Combining the Distance and Confidence Value for Recommendation System in Business Process Modelling

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***Abstract*: Business Process modelling is used for reconstructing and understanding the process for fulfilling the business aim. Manual process modelling is error prone and time consuming. Our propose system takes business process from user and recommend them the next procedure for designing new business. This recommendation system has two stages: 1) offline mine and 2) online validation. In the first phase of offline mining, it mines all relations between each activity from processes which are already in repository, and store all mines in the form of pattern in the database. At the second phase, system takes process from user and compares the new process which is under creation with the mined patterns which are stored in database, and recommends the process. To improve the recommendation systems results, we combine the confidence value and the distance value together.**

Index Terms: Offline mining, online mining, process recommendation, Process modeling.

I. INTRODUCTION

Business process modeling is conducted by the analyst .There is regularly change in customer demands and organization requirements; the new business process generation is very difficult in accurately and sensibly. Nowadays organization spread across the world. So for simplification of work, enterprise system is developed, which compute all the process and combine it into single work. Business process modeling is conducted by the business process analyst for better understanding of organization workflow and making the communication between organization personal and it experts. Developing new business from scratch is time consuming as for developing the new business depth knowledge required in domain for which analyst required more time. And analyst also has the knowledge of organizations rules and regulation. Therefore constructing new business process in accurate way is very important. Business analyst has to take this in account.

There are some old process modelling techniques, such are process mining, process retrieval, which has been used in much organization to analyze and upgrade their processes. Process mining is used to find the bottlenecks, assess the conformance of processes and envision performance problems by analysing event logs. And process discovery aids for finding similar processes from database. However the old mining techniques suffering from more manual work and for highly complex structure analyst not getting any relief.

Our proposed system can help analysts to develop new process system from scratch with minimum timing. The proposed system helps analyst to design new business process model with minimum time. And also help to reduce the error.

Fortunately nowadays, more organization start to generate their own repository for business process data to store and use it whenever required. For example, China Mobile Community owns a huge process repository in many subsidiary organizations and reuses it for various applications.

The large information and great values stored in the repository offer great help to the business process analyst for generating process model. Applying the data mining and recommending technology for developing new business get help as it gives: 1) fasten the modeling the business process when knowledge is inadequate and with less timing 2) gives the direction for selecting the proper process with less error and 3) reduce the contradictory problem from new process from new and old process in repositories.

II. RELATED WORK

Most of the existing approaches for recommendation of process are based on the whole process recommendation. Old approaches take more time to recommend new process.

Y. S. Weng et al. [1] proposed the system of timed Petri nets (TPNs) which have been used as visual formalism for the modeling of complex systems. They describe the features in describing the properties of causality and concurrency.

B. Bordbar et al. [2] suggested a framework for of the Alpha algorithm for analysis and analyzing process mining in algorithms. Under this experimental results and framework, show that from behavior of the algorithm and the substructures in a model.

J. Cortadella et al. [3] proposed the numerical abstract domains used for tackling the problems, for experiments are reported illustrating the significance of this fresh view of the process discovery problem and the particular case of the discovery of Petri nets. have been implemented in a prototype tool.

Y. Li et al. [4] recommended system with an efficient method for determining the distance between select candidate node sets and process fragments for recommendation purpose. For improving recommendation system we use this method.

Yan, Z. Din et al [5] proposed the business process of e-commerce, and propose a formal model for constructing an e-commerce business process called an E-commerce Business Process Net. It integrates both data and control flows based on Petri nets. Rationality and transaction consistency are defined and validated to guarantee the transaction properties of an e-commerce business process.

H. A. Reijers et al. [6] suggested on the basis of a sound theoretical foundation, model are investigated this paper presents a study in factors such as the effect of personal with system. Using questionaries' with the help of students from different universities investigation calculated.
Y. Reich et al. [7] proposed the system that use for translation of DSM based plan to Model which is based on process scheme. Various translation are used to prove that DSM is similar as WRI-WF.
C. H. Q. Ding et al. [8] recommended a system with user interest expansion using ranking method to construct an item oriented model. This is novel system with user interest.
P. Shinjee, et al. [9] proposed a model, Latent Dirichlet allocation (LDA) models as unified topic model havinf two type. One is a topic of the description words for viewed TV programs model and the other is a topic model of TV users.
M. A. Setiawan et al. [10] design science approach towards the development of methods for multi-criteria based process ranking and personalized recommendation. The methods are evaluated using a real scenario and simulated data.
A. Koschmider et al. [11] proposed a system in which a multitude of possibilities with the recommendation system. For isolation , different metrics are used .One comprehensive score have overall recommender component
H. Bunke [12] proposed the system which finds the cost that influences the match between two optimal graph path. The system shows that for given cost function there is number of different cost influencer for given graph.

