Domain Driven Data Mining: An Efficient Solution For IT Management Services On Issues In Ticket Processing

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ABSTRACT

Data Mining is the new emerging technology that can be applied in many real-world problems in order to make the solution. Conventional data mining application faces critical challenges and lack of soft power in solving real-world complex problems when deployed. This data mining is implemented on the IT Infrastructure in order to provide better services. In this aspect, we use a new paradigm shift from 'data-centered knowledge discovery' to 'domain-driven actionable knowledge discovery'. The domain-driven actionable knowledge discovery also termed as Domain-Driven Data Mining, ubiquitous intelligence must be involved and meta-synthesized into the mining process this an actionable knowledge discovery-based problem-solving system is formed as the space for data mining. This is the motivation and aim of developing Domain-Driven Data Mining used for IT Infrastructure Management. In this paper, we propose a methodology to solve the problem raised in the Management of IT Infrastructure. Also, it provides suitable solution for handling the issues raised in the ticket processing. Thus the proposed methodology provides better services to manage the IT services and provide an efficient way to increase the customer satisfaction.

KEYWORDS: *Customer Satisfaction, Data Mining, Domain-Driven Actionable Knowledge Discovery, IT infrastructure, Ticket Processing, Ubiquitous Intelligence.*

1. INTRODUCTION

Information Technology (IT) can be defined as set of tools, processes, and methodologies and associated equipment employed to collect, process and present information. In other terms, IT also includes office automation, multimedia and telecommunications. The methodologies defined include coding, programming, data communications, data conversion, storage and retrieval. In some companies, IT is referred to as Management Information Services (or MIS) or simply as Information Services (or IS). The information technology department of a large company would be responsible for storing information, protecting information, processing the information, transmitting the information as necessary, and later retrieving information as necessary. To perform the complex functions required in the IT field, the modern Information Technology would use many things such as computers, servers, database management systems and cryptography. It would also made up of several System

Administrators, Database Administrators and IT Manager. With the help of these resources, the IT Management Services would be most efficient and powerful. The most popular IT Skills at the moment are:

- Computer Networking
- Information Security
- IT Governance
- Business Intelligence
- Project Management

Information Technology Departments will be increasingly concerned with data storage and management, and will find that information security will continue to be at the top of the list. To lead in this trend this paper focuses the Implementation of Domain Driven Data mining in IT Management service in Order to Provide better efficiency.

Domain Driven Design is a collection of principles and patterns that help developers craft elegant object systems. This can lead to software abstraction called domain models. These models encapsulate complex business logic, closing the gap between business reality and code. It is an approach to develop software for complex needs by connecting the implementation to an evolving model. **Domain** is nothing but a sphere of knowledge, influence or activity. The domain of the software is said to be the area which the user applies a program. In this growing computerized world, data mining has emerged as one of the most essential areas in Information Technology. Many algorithms have been proposed to focus on both domain-independent techniques and specific domain problems. **Domain-Driven Data Mining** aims to develop general principles, methodologies, and techniques for modeling and merging comprehensive domain-related factors and synthesized ubiquitous intelligence surrounding problem domain with the data mining process, and discovering knowledge to support business decision making. In this paper, we implement the Domain-Driven Data Mining in IT Management services in order to reduce the work flow in the organization, and to analysis the issues occurred in the ticket, handling the issues and then fix the issues through proper methodology. These are all proposed in this methodology and it is experimentally verified in order to check for the efficiency of the paper.

II. RELATED WORK

Amir Mosavi et al, paper [1] described that Conventional data mining applications face serious difficulties in solving complex real-life business decision making problems when practically deployed. This work in order to improve the operations in a collection of business domains aims to suggest solutions by reviewing and studying the latest methodological, technical, practical progresses and some cases studies of data mining via domain driven data mining (DDDM). The presented paper tries to answer the question: "what can domain driven data mining do for real-life business applications?" Moreover the work attempts to provide information and abilities to fill the existing gap between academic researches and real-world business problems. Thomas Piton et al, paper [2] described that the trading activities of materials retail was concerned with an extremely competitive market. However, business people are not well informed about how to proceed and what to do during marketing activities. Data mining methods could be interesting to generate substantial profits for decision makers and to optimize the choice of different marketing activities. In the paper, they proposed an actionable knowledge discovery methodology, for one-to-one marketing, which allows to contact the right customer through the right communication channel. They presented a domain-driven view of knowledge discovery satisfying real business needs to improve the efficiency and outcome of several promotional marketing campaigns.

