

# Performance Monitoring in Virtual Organization Using Domain Driven Data Mining and Opinion Mining

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**Abstract:** Performance monitoring is the important problem of virtual organization which is geographical distributed. A virtual team is small variant is an organization network that is structured and managed to function as a complete organization. Unfairness can be more determined virtual organization in which geographically distributed. The papers aims to investigate the main factors that affect the performance of employees in IT industries by using domain driven data mining(D3M)approach and 360 degree feedback for objective measurement and opinion mining for subjective measurement and support vector machine(SVM) to classify the opinions collected.

**Keywords:** Performance evaluation, Virtual Organization; Domain Driven Data Mining (D3M), support vector machine (SVM), virtual team 360 degree feedback, opinion mining

## 1. Introduction

Virtual organization poses challenges to those accustomed to traditional work groups in functional organizations. Virtual program and project management demands a new approach that requires evaluation of the advantages and disadvantages of nontraditional work and the leadership competencies to manage at a virtual level. Leading in the virtual environment poses challenges to those accustomed to traditional work groups in functional organizations. Virtual program and project management demands a new approach that requires evaluation of the advantages and disadvantages of nontraditional work and the leadership competencies to manage at a virtual level. In an organization experiencing resource restrictions and growth that involves an evolution to a cross-functional virtual environment, interpersonal skills and the ability to be an agent of change are important skills. The inability to lead through the challenges of working virtually and moving toward a new organizational structure presents a huge risk to the organization.

Assessing the performance of an employee during a given period of time and planning for his future. It is a powerful tool to calibrate, refine and reward the performance of the employee. Technology helps to measure and manage the employee; evaluation performs very effectively. It helps to automate the resource processes, which save time, cost and reduce the efforts. According to a survey, more than 30 percent of the respondent organizations are already using or planning to use automated software for performance management in virtual organizations.

To help and automate the processes of Performance Evaluation and management, virtual organizations are increasingly taking the help of various performances management software like workforce performance management (WPM) suite systems and talent management systems, which help to systematically record all the data about the employee performance, pre-determined targets and the results achieved, compensation, succession planning and other related HR systems. Because of the development of information technology, the types of organization and the nature of management have changed, and boundaries between organizations have disappeared. "Virtual team" is the newest

type of work group. However, many managers only care about the advantages of the Internet and information technology, and ignore that the members of virtual teams might doubt and distrust with each other.

## 2. Literature Survey

An Employee performance evaluation, whereby a superior evaluates and judges the work performance of subordinates, is one of the most common management practices utilized in all organizations including a MNC like virtual organization. The widespread use of conventional performance evaluation methods can be attributed to the belief by many managers and human resource professionals that performance critically needed tool for effective human management and Organizational performance improvement The assumption appears to be that an effectively designed, implemented, and administered performance evaluation system can provide the organization, the manager, and the employee with a plethora of benefits. In spite of its widespread use, or perhaps because of it, the practice of formal performance evaluation in virtual organizations continues to come under considerable scrutiny and criticism and those methods are not supposed to be used for performance evaluation in virtual organizations.

A virtual organization such as an IT Industry comes across various problems and challenges of Performance Appraisal in order to make a performance evaluation system effective and successful. Researchers have developed and practitioners have implemented various changes to the virtual performance evaluation criteria, rating instruments, and appraisal procedures in an effort to improve the accuracy and perceived fairness of the process. However, in spite of the attention and resources applied to the practice, dissatisfaction with the process still abounds and systems are often viewed by employees in IT Industries as inaccurate and unfair. Hence an effective automated tool using Data Mining and Business Intelligence has to be designed for Performance evaluation of employees in virtual organizations. A novel Domain Driven Data Mining (D3M) approach using 360 Degree performance assessment and opinion mining has been proposed in this research to solve the problem of performance evaluation in virtual organizations.

### 3. Domain Driven Data Mining

Domain Driven Data Mining (D3M) targets the development of next-generation data mining methodologies, frameworks, algorithms, evaluation systems, tools and decision support, which aim to promote the paradigm shift from data-centered hidden pattern mining to domain-driven actionable knowledge discovery (AKD). To this end, D3M needs to involve and integrate human intelligence, domain intelligence, data intelligence network intelligence, organizational and social intelligence, and the meta-synthesis of the above ubiquitous intelligence. As a result of the D3M research and development, the AKD system can deliver business-friendly and decision-making rules and actions that are of solid technical and business significance system environment and interaction in a system.

