

IMPROVING BUSINESS PROCESS MODELING USING RECOMMENDATION METHOD

Deepak Ramchandara Lad¹, Soumitra S. Das²
Computer Dept.

¹²Dr. D. Y. Patil School of Engineering, (Affiliated to Savitribai Phule Pune University)
Pune, India

¹dipaklad7373@gmail.com, ²soumitra.das.1974@ieee.org

Abstract : *In modern commerce, the specialization of the business process and frequent changes of custom demands require the capacity of the modeling process for enterprises effectively and efficiently. Existing processes improving business modeling use workflow mining and process retrieval and require much manual work. In this paper workflow recommendation technique is proposed to provide process designers with support for automatically creating the new business process that is under deliberation. With the help of the minimum depth-first search (DFS) codes of business process graphs for calculating the distance between process fragments and select candidate node sets for recommendation purpose. We will implement recommendation method for improving the modeling efficiency and accuracy. And last, based on both synthetic and real-world datasets, we will compare the proposed method with other methods and the experiment results prove its effectiveness for practical applications.*

Keywords: *Business process modeling, enterprise systems, industrial informatics, string edit distance, workflow, workflow recommendation.*

1. INTRODUCTION

To facilitate the coordination of work across the organization and cooperation, enterprise systems (ES) have been developed to integrate computer systems that support all phases of an organization's operations. Enterprise System [1] has adopted many organizations for their mission critical [2][3] applications. ES has been fueled by the global economy and the

development in information technology including industrial informatics. Enterprise Systems integrate business processes and align IT to support business strategy and workflow technology is essential and is threaded through the very core of the system architecture. Business process is one of the main tool to develop workflow technology. Business process specifies various business logics and handles different business operations. Thus, business process modeling [4][5] plays important role in operating modern enterprises. However, business process is time consuming process which often involves selecting concrete activities to be performed such as determining their execution order and dealing with the exceptions that may occur. Business process is complex process. Besides, in modern commerce, both frequent changes of custom demands and the specialism of the business process require the capacity of modeling business processes for enterprises in an effective and efficient manner. Existing processes improving business modeling use workflow mining and process retrieval and require much manual work.

2. RELATED WORK

Nowadays, research work has been focusing on improving business process modeling. Designing the workflow process use workflow mining [9], its time consuming process. Workflow mining helps the modelers improve process modeling with discovered process models. The construction new business process is referred to the pre-discovered template model and modelers have to construct the process themselves. Instead of the workflow repository, our method can not only automate the construction process but also provide guidance for recommending the most likely nodes. However, taking the result from the workflow mining as the provenance for workflow repositories, then accuracy of workflow recommendation will increase, which means have complementary advantage. Process retrieval [10][11] can help modelers improve the modeling by retrieving the similar fragments from the workflow repository. Similar to workflow mining much manual work is still involved.

A limited number of literature [11][12] available for above research. Workflow recommendation technique also called flow Recommendation [12]. flow Recommendation features a more robust exploration capability to identify the upstream dependency patterns that are essential to the accuracy of workflow recommendation. This leverages source of workflows to provide recommendation for the best node that needs to be chosen to complete the workflow. Flow Recommender consist of complex structure does not support patterns (e.g. AND-join, OR-join, etc.) and it would fail facing with candidate node with multiple influencing upstream sub paths. Flow recommender cannot widely used in real applications. Since our work starts from the graph model its complex structure, in this paper we proposed

recommendation method is more practical and could be applied to real application scenarios.

Other related research work was carried out on service discovery and optimization for composition[13][14][15] in the domain of Service Computing. Traditional service composition issues refer to the web services scenarios recommended based on certain given or pre-defined business template in which high-level abstract web services are well specified by users when the workflow is designed.

3. PROPOSED SYSTEM

New business process promotes the efficiency and accuracy of modeling so-called workflow repository which contain set of already developed process models. Business process model repository for structurally and semantically related models. Similar to the search on internet a user expresses a BPMN-Q query and results receive a list of process models ordered by germaneness of the query. There are more than hundreds and even thousands of business process models in the repository. Large number of process models could serve knowledge base for guidance for the modeling effort.

Nowadays existing methods based on the graphs. For example, event-driven process chains (EPC), Petri nets, and Business Process Modeling Notation (BPMN)[9]. Since similarity of two business process proved the most effective way to distinguish between two business processes ,starting from the graphs and combining with traditional recommendation. we plan to proceed associate rules mining between business activity nodes and process fragments within the workflow repository, and provide related decision support or information for modeling processes. We call it workflow recommendation. A business process modeling fragments under modeling as a “reference model” and pattern are called the influencing upstream subgraphs of the activity nodes that determine the occurrence of these nodes in the workflows. The rule of mining to refer pattern extraction is the foundation of workflow recommendation.