III. PROPOSED METHODOLOGY

3.1 System Architecture:

System Architecture
Offline Mining
This is core component of system. In offline pattern mining there are 3 stages. 1) Subgraph mine 2) upstream subgraph decomposition 3) pattern extraction.
In subgraph mining, graph mining is done. In upstream subgraph candidate node set and upstream subgraph is captured. In pattern extraction, patterns are extracted from graph.

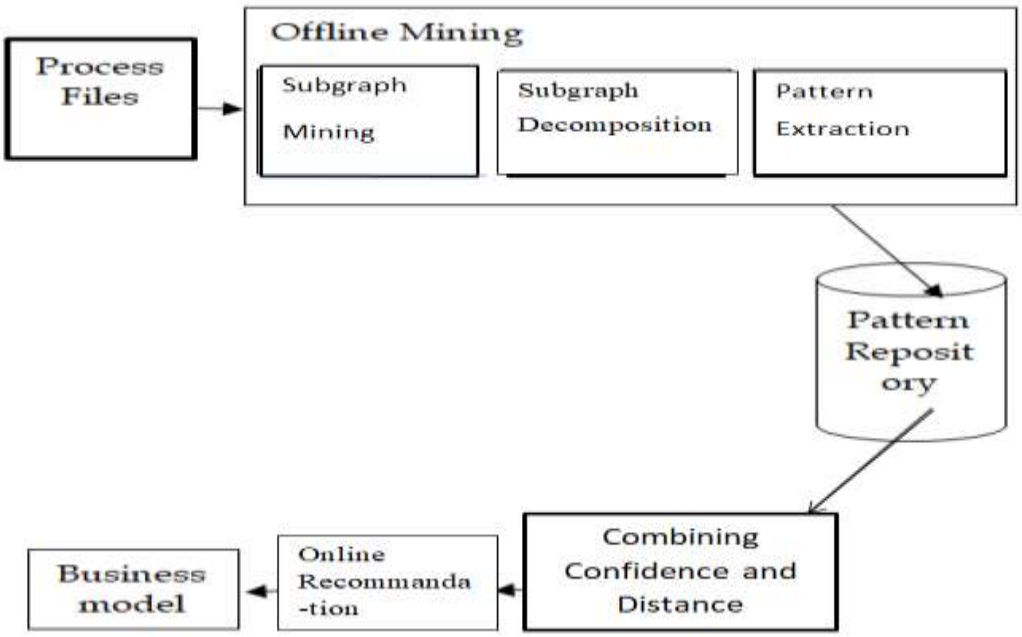

Fig.1 System Architecture

Pattern Repository
In pattern repository, all patterns are stored and also maintain all pattern. When matching is required then information from pattern table is taken.
Online Recommendation
Following four steps are used for online recommendation:
1) From the user interface taking model in reference and position where recommendation needed.
2) From reference model, find the candidate node and reference sub-path.
3) Calculating similarity between the upstream subgraphs and reference sub-path using pattern extraction table.
4) From pattern table recommended the top n similar item set

3.3 Algorithm:

Input: Reference model RM and its Recommendation position i.e. end nodes EN
Output: Candidate note set in sorted order for recommendation
Method:
1. Initialization RT= (cns,dist,conf) where confi and dists represent confidence value and distance values for cns;
2. RS = reference subpath of RM ;
3. For each pattern (us,cns,conf)Ɛ PatternTable DO
4. dist (US,RS) compute the distance between US and RS;
5. IF there exists an item (cns*,dist*,(US,RS*),conf')Ɛ RT and cns* is the same as cns THEN # merge pattern with the same cns
6. conf*= conf*+conf;
7. dist*= min(dist*,dist);
8. RT add(cns,dist*,conf)
9. Else
10. RT add(cns,dist(US,RS),conf);
11. Sort the elements in RT by the distance value;
12. The sorted candidate node sets of RT return;

IV. RESULTS

a. Performance Measures

For each model which has to refer and recommendation position, we generate a list of *N* process nodes. So this performance measures are observe with respect to this four datasets.
There are four performance measures used:

- Time efficiency
- Precision
- Recall
- F1 measures

Module1
In Module 1 image, form of module is given in which candidate node set, frequencies, confidence values, distance values are calculated. After subgraph mining, patterns are extracted and stored in data-set with confidence vale and distance value.