#### A. Why Do We Need (D3M)

In data mining community, there is a big gap between academic objectives and business goals, and also between academic outputs and business expectations. However, the runs in the opposite direction of KDD's original intention and its nature. It is also against the value of KDD as a discipline, which generates the power of enabling smart businesses and developing business intelligence for smart decisions in production and living environment. From both macro-level and micro-level, we can find reasons asking for new methodology and paradigm shift such as domain driven data mining. On the macro-level, issues related to methodological and fundamental aspects which, include:

- An intrinsic difference existing in academic thinking and business deliverable expectation; for example, researchers usually are interested in innovative pattern types, while practitioners care about getting a problem solved.
- The paradigm of KDD, whether as a hidden pattern mining process centered by data, or an AKD-based problem-solving system; the latter emphasizes not only innovation but also impact of KDD deliverables. The micro-level issues are more related to technical and engineering aspects, for instance.
- If KDD is an AKD-based problem-solving system, then we need to care about many issues such as system dynamics, system environment, and interaction in a system.

#### B. The D3M Framework

D3M advocates a framework of actionable knowledge discovery. The Actionable Knowledge Discovery (AKD) is the procedure to find the Actionable Pattern Set P through employing all valid methods M. Its mathematical description is as follows:

$$AKD_{mi} \in M \rightarrow Op \in P \text{ Int}(p),$$

Where  $P = P_{m1} \cup P_{m2} \dots \cup P_{mn}$ ,  $Int(.)$  is the evaluation function,  $O(.)$  is the optimization function to extract those  $\tilde{p} \in P$ . where  $int(p)$  is given benchmark

Correspondingly, the actionability of a pattern p is measured by  $act(p)$ :

$$act(p) = Op \in P \text{ (Int}(p))$$

$$\rightarrow O(\alpha \text{ to}(p)) + O(\beta \text{ ts}(p)) +$$

$$O(\gamma \text{ bo}(p)) + O(\delta \text{ bs}(p)) \\ t_o^{act} + t_s^{act} + \dots + t_o^{act} + t_o^{act} \quad (2)$$

Where  $tacto$ ,  $tacts$  measure the respective actionable performance in terms of each interestingness element.

#### C. D3M Applications

Given the nature of D3M, it can bring about the effective and practical development of many challenging data mining applications in every area. Based on the collaborations with our business partners, we have the experience in developing and deploying D3M in areas such as capital markets and social security area. In capital markets, we develop actionable trading agents, actionable trading strategies, and exceptional market microstructure behavior patterns. In social security area, concept of activity mining and combined mining is being proposed.

### 4. 360 Degree Data Mining

A major advantage to the "360" process is that it provides an opportunity for all those people with a person who comes into frequent contact to offer feedback. A caveat here is that the raters should be that truly have observed an employee or manager on a frequent basis. It's not fair to ask people for input that haven't had a chance to observe someone's skills, talents, and abilities on a regular basis.

When a feedback comes from many sources, it's more difficult for a person to brush aside constructive criticism and rationalize that "the boss just has it in for me". If several people suggest that a manager needs to improve verbal communication skills, chances are high that this is indeed a necessary area for improvement.

Another advantage of the "360" process is that it is designed with a customer focus in mind. The customers can be internal or external. Unfortunately, it's difficult for some employees to understand the impact their daily activities have on other individuals or departments within the company. However, if they receive direct and frequent feedback on how their behaviors affect others, employees are more likely to be attentive to deadlines and quality requirements. They learn how to make their company look good, not just themselves.

"360" performance evaluations are coupled with competency-based job descriptions. When this occurs, an employee or manager is recruited based on core competencies for his or her position and evaluated on those same competencies. In HR, we often hear this complaint: "My performance evaluation is not even remotely connected to my job description." There should be a direct connection and the "360" process can assure this happens. The core competencies, by the way, should be supportive of the company's strategic objectives. In deriving these competencies, the company's leadership must

ask, "what skills, knowledge, and behaviors do we need across the organization to meet the challenges of our mission and vision"?

