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PARSE AND PRUNE BASED EXTRACTION AND CLASSIFICATION MODEL FOR BUSINESS EVENT FROM CONTRACTS AND TEMPORAL CONSTRAINTS IN SERVICE ENGAGEMENTS

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***Abstract*-Contract is a self-agreed, enforceable by law and deliberate agreement between two or more competent authority and parties. Contracts are made in written but may be implied or spoken, and generally have to do with another organization, employment, sale or lease, or tenancy. We assume service engagement is a part of business events. Business events such as payments, purchase, sells, delivery etc. not only impotent processes but are also inherently temporally constrained. Analysis phase is carried out to find out business event and their temporal relationships which helps business partners to analyze what to supply and what to require from others as its participates in the service engagement specified by a contract. Contracts are always be in unstructured text and their details also described in form of unstructured text. Our proposed system through this paper is to introduce a novel approach for employing classification, parsing to extract business event and their temporal constraints from contract text. Also we organize the event terms into cluster automatically with the use of topic modeling.**

Keywords-**Parsing, temporal constraints, Business Event**

I. INTRODUCTION

Suppose a business relationship as a house. A contract is the pre plan structure for building that house; a reference for its operation, working and maintenance. Contracts have the rights and obligations of each party; the terms and conditions of their respective performance. A contract articulates remedies in the event that one or the other party fails to perform as expected and required. By clearly defining the terms and conditions of a business relationship and the consequences of a failure to perform in accordance with those protocol or rules, with the help of contract we measure of assurance, and can quantify the up and down inherent in a business relationship. Service engagements are done by the business contracts; the growth or expansion of the importance of service engagements in today's life business is seen in the tremendous growth of contracts. For example, one of the Infosys report states that 60% to 80% of business transactions are ruled by contracts and that an overall average Fortune 2000 company manages 20,000 to 40,000 active contracts at any given time. This type of business trend produces some new broad challenges in service computing.

The first one is how, during enactment, a contractual authority or company can understand a contract so as to identify or determine its actions to support its involvement in the service engagement. Specifically, would it be able to provide guidance to development of its business processes and checking its interactions? That is, would the party be able to supply its part of a service engagement and determine what to require from its partners in that service engagement? The next and second challenge is how, during obtaining a service engagement, a party can examine and draft contracts in a manner that incorporates the general practices of the relevant domain.

In this paper, we develop an approach that addresses both of the above challenges. This technique is based on the idea of business events including business-oriented actions and activities such as bank interest accrual, dispute resolution, bill payment, licensing, delivery, and purchase. Business events indicate the essential processes involved in a service engagement as well as the exceptions to consider and risks. Moreover, the events are naturally temporally constrained, indicating their occurrence and conditions. The violation of a temporal constraint is often an very crucial factor in the resulting complications and contractual breach. For these reasons, to find out business event and their temporal relationships which helps business partners to successfully enacting a contract: that is, determining both what to supply or deliver and what to expect? Understanding business events and their temporal relationships can also strongly help it decide whether to go for an engagement in the first place.

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Note that real-life service engagements are complex interactions with many details. We do not claim to have addressed all of the details just by finding out events and temporal constraints from contracts, though what we do recognize provide a necessary underpinning for more elaborate future analyses.

II. LITERATURE REVIEW

[1] Xibin Gao and Munindar P. Singh, Fellow, IEEE "Mining Contracts for Business Events and Temporal Constraints in Service Engagements"in this paper authors states that to stimulate requirements for service engagements. Since contracts are widely available in today's business environment and provide a ready infrastructure for service requirements, it behooves us to try to discover contracts to identify and determine such requirements

[2] X. Gao, M.P. Singh, and P. Mehra, ''Mining Business Contracts for Service Exceptions,'' This paper approaches the field of service computing in the broader aspect. In particular, we are concerned first up all with business services, as indicated by value transfer and co-production. Business services agreements or contrast with technical services, such as grid and Web or cloud services, for which a suitable modeling involves the transfer of information such as by a client appealing an operation and the service providing a response.

[3] Z. Milosevic, S. Gibson, P. Linington, J. Cole, and S. Kulkarni, states in ''On Design and Implementation of a Contract Monitoring Facility,'' which presents solution to the problem of presenting contract semantics in a way that enables more reliable, efficient and flexible ECM in the extended enterprise. This involve of a contract language specifically designed and developed for the contracting domain and a contract engine that stand and support common contract management activities. The Business Contract Language (BCL) has a particular intended on supporting event-based analysis and monitoring of business activities associated with contracts.

III. EXISTING SYSTEM

Previous studies on contracts have focused on their model-checking, representation, abstraction, monitoring and execution. The traditional approach does not tackle all the challenges these studies pursue but would support such studies by helping identify the temporal constraints and relevant events.

Disadvantage:

- Contract is not directly use for onsite people who are managing the work
- Workers are not competent and trained.
- Plant and equipment are not standard
- No Efficient systems for maintenance have been developed

IV. PROPOSED SYSTEM

The contract monitoring facility approach involves the Business Contract Language (BCL) as a way to monitor and represent contracts. Their focus is on the technical aspects of monitoring and representing contracts. However, since Business Contract Language is includes the notions of temporal constraints and events, one can conceivably use an approach such as we proposed in this paper to help create a BCL specification based on a contract proposing a service engagement.