Palshikar et al, paper [3], Support analytics (i.e., statistical analysis, modeling and mining of customer/operations support tickets data) was important in service industries. In the paper, they adopted a domain-driven data mining approach to support analytics with a focus on IT infrastructure Support (ITIS) services. The proposed methodology can identify specific business questions and hence reduced an new algorithms for answering them. The questions are: (1) How to reduce the overall workload? (2) How to improve efforts spent in ticket processing? (3) How to improve compliance to service level agreements? We propose novel formalizations of these notions and propose rigorous statistics-based algorithms for these questions. The approach was domain-driven in the sense that the results produced are directly usable by and easy to understand for end-users having no expertise in data-mining, do not require any experimentation and often discover novel and non-obvious answers. All this helps in better acceptance among end-users and more active use of the results produced. The algorithms have been implemented and have produced satisfactory results on more than 25 real-life ITIS datasets, one of which they use for illustration.

Chengqi Zhang et al, paper [4], extant data mining were based on data-driven methodologies. The domain-driven data mining consists of a DDID-PD framework that considers key components such as constraint-based context, integrating domain knowledge, human-machine cooperation, in-depth mining, actionability enhancement, and iterative refinement process. They also illustrate some examples in mining actionable correlations in Australian Stock Exchange, which show that domain-driven data mining has potential to improve further the actionability of patterns for practical use by industry and business.Longbing Cao, paper [5], Traditional data mining research mainly focus]es on developing, demonstrating, and pushing the use of specific algorithms and models. The process of data mining stops at pattern identification. Consequently, a widely seen fact was that 1) many algorithms have been designed of which very few are repeatable and executable in the real world, 2) often many patterns are mined but a major proportion of them are either commonsense or of no particular interest to business, and 3) end users generally cannot easily understand and take them over for business use. In summary, they see that the findings are not actionable, and lack soft power in solving real-world complex problems.

To the end, domain-driven data mining (D3M) has been proposed to tackle the above issues, and promote the paradigm shift from "data-centered knowledge discovery" to "domain-driven, actionable knowledge delivery." In D3M, ubiquitous intelligence was incorporated into the mining process and models, and a corresponding problem-solving system was formed as the space for knowledge discovery and delivery. Based on the related work, the paper presents an overview of driving forces, theoretical frameworks, architectures, techniques, case studies, and open issues of D3M. We understand D3M discloses many critical issues with no thorough and mature solutions available for now, which indicates the challenges and prospects for the new topic.

In recent years, researchers with strong industrial engagement have realized the need to shift from "data mining" to "knowledge discovery" [6], [7], [8]. Targeting real-world problem solving, knowledge discovery was further expected to migrate into Actionable Knowledge Discovery and delivery (AKD). AKD aims to deliver knowledge that was business friendly, and which can be taken over by business people for seamless decision making. As a direct application of a recent research carried out by Atish et al. [9] established that there was interaction between the classification method of data mining and domain knowledge. They concluded that the incorporation of domain knowledge has a higher influence on performance for some data mining methods than for others. Chien et al. [10] collaborated with domain experts to develop specific recruitment and human resource Management strategies using data mining techniques. Their results were successfully applied in a real-world business.

Zhao et al. examined the effects of feature construction [11] guided by domain knowledge, on classification performance. The results of their study showed that feature construction, guided by domain knowledge, significantly improves classifier performance. An imbalance exists between the number of data mining algorithms published and the very few that are actually useful in a business setting. Hence conventional data mining has failed to deliver adequate results in decision making for real life business. A need therefore arises for a better framework within which better results can be obtained from existing data mining methodologies, techniques, tools and applications [12].

III. PROPOSED METHOD

The aim of the paper is to propose a methodology to fix the issues raised in the ticket submitted by the user in order to process the request, and to improve the customer satisfaction.The summary of the proposed methodology is as follows: The IT Organization comprises of several levels of industrial patterns, to manage and maintain the infrastructure. Each level performs its own functions depending upon the organizational structure. Domain-Driven Data Mining extends organizational toolbox and borrows from well-known industry patterns. Organizational patterns that the domain-driven data mining lays out are that there are solutions for every level of detail in the system. In this paper, the IT Infrastructure management can be carried out in Domain-Driven Data Mining in order to provide a generalized solution in any kinds of domain, that we can be implemented. The initial step is to receive the tickets from the user to process. Upon receiving the tickets from the user, the tickets can be classified into categories based on the concern. Since the tickets has been processed based on these categories. Upon classifying the tickets into categories, the next step is to check for any issues or errors arised in the submitted tickets. If so, then the issues are analyzed in order to verify whether the occurred issues are relevant to each other. After analyzing the issues, the next process is to find the ticket with high issue rate. The found ticket is then undergoes for the process. Then **RCA** is applied on the ticket.

