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Mining TPattern for capture, recognition and visualization in multiparty conversation

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Abstract— Discovering semantic knowledge is significant for understanding and interpreting how people interact with each other for a discussion. It becomes possible to extract frequent patterns of human interaction based on the captured content of face-to-face meetings by using mining method. Human interactions, such as proposing an idea, giving comments, and expressing a positive opinion, indicate user intention toward a topic or role in a discussion. Tree is used for representing a human interaction flow in a discussion session. Tree-based interaction mining algorithms are designed to analyze the structures of the trees and to extract interaction flow patterns. It can successfully extract several interesting patterns which is useful for the interpretation of human behavior in meeting discussions, such as determining frequent interactions, typical interaction flows, and relationships between different types of interactions.

Keywords— Human interaction, Interaction flow, Interaction Pattern, Meeting, Tree based mining, Decision Tree, Pattern Discovery

INTRODUCTION

Human interaction is the one of the important characteristic for understanding how a human's behavior or human activities under the meeting and determining whether the meeting was well organized or not is the one of the main issues in the meetings [1]. Meetings are an important communication and coordination activity of team where status is discussed, new alternatives are considered, information is presented, details are explained, decisions are made, and new ideas are generated. To understand and interpret human interactions in meetings, we need to discover higher level semantic knowledge about them, such as which interactions often occur in a discussion what interaction flow a discussion usually follows, and what relationships exist among interactions. This knowledge can called as grammar of meeting discussion because it describes important patterns of interaction. We are proposing an idea for a smart meeting system for capturing human interactions and recognizing their types, such as proposing an idea, giving comments, expressing a positive opinion, and requesting information [1]. In this study, we investigate data mining techniques to detect and analyze frequent interaction patterns; we hope to discover various types of new knowledge on interactions. Human interaction flow in a discussion session is represented as tree which is inspired by tree-based mining [2-3].

ANALYSIS OF PROBLEM

It is very important to understand the behavior and activities of a human during interaction. As such, meetings contain a large amount of rich project information that is often not formally documented. Capturing all of this informal meeting information has been a topic of research in several communities over the past decade. The most common way to capture meeting information is through writing the notes. However, it is very difficult task to write the whole content of a meeting.

PROPOSED SYSTEM

We propose a mining tree based method to extract frequent patterns of human interaction based on captured content of face-to-face meetings. The work focuses on discovering higher level knowledge about human interaction. In proposed system T-pattern technique is used to discover hidden time patterns in human behavior [5]. It conducts analysis on human interaction in meetings and addresses the problem of discovering interaction patterns from the perspective of data mining. It extracts simultaneously occurring patterns of primitive actions such as gaze and speech [6]. Discovering patterns of interaction flow from the perspective of tree-based mining [7] rather than using simple statistics of frequency. The main features of the process are user can also provide the idea about the topic. So admin can easily solve the problem based on users needed.

