Quantifying Qualitative Analysis for Collaborations in Enhanced Virtual Social Platforms

P. Siva Kumar[1], K. Srikanth[2]

[1]Computer Science Engineering, Rise Group of Institutions, Ongole, India

[2]Computer Science Engineering, Sri Venkateswara University, Tirupati, India

Abstract: *Business collaboration for more productive solutions are trending in today's business scenarios , collaboration is word defined more specifically towards social community events. Therefore social communities play an vital role in identifying, extending support platform for collaboration. As of IT is considered most popular social platforms are Twitter, Facebook etc have changed the face of IT social communication when considered. In order to create and sustain this kind of business collaborations, specialized methods or techniques are required. In this paper we propose concept of quantifying qualitative MMQCDL for business collaborations in Enhanced social Platforms. It is achieved by discovering present relevant businesses and prospective business alliances by developing related collaborations technique assumptions. The empirical results revealed that the proposed system is effective when tested with test bed which is based on social platforms.*

Keywords: Business collaborations, quantifying qualitative, alliances empirical, effective distributed

1. Introduction

Social Networking Platforms advancements in distributed computing and infrastructure pertaining Information and Communication Technology has paved the way for potential collaborations among companies/firms doing relevant business [1]. Especially the technologies like Customer Relationship or Sales Related market has practically made it possible for companies to have realistic alliances virtually. This has led to the formation of chain of companies or group of companies that involve in customer centric business processes. For instance, the banking sector is fully making use of the distributed technologies like web services to leverage and customize its consumer centric policies and making banking service available to its customers in many ways. However, there are some obstacles to establish such collaborations among companies. They include resources and services are to be discovered dynamically and context aware and flexible interactions among people of different companies and also different departments of same company. In social networking interactions are from various individuals or organizations that have influenced the emergence of many techniques pertaining to interaction mining and knowledge discovery. However, the social networking structures have relatively small information paths [2]. As the social networks are organizational units, the collaborations are restricted. In this paper we propose a social networking principle in order to bridge disjoint collaborative networks. The contributions of our research include introduction of brokers to connect sub groups; metrics to support discovery and selection of brokers; MMQCDL (Middle Man Query and Cross Domain Language). The rest of the paper describes related work and the concepts of this paper in theory and practical.

2. Related Work

Service oriented systems are becoming stable and practical as there are standards established that are followed globally [3]. There is an important aspect to be observed in the service oriented systems. Though the technologies like web services support heterogeneous systems to be connected seamlessly, the human intervention is required some where in the business process. Therefore it is essential to consider human-based process as part of the whole service based systems. Hence, in our system we mix the service based systems based on SOA and also social principles. In order to support flexible service oriented systems among diverse organizations, we adopt HPS (Human Provided Services) which is proved to be suitable [4]. Simple interaction models are supported by existing platforms while social network principles can support advanced techniques like formation and adaptive coordination.

Burt [5] proposed theory known as "structural holes". It depends on the hypothesis that individuals who serve as intermediaries can be benefited. In our work, we use strategic formation of communities and social networks as described in [6]. In [7] broker incentive techniques are used which are based on game theoretic analysis. The proposed system is based on interaction mining. It also makes use of metrics that help in discovering brokers dynamically. The amount of information available on human interactions in social networking has closed a loop [2] that allows forming models that can help in the design of applications such as crowd sourcing techniques [8]. In [9], [10], many trust models have been described. However, we make use of social trust models described in [11], [12], [13]. For improving queries on social networking information, we proposed MMQCDL which is intuitive in nature. SPARQL [14] is a generic query language while MMQCDL is not and allows specific discovery of actors in the social landscape.

3. Virtual Platforms

An emerging virtual community in the social and collaborative landscape is Professional Virtual Community (PVC). It has actors who interact with others through a well established ICT. In order to realize this service oriented

systems are used. The emergence of distributed computing technologies has paved way to have web-enabled PVCs.

A. Collaboration Brokering in PVC

PVC allows experts from various organizations to have collaborations through social networking or other customized applications. The experts are considered actors while the actions they perform are known as activities. They use SOA based technologies in order to form a virtual community that can have flexible interactions. HPS framework [4] is such technology that supports human interactions and participation in service oriented system. The members of PVC can benefit from other experts as they can share knowledge, clarify doubts of others and also help each other in their professions. The PVC network comprised sub domains that have groups of experts. Broker concept helps in connecting different sub groups in the virtual community. A person from a domain may be acting as broker who can help connect a known person with other domain. Inter – domain relations are improved by using broker concept. It also leverages finding new groups that can join the PVC thus supporting the formation of expert groups. The relationships among the actors can be converted into FOAF relations. This is because people in general trust known people when compared with unknown people. Therefore the broker concept has its impact on the scenarios such as formation of expert groups; controlling interactions and delegations; establishment of new social relations.

4. Enhanced Virtual Social Platforms

This section focuses on flexible service oriented collaborations, trust relationships and broker behavioral patterns.

A. Service Oriented Collaboration

SOA is basis for service oriented collaborations. While this is the fact, the HPS can enhance collaborations containing software services and also human activities together. Thus it is capable of forming flexible service oriented collaboration. In order to achieve this steps followed are publish, search and interact. Publish does mean that people can develop HPS and publish them to make it available to public. Search allows people to search for services suitable to their needs and Interact is for providing personalized interaction environments that are intuitive and usable.