RCA (Root Cause Analysis) is a method of problem solving that tries to identify the root causes of faults or problems that cause operating events. The RCA is applied on the tickets with issues. The result is then obtained and then analysis the result to get the ticket with high issue rate. The ticket with high issue rate is identified and then analyzed the cause for the issue. Upon analyzing the cause, the next step is to verify whether there is any option to fix the issue. If so, the next step is to apply CI on that issue.

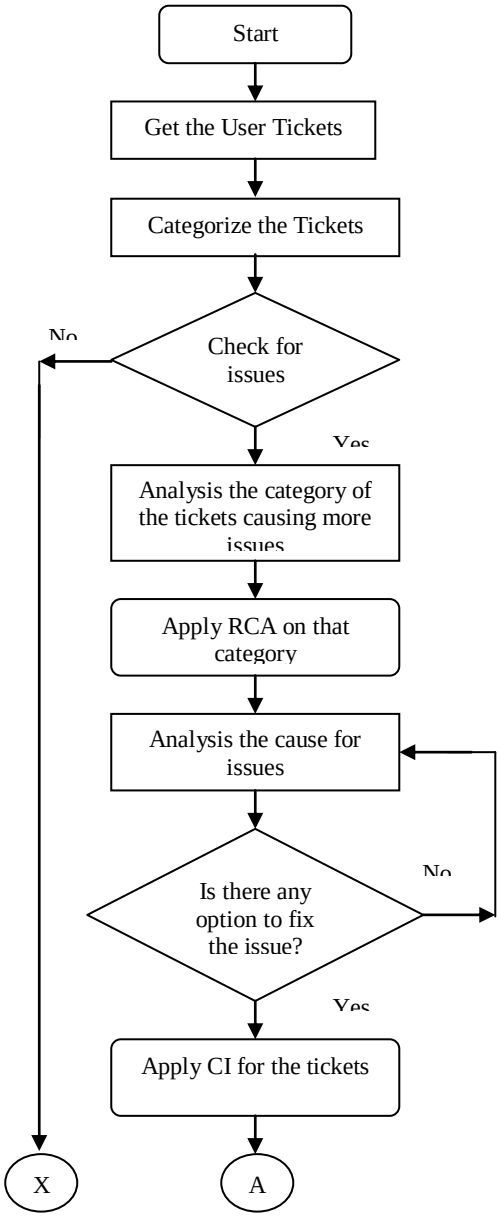
CI (Continuous Improvement) is a method to improve the status of the tickets with issues through continuous periodic improvement to overcome the issues. The CI can be applied on the ticket in the category, to find the solution. The identified solution can be applied on every ticket in the category and analyze whether the solution reduces the number of tickets causing the issue. If so, we can fix the solution to improve the customer satisfaction by reducing the number of tickets.Thus, with the help of RCA, we can analysis the cause for the issue and through CI, we can fix the issue and to reduce the number of tickets causing the issue. Through our proposed methodology, we can gain more advantages which are as discussed below:

- Reduce the number of issues.
- Increase the customer satisfaction
- Increase the number of customer requirements
- No need to wait for SLA
- Efficient way to fix the issue.

Thus our proposed methodology provides a better solution to manage the issues arised in the IT field.

Diagrammatic Representation

The diagrammatic representation of the proposed methodology is given in figure 1.



