Efficient Analysis of RFID

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ABSTRACT— *RFID is used capture an individual objects, but it does not capture the inter-object relationship such as collocation and containment information. So, it leads to insufficient information about objects. RFID readings are inherently noisy with read a rate significantly leads to below 100 percent in actual deployments. This is largely due to sensitivity of radio frequency to environment factors such as metal objects and collisions among tags. So this leads to incomplete data. RFID can read excessive amount of large volume of data. However, the resulting data may encode significant amount of redundant information such as unchanged object locations. So it is necessary to be filtered and compressed the data. In this system addresses the above challenges by enhancing the Data inference and Compression techniques to reduce the collision rate and augment the missed data through anti-collision algorithm. It provides the accurate object location and collocation by using data inference.*

Keywords— RFID, Data mining, Web Mining, Supply Chain Management.

1. INTRODUCTION

1.1SYNOPSIS

Radio Frequency Identification (RFID) is a technology that uses radio waves for Automatic Identification that was developed in 1980's. Typically RFID system is composed by two parts: RFID Tags that attached to the objects and RFID Readers that can read information from tags. A RFID tag includes an integrated circuit that contains information about the object and an antenna to receive signals from RFID Readers and transmit information to RFID Readers.

The Radio Frequency Identification devices technology that enables to monitoring and tracking the numerous objects in remote areas. It is likely to apply in supply-chain management, employee tracking, healthcare, pharmaceuticals, and surveillance in future decade and so on. The RFID uses electromagnetic fields to transfer data from the tag attached within objects, for the purpose of automatic identification and tracking. Despite RFID deals certain problems such as insufficient information, incomplete data, lack of location and containment relationship, and high-volumes of data.

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2. CLASSIFICATION OF RFID

A typical RFID system consists of tags and readers. The block diagram of such system is shown in Figure 2.1. RFID reader consists of a transmitter-receiver module, a control unit and an antenna. A tag is made up of a microchip with an antenna. The reader sends electromagnetic signals and the tag receives these signals through antenna. The microchip modulates the signals and sends it back to the reader. This information received from the tags is then processed by sending it to the host computer.

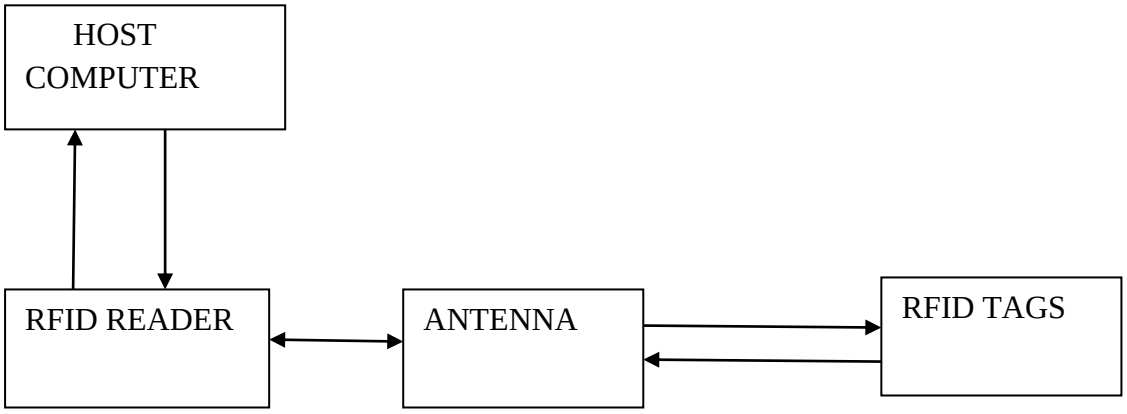

Figure 1.1 Block diagram of RFID system.

In general, there are four types of RFID tags: active, passive, semi-passive, and beacon types.