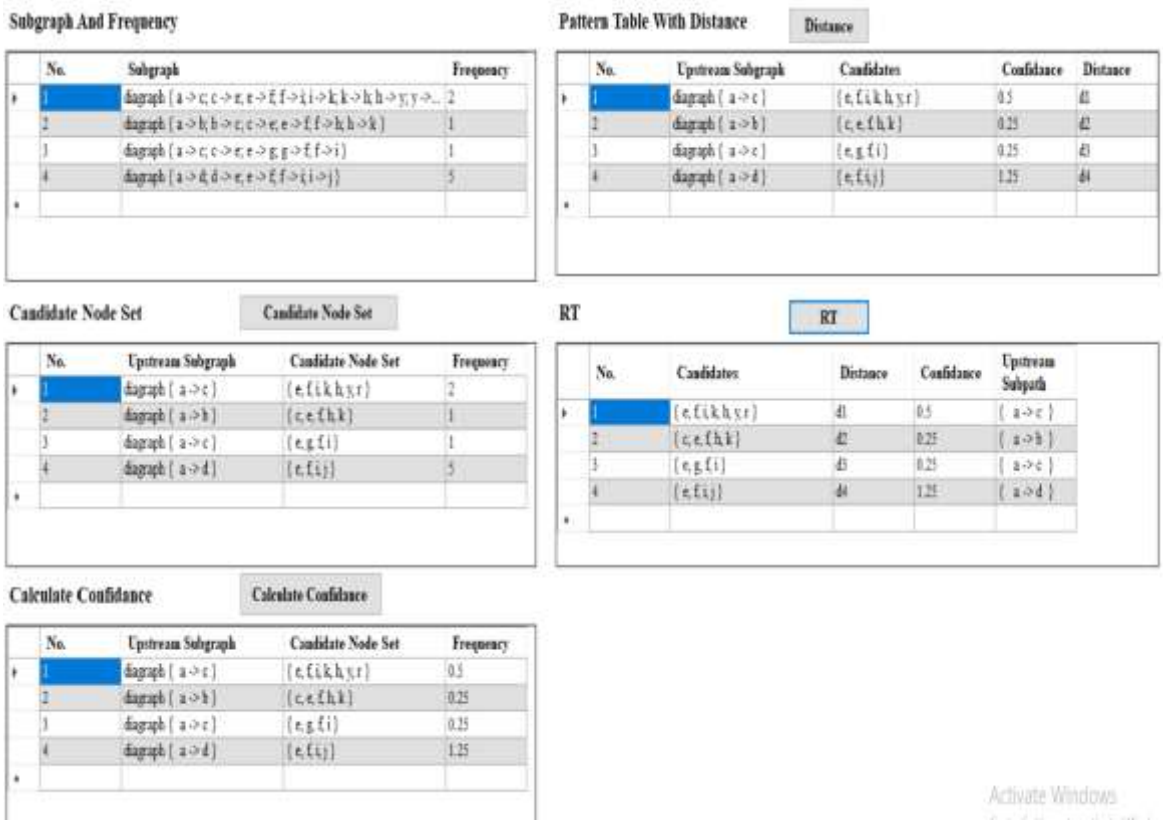

Fig.2 Module1. Graph Mining, Distance calculation

Module 2

In Module2 image, form contains the input query given by user, the business type, and the flow and at which point recommendation is needed. If user gives wrong flow then that pattern point is removed and whole recommendation is given. Green color recommendation denotes that user gives correct flow and red recommendation denotes that these processes are required to develop the new business.