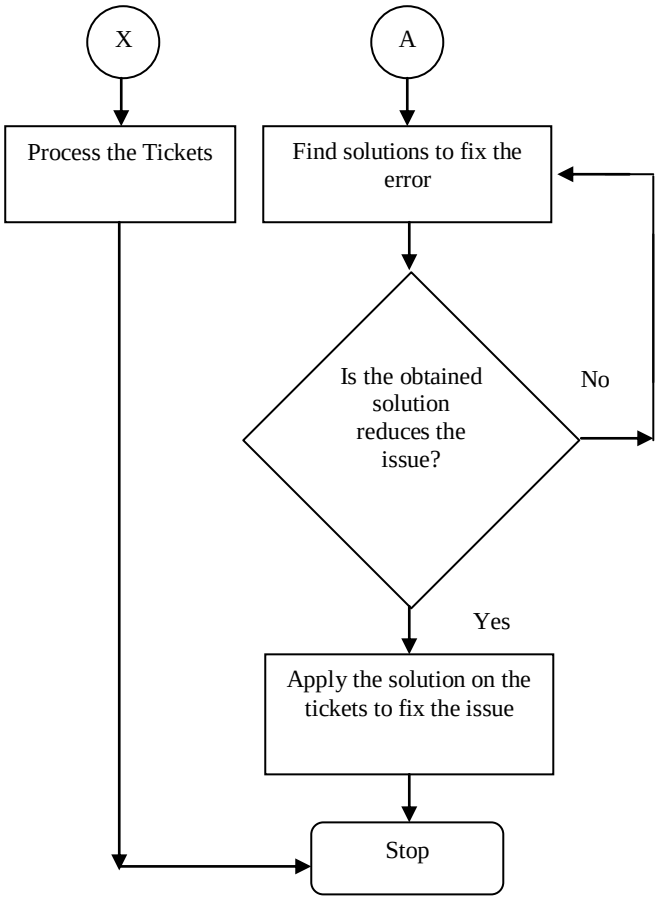


Fig.1 Representation of Proposed Method

Implementation Algorithm

Begin
Get the tickets from the user
Categorize the tickets based on the concern
For i in 1 to n categories
If issues on tickets = true then
ICat = category(i)
End if
Next
Apply RCA on ICat
Cause = Identify the root cause for the issue using RCA
If Cause possible to solve then
Apply CI on the tickets
Solution = Identify the solution using CI
End if
If Solution minimize the issue then
Apply Solution to fix the issue
End if
End

VI. EXPERIMENTAL RESULTS

The experiment is taken out in banking sector in order to verify the efficiency of our proposed method. In that banking sector, we undergo an experiment with two sections. First, we test the result of processing the tickets without implementing this proposed methodology. Also, each ticket is processed independently and so the time consumption to process the ticket becomes more. Secondly, we implement proposed methodology to verify the result. these tickets have been categorized and then it undergoes for processing. using proposed

methodology So the time consumption becomes less. Also the issues arised in the tickets has been processed efficiently in our proposed method than the existing method. The comparison has to be made between these two sectors and the resultant shows that the proposed method provides better solution in solving the tickets with issues in a much better way with the help of RCA and CI methods. The comparison result is shown below:

Table.1 Comparison Data

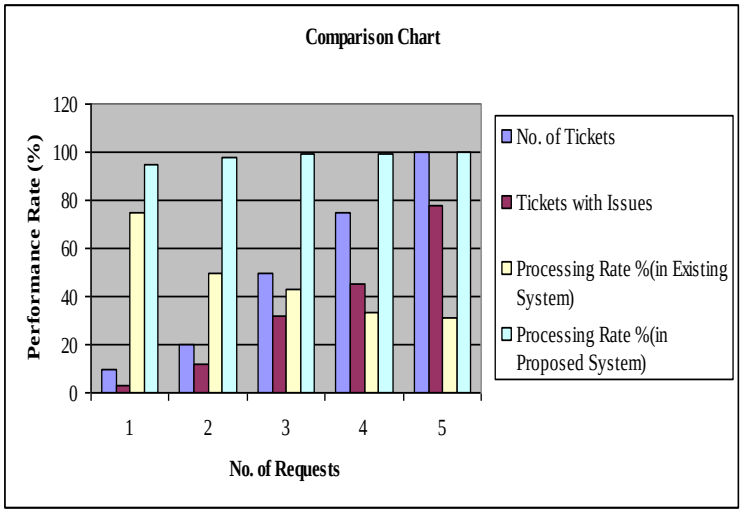


Fig.2 Comparison Chart

No. of Tickets	Tickets with Issues	Processing Rate %(in Existing System)	Processing Rate %(in Proposed System)
10	3	75	95
20	12	50	98
50	32	43	99
75	45	33	99
100	78	31	99.9

From the comparison chart, it is clear that when the number of tickets and the issues increases, the performance of the existing system becomes low compared to the proposed methodology. Thus, our proposed system performs well in solving and processing the tickets.

VII. CONCLUSION

Thus, the proposed methodology provides an efficient solution to fix the issues raised in the tickets through the methods RCA and CI. With the help of the proposed methodology, IT organization can process the tickets in a much more efficient way than before. Since, we can provide the strategy to reduce the number of tickets causing the issues, the number of customer requests has been increased. Also, there is no need to wait for SLA to process the tickets; the customer satisfaction also gets increased. Thus, our proposed methodology gives a better solution to manage the ticket processing in an IT organization and also to fix the issues raised in ticket processing.

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