- Active RFID tags

  Active RFID tags are equipped with internal power source such as battery to power up the integrated circuit and to send the signal to the reader. The operating range of active RFID tags is several hundred meters. They even have the capability to store any additional information received from the reader.

- Passive RFID tags

  Passive RFID tags are not equipped with any power source. The radio frequency signal from the reader is needed to power them and to communicate with the reader. As the tags have to receive the radio-frequency signal from the reader, there is a constraint on the operation range of passive RFID tags.

- Semi-passive RFID tags

  Semi-passive RFID tags have internal power source similar to active RFID tags. But this power source is used to power up the integrated circuit/microchip only. The tags use the radio frequency energy from the reader for broadcasting the signal.

- Beacon RFID tags

  Beacon RFID tags send regular patterned radio signals with some limited information.

3. CLASSFICATION OF TAGS

There are three types of collisions which have possibility of occurrence in the system

- Tag-tag collision

  In tag-tag collision, there are multiple tags and single reader. This collision occurs when multiple tags try to communicate simultaneously with a single reader. As multiple tags respond simultaneously, the reader may not identify all the tags.

- Reader-tag collision

  This type of collision occurs when there is neighboring reader near the tag responding to another reader. The signal from the neighboring reader interferes with the signal being sent by the tag to another reader for its identification.

- Reader-reader collision

  In reader-reader collision there are multiple readers trying to send the query for the tag to respond at the same time. In such a situation, the tag may not be able to respond to any reader.

4. SYSTEM ANALYSIS

System Analysis is a combined process dissecting the system responsibilities that are based on the problem domain characteristics and user requirements.

4.1 EXISTING SYSTEM:

RFID technology addresses the challenges such as insufficient information, incomplete data and high-volumes by building Data inference and Data compression. It has three main contributions such as Time-varying graph model, Probabilistic algorithm and compression algorithm.

A time-varying graph model is to capture possible location and containment from raw RFID stream. Probabilistic algorithm is to identify the location of objects and containment relationship among objects. Data compression is to transforms the input raw RFID stream into compressed output with location and containment relationship into the database.

Disadvantages:

RFID reader fails to read accurate in regular interval of time .It does not provide accurate location and containment information. A disk-based sorting compression is not designed for fast low-level inference and compression of raw RFID streams.

In the DFSA, the frame size is changed for every read cycle. But the maximum size of the frame is limited. If the number of tags is high, it will not be efficient. The identification will be low.

In RFID warehouse stores many tagged-items so it leads to enormous redundant data. It occupies many space and difficult to identify the tag items in their location. It is difficult to provide the exact location as well as containment relationship i.e. it leads to anomalies.

4.2 PROPOSED SYSTEM:

In this project enhance the data inference and compression over RFID stream to reduce error rate and augment the read rate as well as containment range. It can extend the data inference and compression substrate on combination of static and dynamic reader. Data compression is to reduce the data volumes and data transfer cost. Compression techniques for RFID warehouse use expensive disk-based operations such as sorting and summarization .it can handle the query processing in distributed environment. Anti-collision algorithm is used to reduce collision between reader and tag.

Advantages:

The advantages of proposed systems are:

- Read rate can be improved and reduce the collision rate as well as redundancy data
- Easy to handle query processing in distributed environment.
- It supports both static and dynamic reader.
- Data compression can be done efficiency.

5. IMPLEMENTATION

Implementation is the stage of the project when the theoretical design is turned out into a working system.

5.1 MODULE DESCRIPTION:

- Data capture
- Anti-collision algorithm
- Data Compression
- Query Processing

DATA CAPUTURE:

In this module use time-varying graph model that capture object in regular interval of time and varies containment relationship among the objects from raw RFID streams. We propose Stream driven graph update algorithm used in both static and mobile readers. Data capture contains data about read data, missed data and redundancy data in the supply-chain management.