B. Trust Evolution in PVC

The trust being described here is not related to security but social in nature. It depends on the collaborations and the behavior in the previous such collaborations as per the needs and changing interests of individuals [11], [12]. As people in collaborative network involve in business and the trust is required in order to ensure that collaborations are productive and long lasting. The trust model proposed by us is influenced by [15], [10] and [12]. Interaction loges are used to derive metrics that help in finding facts and relationships among actors in right perspective. The proposed system is also based on HPS concept. One example for metric is the success rate of delegated tasks between members. These metrics help in finding trustworthy collaborations. The interaction metrics such as responsiveness, success rate are used in our work to promote trust relationships. Further the trust is based on the context and scope.

5. The Cross Platform Dynamic Language and its Specifications

MMQCDL is a language that has syntax similar to SQL. It is meant for querying data from the interactions of collaborative and socially enhanced virtual communities such as PVC. The important terms or keywords of this language are described in table 1.

Table 1: Show elements of MMQCDL

Element	Description
[ ]	Used to make an expression to represent one, one to m[1…m] and one to many[1…*] relationships.
<all>	Retains all nodes that satisfy given criteria.
as	Used to create an alias
satisfy	Requires that given criteria should be satisfied.

When there are many communities and finding required information among the communities is possible with MMQCDL language expressions. The figure 1 shows the MMQCDL script that is used to obtain suitable broker to connect two predefined communities.

```
Select node From(
(select distinct9node0 From G Where
([1..*]n in source ) satisfy
Path(n to node) as P1 With P1.length = 1)
As G1,(target) as G2)
Where
(<all>e in G1.nodes) satisfy
Path (n to [1..*]G2.nodes) as P2
With P2.length = 1
And
(<all>e in G1.edges) satisfy
(e.relation = EPredicates.BIDIRECTIONAL) and
(e.trust>=MTrust.MEDIUM)

Order by node
```

Figure 1: Shows MMQDL script to obtain broker to connect two predefined communities

As can be seen in the above figure, the CPDL is used to find out broker suitable to connect two predefined communities. The query also makes use of trust values. The predicate is used to obtain only required communities. The above query can also be given to real world system with some form of GUI or web based interface to make it user friendly.

6. Implementation

As part of the proposed system that leverages the social enhanced virtual communities, MMQCDL is instrumental in achieving this. The implementation is making use of web services that help integrate even heterogeneous applications that is the need of the hour in the real world. A broker discovery application has been built in order to test the concepts and MMQCDL proposed in this paper.

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A. Broker Discovery Application

The web based application which has been implemented can be considered a broker discovery tool that makes use of a query language such as MMQCDL. It internally is based on the concept of FOAF that is the basis for brokers in order to connect previously disconnected communities and also add new communities into the existing virtual communities' network which is based on SOA technologies. The result of MMQCDL query is a visualization of graph comprising brokers that can be used to connect disjoint social communities.

B. TESTBED

Genesis2 framework is used in Linux operating environment. The SOA based PVCs established by Genesis2 web services that has capabilities to simulate communities are used. Minimum spanning trees algorithm is used in the application of broker discovery. Amazon EC2 cloud has been used for experiments.

C. Performance Evaluation Of MMQCDL

The MMQCDL language has been tested in the given test bed configuration. The testing has been done under various characteristics such as changing nodes and groups. The libraries pertaining to graph are implemented in C# which is used in MMQCDL. The queries made by changing number of tags, nodes, communities or groups revealed that the MMQCDL processing time is based on the experiment parameters considered. The MMQCDL processing time for various experiments is shown in the table given below.

Table 2: Shows Processing Time of MMQCDL

EXPERIMENT	#REQ	MIN	AVG	MAX	TOTAL
1(RP = 10)	50	3167	9000	10349	52543
	100	1650	9369	10345	101240
	200	1800	9201	10734	190640
1 (RP = 50)	50	1606	15955	29952	50763
	100	1482	27440	48562	98685
	200	1639	36313	47687	188573
1 (RP = 100)	50	1606	15955	29952	50762
	100	1544	28560	57501	105331
	200	1591	55185	100370	202394

As can be seen in table 2, the results reveal that the processing time gets increased when number of requests is increased. RP represents concurrent requests. The influence of RP is less on the results while the number of requests has impact on the processing time of MMQCDL.

7. Conclusion

This paper proposed the brokers concept in social enhanced systems that are based on SOA. The concept is taken from the structural holes which is part of social sciences. Generally service oriented systems comprise of services. However, human modeled system integrating with SOA is required as the human element will act as broker in the system used to connect disjoint communities. Interaction mining techniques are used to achieve this. The MMQCDL query language has been proposed that is meant for making user friendly queries on interactions of virtual communities and also discovering brokers. The present system also uses trust model that helps in increasing the reliability of the system in social aspect. The system can be enhanced in future by implementing link based reputation ranking algorithm for brokers.

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Author Profile

P. Siva Kumar Obtained the M.Tech. degree in Computer Science and Engineering (CSE) from Andhra University, Visakhapatnam. He is dedicated to teaching field from the last 8 years. He has guided 4 P.G and 16 U.G students. His research areas included Data Mining. At present he is working as Associate Professor in Rise Group of Institutions, Ongole, Andhra Pradesh, India.

K. Srikanth obtained Ph. D (CSE) in S. V .U University .He has 4 years of teaching experience and working in Computer Science and Engineering (CSE) Department at Sri Venkateswara University, Tirupati, Andhra Pradesh, India.

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