The "360" evaluation is particularly strong when combined with an action plan, developed by the person receiving feedback and shared with those who provided the feedback. This action plan demonstrates that the feedback was heard and assuming that suggestions are reasonable, will be put to use as soon as possible.

The 360-degree is an assessment tool that provides employees with feedback about their performance. Supervisors, peers, and, where appropriate, customers answer questions about an individual's skills and attributes. The employees are often rated in areas such as performance evaluation based upon four-factor model. Employees also rate themselves in these areas. All of the information is compiled into an individual report for each employee. The reports show employees' strengths and weaknesses according to the 360 Degree survey responses.

More 90% of the companies are using a type of 360° assessment as the traditional standard method for identifying their employee's performance evaluation. In this research, the traditional records are not neglected. Those records are also used to retrieve data and domain intelligence in D3M. The past 360 Degree records are stored and mined for retrieving both data and domain intelligence of an employee. Hence it is named as 360 Degree Data Mining. Data intelligence refers demographic (personal) and performance measures of an employee from his past historical record. Domain intelligence means that the domain knowledge possessed by the employee from the work flow data, performance record, past history, achievements and operational information all previous data will be taken in two columns.



Figure 1: 360 degree feedback for virtual organization

## 5. Opinion Mining

An important part of our information gathering has always been to find out what others people think, with growing availability of opinion rich resources like online review sites and personal blogs.

The textual data can be classified into two types: facts and opinions. Facts are objective expressions about entities, events

and their properties. Opinions are usually subjective expressions that describe people's sentiments, appraisals or feelings toward entities, events and their properties. The concept of opinion is very broad. In this research, it has been focused opinion expressions that convey people's positive or negative sentiments.

The existing research on textual information processing has been focused on mining and retrieval of information, e.g., information retrieval, Web search, text classification, text clustering and many other text mining and natural language processing tasks. Little work had been done on the processing of opinions. People, such as students, employees and public, are talking about the virtual organization and its business everyday positively or negatively. Since feedbacks are by and large unstructured in nature, understanding and extracting the meaningful information from massive data collections becomes a real challenge. This paper outlines the various tasks that are to be carried out during the performance evaluation and appraisal process from the IT Industry setting.

- Collect feedbacks, opinions as unstructured text from different information ex. Email, and online forms
- Perform Extraction, Transformation and Loading, Preprocessing to remove noise from the information sources.
- Cluster feedback data into meaningful categories by applying K-Means clustering algorithms.
- Visualize the categories
- Discover patterns and relationships through classification techniques.

Classification has been widely studied in the natural language processing (NLP) community. For example, given a set of movie reviews, the system classifies them into positive reviews and negative reviews. This is clearly a classification learning problem. It is similar but also different from the classic topic based text classification, which classifies documents into predefined topic classes, e.g., politics, sciences, and sports. In topic-based classification, topic related words are important. Opinion words that indicate positive or negative opinions are important, e.g., great, excellent, amazing, horrible, bad, worst, etc. There are many existing techniques. Most of them apply some forms of machine learning techniques for classification. Custom-designed algorithms specifically for sentiment classification also exist which exploit opinion words and phrases together with some scoring functions

## 6. Support Vector Machine

In machine learning, support vector machines (SVM), also support vector networks are supervised learning models with associated learning algorithms that analyze data and recognize patterns, used for classification and regression analysis. Given a set of training examples, each marked as belonging to one of two categories, an SVM training algorithm builds a model that assigns new examples into one category or the other, making it a non-probabilistic binary linear classifier. An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible

Machine Learning (ML) phase consists of three Components named as:

- Retriever,
- Feature Extraction Engine
- Classifier shown in Figure 2

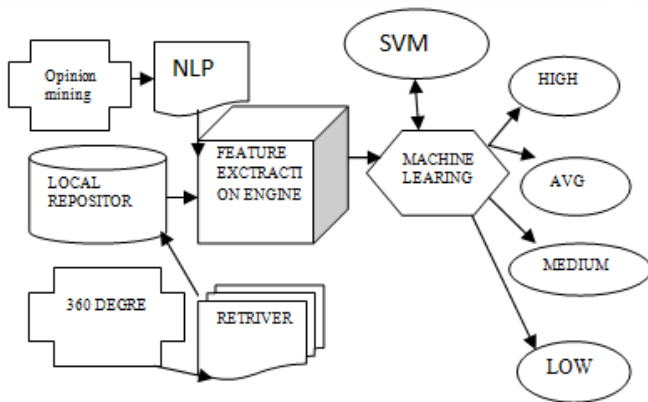


Figure 2: Support Vector Machine for Performance Monitoring

## 7. Related Work

Opinion words are words that express desirable ( ex. awesome, fantastic, great, amazing, exceptional, excellent, best, etc.) or undesirable (e.g. bad, poor, frustrating, disappointing, horrible, terrible, worst, sucks etc.) states They reflect valuable aspects of the rater experience that can complement other forms of feedback from employees.

As a human being, people like to express their own opinion. They are also interested to know about others opinion on anything they are interested especially whenever they need to make a decision. The technology of opinion mining thus has a tremendous scope for practical applications. The opinion regarding different element or feature of the service could be considered. Most existing techniques utilize a list of opinion bearing words, generally called opinion lexicon for this purpose [3].

One of the obstacles is that reading and making sense of all the textual responses can be a daunting task. This paper aims at a combined analysis of the textual and quantitative responses using novel data mining techniques in order to provide a more comprehensive understanding of the employee. One goal of sentiment classification is to determine whether a text is objective or subjective, or represents a positive or negative opinion affect classification is to identify the expressions of emotion such as happiness, sadness, anger, etc. Since the textual opinions is daunting task the quantitative response can be measured in 5-points ranging from 1= very low, 2= low, 3= average, 4= high, 5= very high [4].The architectural design is shown in figure 3.

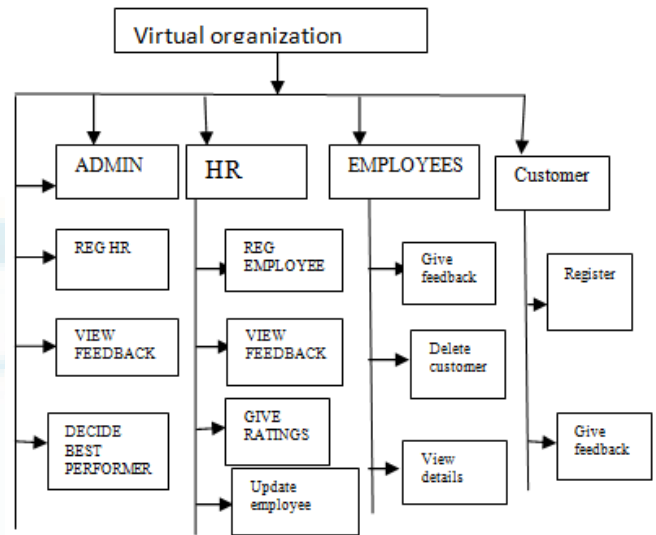


Figure 3: Architecture Design

## 8. Conclusion

In this paper most effective factors are discussed to increase performance monitoring of employee’s using Domain driven data mining(D3m) approach using 360 degree feedback and opinion mining and support vector machine(SVM)as the technical basis. Less satisfaction (although not dissatisfaction) was indicated for the virtual organization with the previous performance evaluation. When making long and short term goals, virtual organizations must carefully calculate who will champion their initiatives. Selecting the appropriate individuals for performance evaluation positions is paramount to virtual organizational success. Placing the wrong person in a performance evaluation role in virtual organizations can result in devastating problems which are subject to strong public scrutiny. These problems can range from lack of employees morale to financial destruction.

All industries will also be intensifying their efforts to attract new talents. This creates an opinion polling that can find multiple positions in industries. This domain driven data mining approach makes it even more challenging to retain the talented individuals in employee performance evaluation roles. However, despite the challenge, the effort must be made in order for the virtual organizations to succeed in this consumer driven market. By combining Opinion Mining procedures and effective 360 Degree data mining, organization facilities can create a long-term process that will provide them with boundless performing talents with more employee performance development activities. A 360 Degree feedbacks and opinions play a vital role in any organization to achieve the substantially. Every feedback or opinion in a virtual organization tells something important in it and that is why this system mines it for possible performance evaluation with the help of various intelligences. Further, it has been collected opinions from several subjects and working on evaluation of performance of employee’s.

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