Data capture is used in supply chain management. Here we have different reader in different location have different frequency. A time-varying graph uses stream driven algorithm for identifying objects and containment from the different locations. In this graph model we can identify object location and some of objects cannot be identified because of collision and environment factor. Collision can be avoided by invoking the anti-collision algorithm. An anti-collision algorithm can used to reduce the collision between the reader and tag. The below diagram will explain detailed information about the data capture module.

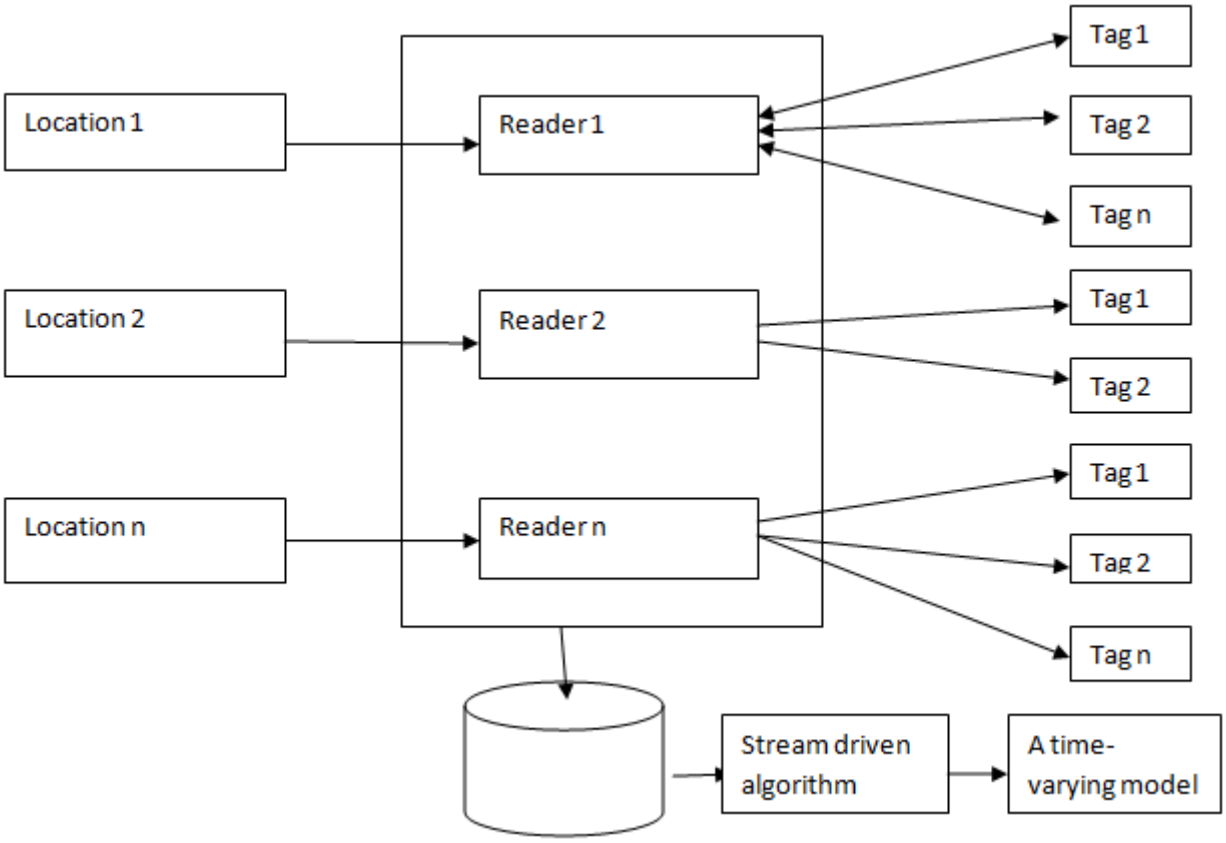

Figure 5.1 Data Capture

ANTI-COLLISION ALGROTHIM:

In this module develop a new algorithm for collision between tags i.e. missed data. It is divided into two steps.