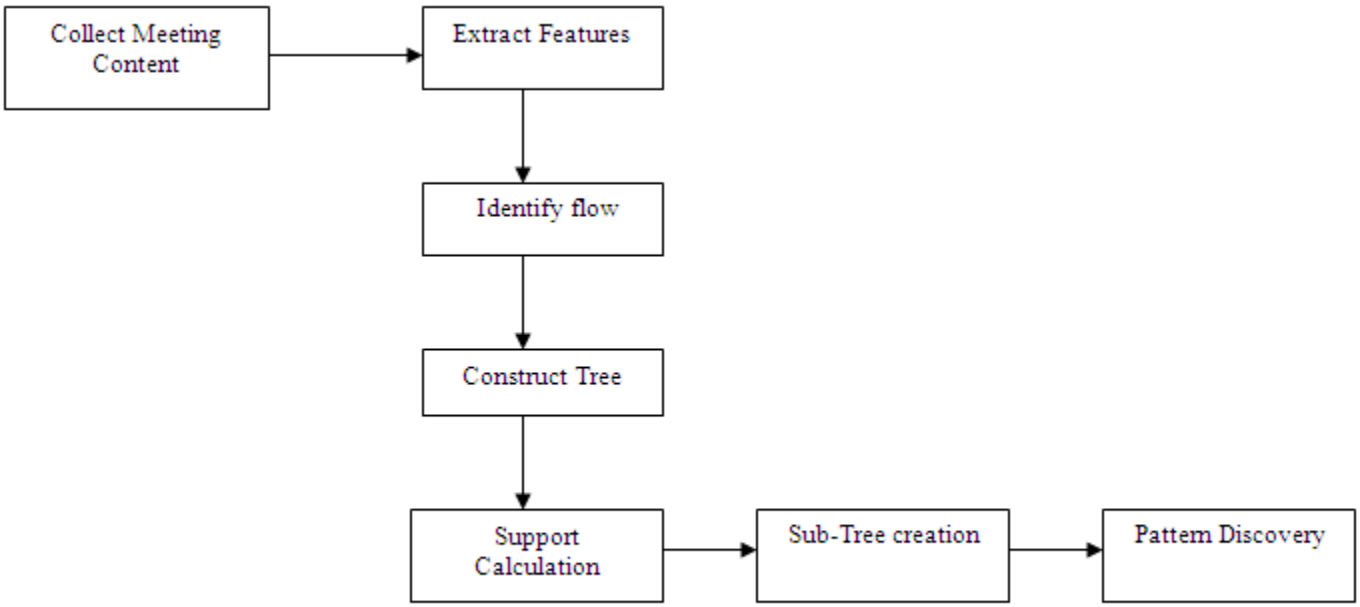

Fig1. Data Flow Diagram

Human Interaction Definition and Recognition

Human interactions in a meeting discussion are defined as social behaviors or communicative actions taken by meeting participants corresponding to the current topic. In meeting discussion human interaction are categorized as; propose, comment, acknowledgement, requestInfo, askOpinion, posOpinion, and negOpinion. The detailed meanings are as follows: propose— a user

Proposes an idea with respect to a topic; comment— a user comments on a proposal, or answers a question; acknowledgement—a user confirms someone else's comment or explanation, e.g., "yeah," "uh huh," and "OK;" requestInfo— a user requests unknown information about a topic; askOpinion- a user asks someone else's opinion about a proposal; posOpinion—a user expresses a positive opinion, i.e., supports a proposal; and negOpinion—a user expresses a negative opinion, i.e., disagrees with a proposal.

Interaction Flow

Based on the interaction defined and recognized, we now describe the notion of interaction flow and its construction. An interaction flow is a list of all interactions in a discussion session with triggering relationship between them. We first give the definition of a session in a meeting discussion.

Definition 1 (Session) A session is a unit of a meeting that begins with a spontaneous interaction and concludes with an interaction that is not followed by any reactive interactions

Pattern Discovery:

Patterns are frequent trees or sub trees in the tree database. TD denotes of Interaction trees.ITD denotes the full set of isomorphic trees to TD.t denotes a tree.tk denotes a sub tree with k nodes, Ck denotes a set of candidates with k nodes. Fk denotes a set of frequent k-sub trees.

Definition 2 (Interaction Tree) :

A tree is used to represent an interaction flow in a session. It is an acyclic connected graph. In which trees are also rooted, directed, and labeled. And they are represented as, L ={PRO,COM,ACK,REQ,ASK,POS,NEG}.

