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HIDDEN INTERACTION PATTERN DISCOVERY OF HUMAN INTERACTION IN MEETINGS

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Abstract : In this paper, we propose a mining method to extract frequent patterns of human interaction based on the captured content of face-to-face meetings. Human interaction, such as proposing an idea, giving comments and expressing a positive and negative opinion, indicate user topic or role in a discussion. Human interaction flow in a discussion session is represented as a tree. We developed several applications based on the discovered patterns. We explore embedded tree mining for hidden interaction pattern discovery. Embedded sub trees are a generalization of induced sub tree, which allow not only direct parent child branches, but ancestor-descendant branches. The current meetings are all task oriented. It is valuable to capture various categories of meetings for analysis such as panel, debate, interview etc. There would be some differences in the frequent interaction patterns for different meeting styles.

Keywords: patterns, human interaction, tree mining, pattern discovery, embedded.

1. INTRODUCTION

HUMAN interaction is one of the most important characteristics of group social dynamics in meetings. We are developing 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]. To further 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 likely describes important patterns of interaction. We also can regard it as a grammar of meeting discussion. Data mining, which is a powerful method of discovering new knowledge, has been widely adopted in many fields, such as bioinformatics, marketing, and security [2]. 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 a tree. Inspired by tree-based mining [3], [4], we designed interaction tree pattern mining algorithms to analyze tree structures and extract interaction flow patterns. An interaction flow that appears frequently reveals relationships between different types of interactions. For instance, if one type of interaction appears, what is the probability of another type following it? Mining human interactions is important for accessing and understanding meeting content. First, the mining results can be used for indexing meeting semantics, also existing meeting capture systems could use this technique as a smarter indexing tool to search and access particular semantics of the meetings [5]. Second, the extracted patterns are useful for interpreting human interaction in meetings. Cognitive science researchers could use them as domain knowledge for further analysis of human interaction. Moreover, the discovered patterns can be utilized to evaluate whether a meeting discussion is efficient and to compare two meeting discussions using interaction flow as a key feature.

2. PROPOSED SYSTEM

We propose a mining method to extract frequent patterns of human interaction based on the captured content of face-to-face meetings. The work focuses on discovering higher level knowledge about human interaction. In our proposed system T-pattern technique is used to discover hidden time patterns in human behaviour. We conduct analysis on human interaction in meetings and address 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. We discover patterns of interaction flow from the perspective of tree-

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based mining rather than using simple statistics of frequency. The main features of the process are user can also provides the idea about the topic. So admin can easily solve the problem based on users needed.

ADVANTAGES OF PROPOSED SYSTEM:

- Easy to handle.
- It extracts data simultaneously.
- Problems occurred in the process is easily solved by the admin.

3. EXISTING SYSTEM

Existing meeting capture systems could use this technique as a smarter indexing tool to search and access only particular semantics of the meetings. This work focuses on only lower level knowledge about human interaction. The process didn't have any key features. So it not compares two meeting discussions. The process only gets the positive and negative comments from the users. So further process to be discussed only by the admin. So complex of the topic should not be identified easily. Sometimes this process not provides the semantic information and produces redundant data.

DISADVANTAGES OF EXISTING SYSTEM:

- Complex to handle.
- Identification of negative points in topic is very tough.
- It increases the repeated data.

4. HUMAN INTERACTION

4.1 Human Interaction Definition and Recognition

Human interactions in a meeting discussion are defined as social behaviours or communicative actions taken by meeting participants corresponding to the current topic. Various interactions imply different user roles, attitudes, and intentions about a topic during a discussion. The definition of interaction types naturally varies according to usage. In this paper, we mainly focus on the task-oriented interactions that address task-related aspect. The other communicative actions that concern the meeting and the group itself (e.g., when someone invited another participant to take the floor) are not included. For generalizability, we create a set of interaction types based on a standard utterance-unit tagging scheme: 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.

4.2 Algorithms for Pattern Discovery

With the representation model and annotated interaction flows, we generate a tree for each interaction flow and thus build a tree data set. For the purpose of pattern discovery, we first provide the definitions of a pattern and support for determining patterns. Definition 7 (Pattern). Patterns are frequent trees or subtrees in the tree database. Definition 8 (Support). Given a tree or subtree T and a data set of trees TD, the support of T is defined as

$$supp(T) = \frac{number\ of\ occurrences\ of\ T}{total\ number\ of\ trees\ in\ TD}.$$

If the value of supp (T) is more than a threshold value minsupp (e.g., 5 percent), T is called a "frequent tree" or "frequent subtree."

5. EXPERIMENTAL RESULT

Fig.5.1. Home page

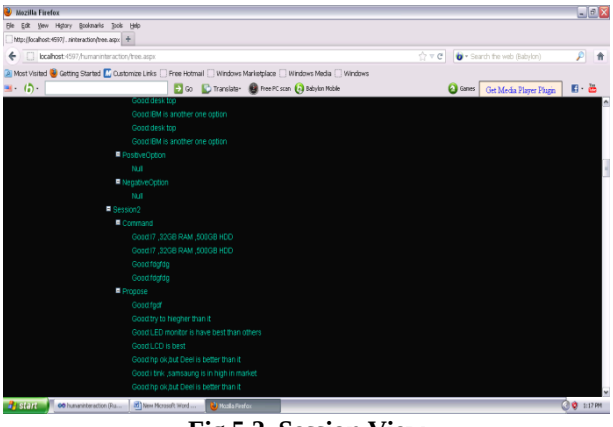

Fig.5.2. Session View

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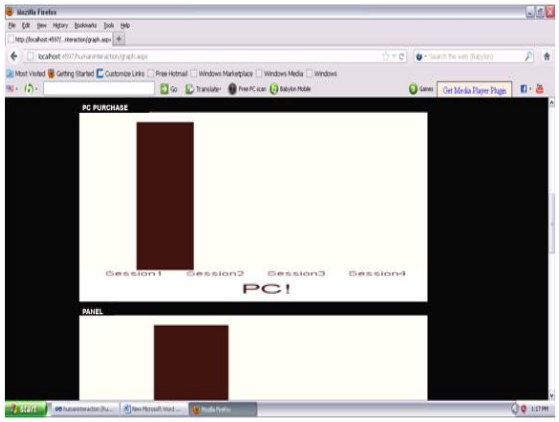

Fig.5.3. Graph

6. CONCLUSION

We proposed a tree-based mining method for discovering frequent patterns of human interaction in meeting discussions. 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. In the future, we will develop several applications based on the discovered patterns. We also plan to explore embedded tree mining for hidden interaction pattern discovery. Embedded sub trees are a generalization of induced sub trees, which allow not only direct parent child branches, but ancestor-descendant branches [3]. For example, when there is an interaction of propose, there always follows a comment, directly or indirectly. Finally, we plan to incorporate more meeting content in both amount and category. The current meetings are all task oriented. It is valuable to capture various categories of meetings for analysis such as panel, debate, interview, etc. There would be some differences in the frequent interaction patterns for different meeting styles.

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