- Tag estimation technique
- Frame size estimation

Tag Estimation Technique

Collision can be between two tags or more than two tags. The data transmitted by the tags in these time slots is not identified by the reader as their information is lost due to collisions. Initially, the reader has no prior knowledge about the number of tags present in the system.

The tag estimation is used to fix the frame size for the next read cycle. Depending upon the estimated number of tags, the frame size will be decreased or increased. Therefore the reader estimates the number of tags present in the system by using different estimation techniques.

Frame Estimation Technique

Initially, the reader has no prior knowledge about the number of tags present in the system. After the initial frame size is set, the reader sends a triggering signal to all the tags to broadcast their information. In each read cycle, the tags randomly choose their slots to send their information. As the tags randomly choose their slots for transmission, there is a probability of collision. After one read cycle, the reader has knowledge about the number of empty time slots, number of successful time slots and number of collision time slots.

After finishing the tag estimation for each read cycle, the frame size will be estimated. There are many techniques for frame size estimation. In this project, a new technique for frame size estimation is used to improve the efficiency of the system

DATA COMPRESSION:

In this module develop compression algorithm that transform an input raw RFID stream into a compressed output with both location and containment relationship among objects in compressed format. A key idea is to reduce the redundancy information about the object location and the containment relationship among the objects.

Location Compression

Location compression is used to compress the RFID-tagged items and easily to extract the accurate location of object.

Containment Compression

Containment relationship which describes the relationship between the RFID-tagged items among the different location and easily to identified the parent of tagged objects.

QUERY PROCESSING

An user can provide query to obtain the accurate location of object and containment relationship among the objects. Different user can obtain objects location in a distributed environment with the assist of network.

6. SOFTWARE DESCRIPTION

6.1. Microsoft Visual Studio 2008

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silver light.

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source-control systems (like Subversion and Visual SourceSafe) and adding new toolsets like editors and visual designers for domain-specific languages or toolsets for other aspects of the software development lifecycle (like the Team Foundation Server client: Team Explorer).

6.2 SQL Server 2008

Microsoft SQL Server is a relational database management system developed by Microsoft. As a database, it is just a software product whose primary function is to store and retrieve data as requested by other software applications, be it those on the same computer or those running on another computer across a network (including the Internet). There are at least a dozen different editions of Microsoft SQL Server aimed at different audiences and for different workloads (ranging from small applications that store and retrieve data on the same computer, to millions of users and computers that access huge amounts of data from the Internet at the same time).

SQL Server 2008 (formerly codenamed "Katmai") was released on August 6, 2008 and aims to make data management self-tuning, self organizing, and self maintaining with the development of SQL Server Always On technologies, to provide near-zero downtime. SQL Server 2008 also includes support for structured and semi-structured data, including digital media formats for pictures, audio, video and other multimedia data. In current versions, such multimedia data can be stored as BLOBs (binary large objects), but they are generic bit streams. Intrinsic awareness of multimedia data will allow specialized functions to be performed on them. According to Paul Flessner, senior Vice President, Server Applications, Microsoft Corp., SQL Server 2008 can be a data storage backend for different varieties of data: XML, email, time/calendar, file, document, spatial, etc as well as perform search, query, analysis, sharing, and synchronization across all data types.

7. CONCLUSION

7.1 SUMMARY:

In this work, RFID tagged objects have been identified in the transition state varies from one place to another. A time varying graph model uses Stream driven graph algorithm to analyze and identify objects in different location and plotted in graphical view in regular time interval. A missed data, read data and redundancy data can be clearly viewed from the time-varying graph model. A missed data occur because collision between tag and reader and environmental factor. A collision can be reduced by using anti-collision algorithm.

7.2 FUTURE ENHANCEMENT:

In future, we propose data inference is to estimate the most likely location of objects and containment relationship between the objects. Data compression techniques were used to reduce the location and containment compression in the data warehouses. Data inference and compression technique were used in static and dynamic reader and also handle the query processing in the distributed environment.

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