in mobile computing

The market of mobile devices such as smart phones and PDAs is expanding very fast, with new technologies and functionalities appearing every day. Even if such devices share a common set of functionalities, they run on many different platforms, Problematic. As in standard wired improve interoperability between clients and server applications independently from the different platforms they execute on. Basically, there are three architecture models for implementing Web Services in mobile environments [8]:

- a wireless portal network;
- a wireless extended Internet;
- a Peer to Peer (P2P) network;

In a wireless portal network there is a gateway between the mobile client and the Web Service provider. The gateway receives the client requests and takes care of issuing corresponding SOAP requests and returning responses in a specific format supported by the mobile device The wireless extended Internet configuration requires mobile devices with XML/SOAP processing capabilities. This introduces additional processing load on the device and some traffic overhead for transporting
SOAP messages over the wireless network [9]. While the additional processing load could be negligible in most devices, the traffic overhead can affect response time in presence of wireless connections with limited bandwidth. On the other hand, wireless portal network architecture requires the intermediation of a gateway that acts as proxy between client requests and service providers. Chu, You and Teng [10] proposed an architecture that divides the application components into two groups: local components, which are executed on the mobile device, and remote components, which are executed on the server side. The system is able to dynamically reconfigure application components for local or remote execution to optimize a utility function derived from the user preferences. Besides these and other research works on architectural aspects, some industries worked on the implementation of a software library, named JSR172 [11], which provides standard access to Web Services from mobile devices. JSR172 is available as an additional library for the Java 2 Micro Edition (J2ME) platform [12]; thus, it can be used on mobile devices that support the Java technology. The main goal of JSR172 is to enable interoperability of J2ME clients with Web Services. It does so by providing:

- APIs for basic manipulation of structured XML data, based on a subset of standard APIs for XML parsing.
- APIs and conventions for enabling XML based RPC communication from J2ME, including:
  - definition of a strict subset of the standard WSDL to Java mapping, suitable for J2ME;
  - definition of stub APIs based on this mapping for XML based RPC communication;
  - definition of runtime APIs to support stubs generated according to the mapping above.

Our system, described in the next section, implements a wireless extended Internet architecture. We used the JSR172 library for the implementation of its client applications.

III. METHODOLOGY

3.1 Designing and Implementation

In this implementation part of paper we are proposing system design is has already being described that the main object of the proposed system is to support of data mining in devices like mobiles, tablets via web services and its applications for this purpose the architecture of the system is going to introduced and then it moves on towards its functional.

3.1.1 System Architecture

This system is based and support to client server technology and which consist on three types of basic components which are vital part of the proposed system.

1. Data providers-
The applications that generate the data to be mined.

2. Mobile clients-
The applications that require the execution of data mining computations on remote data.

3. Mining servers-
Server nodes used for storing the data generated by data providers and for executing the data mining tasks submitted by mobile clients. data generated by data providers is collected by a set of mining servers that store it in a local data store. Depending on the application requirements, data coming from a given provider could be stored in more than one mining server. The main role of mining servers is allowing mobile clients to perform data mining on remote data by using a set of data mining algorithms. Once connected to a given server, the mobile client allows a user to select the remote data to be analyzed and the algorithm to be run. When the data mining task has been completed on the mining server, the results of the computation are visualized on the user device either in textual or visual form.

![Fig: 6 System Architecture Design](image)

Mobile client

The mobile client is composed by three components: the MIDlet, the DMS Stub, and the Record Management System (RMS) The MIDlet is a J2ME application allowing the user to perform data mining operations and visualize their results. The DMS Stub is a Web Service stub allowing the MIDlet to invoke the operations of a remote DMS. The stub is generated from the DMS interface to conform with the JSR 172 specifications, introduced in the previous section. Even if the DMS Stub and the MIDlet are two logically separated components, they are distributed and installed as a single J2ME application.

Mining server

Each mining server exposes its functionalities through two Web Services: the Data Collection Service (DCS) and the Data Mining Service (DMS). the DCS and DMS...
and the other software components of a mining server. The DCS is invoked by data providers to store data on the server. The DCS interface defines a set of basic operations for uploading a new data set, updating an existing data set with incremental data, or deleting an existing data set. These operations are cumulatively indicated as DCS ops in the figure. Data uploaded through the DCS is stored as plain data sets in the local file system. As shown in the figure, the DCS performs either store or update operations on the local data sets in response to data providers requests. The DMS is invoked by mobile clients to perform data mining tasks. Its interface defines a set of operations (DMS ops) that allow to: obtaining the list of the available data sets and algorithms, submitting a data mining task, getting the current status of a computation, and getting the result of a given task. Table 1.1 lists the main operations implemented by the DMS.

3.2 Functionality of the system
In the following we describe the typical steps that are executed by the client and server components, to perform a data mining task in our system:

1) The MIDlet invokes the submitTask operation of the remote DMS, passing the data set and the algorithm selected by the use with associated parameters. The task is submitted in a batch mode: whenever the task has been submitted, the DMS returns a unique id for it, and the connection between client and server is released.

2) After the task submission, the MIDlet monitors its status by querying the DMS. To this end, the MIDlet periodically invokes the getStatusCode operation, which receives the id of the task and returns its current status. The polling interval is an application parameter that can be set by the user.

3) When ever the get Status operation returns done, the MIDlet invokes the Get Result operation to receive the result of the data mining analysis. Depending on the type of data mining task, the MIDlet asks the user to choose how to visualize the result of the computation (e.g., pruned tree, confusion matrix, etc.).

All the system components, but the Data Collection Service, have been implemented and tested. The mobile client has been implemented using the Sun Java Wireless Toolkit [13], which is a widely adopted suite for the development of J2ME applications. The Data Mining Service has been implemented using Apache Oxy [14], an open source Java platform for creating and deploying Web Services applications. The small size of the screen is one of the main limitations of mobile device applications. In data mining tasks, in particular, a limited screen size can affect the appropriate visualization of complex results representing the discovered model. In our system we overcome this limitation by splitting the result in different parts and allowing a user to select which part to visualize at one time. Moreover, users can choose to visualize the mining model (e.g., a cluster assignment or a decision tree) either in textual form or as an image. In both cases, if the information does not fit the screen size, the user can scroll it by using the normal navigation facilities of the mobile device. The system has been tested using some data sets from the the UCI machine learning repository [15][16], and some data mining algorithms provided by the Weka Library. Our early experiments show that the system performance depends almost entirely on the computing power of the server on which the data mining task is executed.

IV. CONCLUSION
In this paper data mining for mobile via accessing all the web services is being discussed. Introducing the web services through all mobiles for all mobile users it is being allocated the space and brought into the consideration that mobile users which are remotely accessing the services he may executes and runs data mining operations and jobs through either mobiles or tablets like devices. And not only executes but being a client he can easily access the data mining results after being its processed. Though mobile data mining is in the first phase of its developments but it is a emerging area for study for new researcher in the field of research and developments. In this mobile users can access the resource of applications through mobile. And hence data mining techniques are sufficient for mobile computing and management of service oriented architecture through provided web services.

REFERENCES


ISSN (Online): 2347-2820, Volume -3, Issue-2 2015