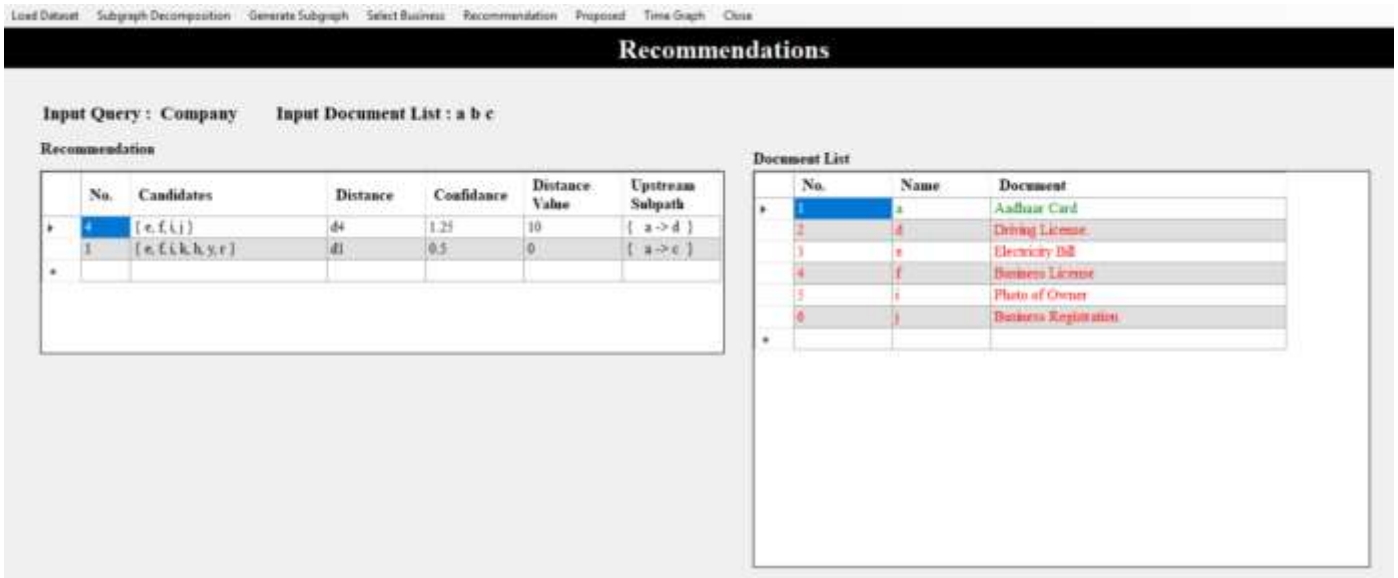

Fig.3 Edit distance calculation

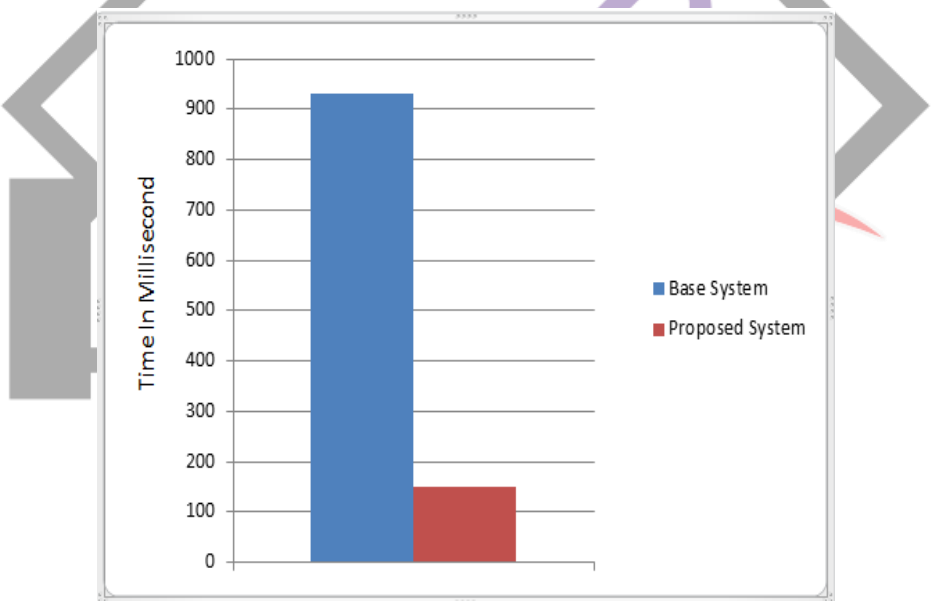

Fig. Index time

The above chart represents the difference between base system and our proposed system. In base paper, values of distance and confidence for pattern matching was calculated separately and in our proposed system both distance value and Confidence values are calculated at the same time. So the time required for pattern matching and recommendation of process is very minimum in our proposed system

V. CONCLUSION

This paper represents the system for recommendation a next process that can help the business process analysts to construct new business processes. It recommends proper process from patterns stored in existing process repositories. The experiments carried out on databases show that our proposed system can work in an accurate and efficient way. Our system takes very minimum time to recommend the new process from repository. If user gives wrong query then our system removes the wrong process and then recommends the next business process for building new business. The time required for previous system was much more than our proposed system.

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