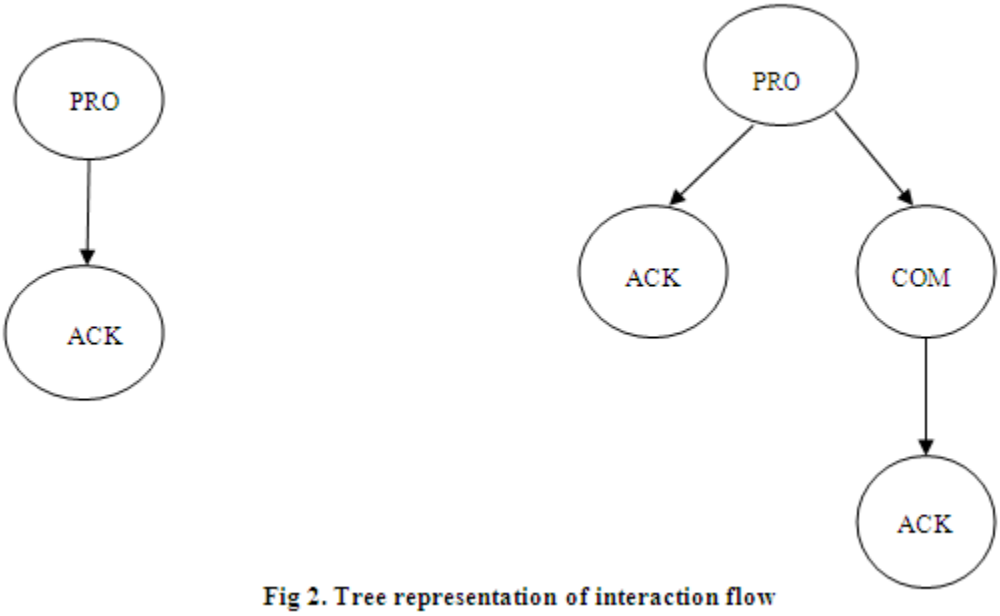

Fig 2. Tree representation of interaction flow

Definition 3 (Tree String Code):

A tree is represented as a string. We represent a tree T by its string encoding, denoted by tsc. It starts with the root, using "-" and " * " to denote parent child and sibling relationships, respectively. If a child has a descendant of its own, a parenthesis is used to separate it and its descendant from the others. According to this definition, trees in Fig. 2 are represented as PRO-ACK, PRO-(ACK-COM)*ACK, respectively.

Definition 4 (Tree Preorder Sequence):

This is a depth-first preorder traversal label sequence of a tree (T), denoted by tps. We use "-" to connect node labels in the sequence. In accordance with Definition 4, the trees in Fig. 2 are represented as PRO-ACK, PRO-ACK-COM-ACK, respectively.

Definition 5 (Isomorphic Tree):

Given two trees, T1 = (V1, E1) and T2 = (V2, E2), if tps(T1) ≠ tps(T2) and through exchanging the places of siblings on T1 or T2 (i.e., commutation processing), tps(T1) = tps(T2), we call T1 and T2 isomorphic trees. The purpose of the isomorphic tree definition is to find the same tree structure by exploiting temporal independence in the original interaction trees. For instance, two trees depicted in Fig. 3 are isomorphic because although their tree preorder sequences are different (PRO-COM-ACK- ACK and PRO-ACK-COM-ACK), through commutation.

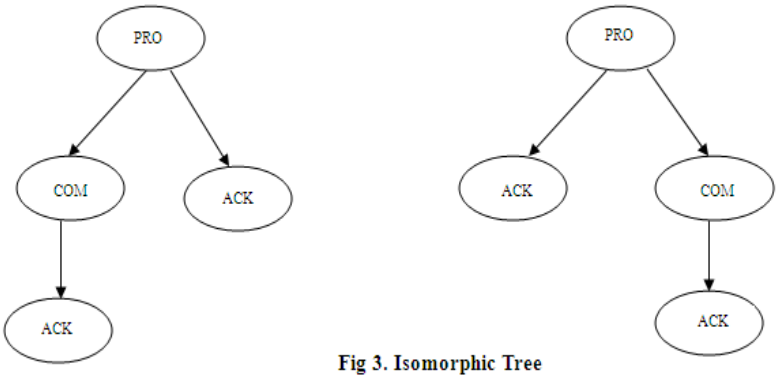

Fig 3. Isomorphic Tree

For the Pattern Discovery, we should have to find the support value.Where, σ denotes a support threshold of minimum support. Support is with given a tree or sub tree T and a data set of trees TD.

$$\text{Support} = \frac{\text{Number of occurrences of T}}{\text{Total no. of trees in TD}}$$

If the value of supp(T) is more than a threshold value Minimum support T is called a frequent tree or frequent sub tree. We have a data set of interaction trees TD. Given a minimum support σ, we would like to find all trees and sub trees that appear at least $\sigma \times |TD|$ times in the data set.

CONCLUSION

We proposed a tree-based mining method for discovering frequent patterns of human interaction in meeting discussions. It determines frequent interactions, typical interaction flows, and relationships between different types of interactions.The mining results would be useful for summarization, indexing, and comparison of meeting records. They also can be used for interpretation of human interaction in meetings .The Human interaction is represented as a Tree. Tree structure is used to capture how the person is interacted in meeting and discovers the interaction flow in meeting. Tree pattern mining and sub tree pattern mining will automatically analyze the structure and extract interaction flow pattern. Interaction flow helps to assume the probability of another type of interaction. The frequent interaction pattern and behavior of the person is determined.

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