Advantage:-

- Ensure for building a good working relationship is established and maintained with the company and customer
- Resource the job to meet all the condition under the contract
- Manage the contract consistently, fairly and effectively.
- Be wary of perfectionism

System Architecture-

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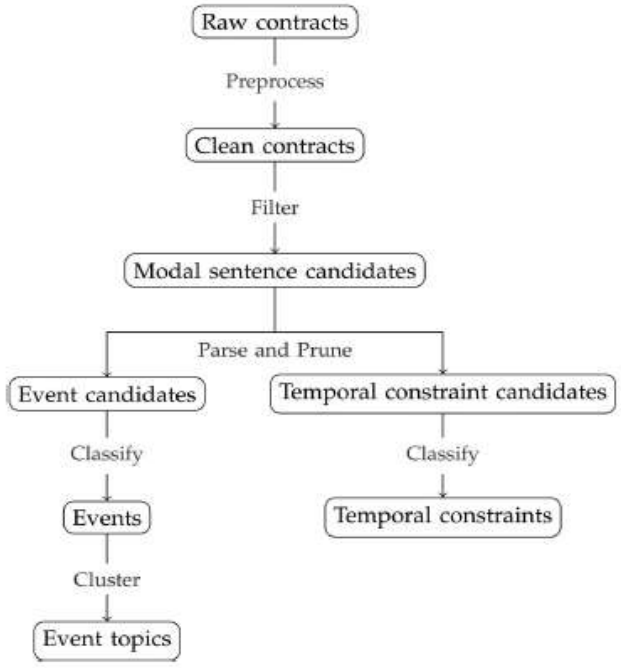

Fig.1 Overall System Flow

A) Problem Definition

Develop a novel approach as a combination of surface patterns, parsing, and classification to extract business events with their temporal constraints from contract text and with the help of topic modeling organize the event terms into clusters automatically.

B) Business Event Extraction

The header, definition, body, and sign off are the part of typical service engagement contract. The main parts of a contract is the statements specifying mutual expectations and requirement expressed as normative relationships such as declaration, commitments, authorizations, prohibitions, and approvals of the participating parties. Normative relationships play very important role in expressing business relationships among the parties to a service engagement and these relationships are built on top of business events. These normative expressions are often associated with modal verbs such as "may," "must" and "shall", In English Grammar. We use modal verbs as signals to signify the occurrence of business events. Signal words are widely used in information extraction and serve as hint for locating the extraction context.

1. Algorithm: Business events extraction.

Require: Contract corpus C
1: for all contract c in C do
2: for all sentence s in c that contains a signal word do
3: Parse sentence s to induce grammar tree t
4: Prune tree t to obtain event candidate e
5: Build feature vector f for the event candidate e
6: end for
7: end for
8: build classification model with the training data composed of entries in the form of (e, f, Boolean)

Using the Parser, we parse each event candidate sentence to produce its grammar tree that associates each token with a part-of-speech tag, and each phrase with a phrase label from the Penn Treebank.

2. Algorithm: Grammar tree pruning.

Require: Grammar tree t
1: Locate signal words in grammar tree t
2: Obtain the (tree-structured) verb phrase v where a signal word is located
3: for all children c in v do
4: if the label of c appears in Table 2 then
5: Prune c
6: end if
7: end for

Algorithm 2 describes the steps to prune the grammar tree to obtain a concise representation of the event candidate. For example, from the above sentence we obtain ''CLIENT shall select and pay freight forwarder who shall solely be CLIENT's agent'' as the extracted event candidate because the signal word ''shall'' precedes this verb phrase.

C) Temporal Constraints Extraction

In Service contracts temporal information of various forms are available. The temporal expression format also varies. From that some temporal information is expressed explicitly in the form of dates, for example, May 22th 1988.
In service engagements, the most of temporal information pertains to the constraints that the participants need to check and monitor. For example, a business work environment usually follows a temporal order, and the proper execution of a service engagement greatly depends on the accurate time management of those business processes for completion of

task. Such temporal relations among the business events are usually expressed explicitly for the purpose of transparency and emphasis. Temporal constraints in contracts are mostly expressed in prepositional phrases.

3. Algorithm: Temporal constraints extraction.

Require: Contract corpus C
1: for all contract ci in C do
2: for all sentence s in ci that contains signal word do
3: Parse sentence s to induce grammar tree
4: Extract the PPs from the grammar tree as temporal constraint candidates
5: Build a feature vector for each temporal constraint candidate
6: end for
7: end for
8: Build a classification model with the training data composed of entries in the form of (PP, Boolean)

D) Event Term Clustering

All the Business events in service engagements are divided into some categorizes such as product delivery, payment and natural hazards. The event categories can help us better arrangement of events in different service engagement domains if it is done automatically it will be better. Further, it would help complete the full knowledge discovery by beginning from unstructured text and ending with discovered event categories.
Clustering and Classification are widely applied to structured and categorize text. Methods of Classification are automatic and supervised, so a sample data-set needs to be built manually beforehand that predefined the categories. However business events found in contracts cut across various service engagement domains, with potentially different categories across domains. For example, in licensing contracts, the event categories may be of financial payment, patent infringement, undertaking and product licensing. And, in leasing contracts, the event categories may be of agreement, property management, and eviction and rent payment.

V. CONCLUSION

Enacting a service engagement is crucial for business events and temporal constraints; therefore extracting them is must essential for each company or party to an engagement to ensure it is being extracted correctly. Business events and constraints can be automatically checked and analyzed to determine whether a potential service engagement is well-structured and well-formed. Moreover, each party can check if the engagement is acceptable given its individual goals and requirement. Importantly, our systems work on real-life contracts and can thus ensure and facilitate service engagements that come across in practice. Our classification-based extraction yields F-measures in the high 80 percent range and vocabulary clustering yields a 85 percent match with the gold standard.

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