In this paper, we use a graph-mining technique to extract the patterns from the workflow repository. The minimum depth-first search [6] codes are used as label for business process models of fragments. These codes we proposes an efficient string edit distance (SED) [7]. Similarity metric This turns the graph-matching problem into string matching problem. The method is not only more efficient than GED-based distance metric methods [8], but also overcomes the drawback of the GED method which requires to determine different cost functions for different scenarios, for analyzing and measuring the distance between

reference model and process patterns. Based on the results system selects most probable activities or task for recommendation. Workflow recommendation technique can do the following:

- 1) Speed up the business process design and reducing the deliberation time which is needed when domain knowledge is inadequate or missing.
- 2) Choosing most likely task by minimizing the errors that are possibly made in business process design work.

4. CONCLUSION AND FUTURE WORK

In this paper We not only address the problem of distance calculation between two process containing complicated structures such as AND-Join and OR-Split, but also improved the efficiency for matching two fragments. we proposed SED-based workflow recommendation method which is improving the business process model for providing the guidance to extend or complete the business process under construction. And we proposed a framework for prototype implementation and two algorithms respectively for pattern discovery and workflow recommendation. The experimental evaluations conducted on synthetic and real world datasets, which is showed that our method achieved better or equal performance in both efficiency and effectiveness when comparing with other methods (i.e., GED-based method and FlowRecommender). It turns out to be a promising approach for improving the efficiency and accuracy of business process modeling in real applications. Much work still needs to be in the future. Iteration structure which is not supported in our work, is common in business process, we plan to solve this problem using redefining the pattern location or redesign new method to distance calculation.

5. ACKNOWLEDGEMENT

I wish to express my sincere thanks to the guide and Head of Department, Prof. Soumitra S.Das, as well as our Director Dr. S.S.Sonavane. also grateful thanks to our PG Coordinator Prof.P. M. Agarkar and last but not least, the departmental staff members for their support.

REFERENCES

- [1]. L. D. Xu, "Enterprise systems: State-of-the-art and future trends," *IEEE Trans. Ind. Inf.*, vol. 7, no. 4, pp. 630–640, Nov. 2011.
- [2]. L. D. Xu, C. Wang, Z. Bi, and J. Yu, "Autoassem: An automated assembly planning system for complex products," *IEEE Trans. Ind. Inf.*, vol. 8, no. 3, pp. 669–678, Nov. 2012.
- [3]. L. Li, R.-L. Ge, S.-M. Zhou, and R. Valerdi, "Guest editorial: Integrated healthcare information systems," *IEEE Trans. Inf. Technol. Biomed.*,
- [4]. L. Aldin and S. de Cesare, "A literature review on business process modelling: New frontiers of reusability," *Enterp. Inf. Syst.*, vol. 5, no. 3, pp. 359–383, 2011.

- [5]. B. Wetzstein, P. Leitner, F. Rosenberg, S. Dustdar, and F. Leymann, "Identifying influential factors of business process performance using dependency analysis," *Enterp. Inf. Syst.*, vol. 5, no. 1, pp. 79–98, 2011.
- [6]. X. Yan and J. Han, "gSpan: Graph-based substructure pattern mining," in *Proc. IEEE Int. Conf. Data Mining*, 2002, pp. 721–724.
- [7]. V. I. Levenshtein, "Binary codes capable of correcting deletions, insertions and reversals," *Sov. Phys. Doklady*, vol. 10, no. 8, pp. 707–710, 1966.
- [8]. B. Cao, J. Yin, S. Deng, D. Wang, and Z. Wu, "Graph-based workflow recommendation: On improving business process modeling," in *Proc. 21st ACM Int. Conf. Inf. Knowl. Manag.*, 2012, pp. 1527–1531.
- [9]. B. van Dongen, R. Dijkman, and J. Mendling, "Measuring similarity between business process models," in *Advanced Information Systems Engineering*. New York, NY, USA: Springer, 2008, pp. 450–464.
- [10]. R. Dijkman, M. Dumas, B. Van Dongen, R. Käärik, and J. Mendling, "Similarity of business process models: Metrics and evaluation," *Inf. Syst.*, vol. 36, no. 2, pp. 498–516, 2011.
- [11]. R. Zeng, X. He, and W. M. P. van der Aalst, "A method to mine workflows from provenance for assisting scientific workflow composition," in *Proc. IEEE World Congress Services*, 2011, pp. 169–175.
- [12]. J. Zhang, Q. Liu, and K. Xu, "Flowrecommender: A workflow recommendation technique for process provenance," in *Proc. 8th Australasian Data Mining Conf.: Data Mining Analytics*, 2009, pp. 55–61.
- [13]. M. Nikola and M. Miroslaw, "Current solutions for web service composition," *IEEE Internet Computing*, vol. 8, no. 6, pp. 51–59, 2004.
- [14]. W. Viriyasitavat, L. D. Xu, and A. Martin, "SWSPEC: The requirements specification language in service workflow environments," *IEEE Trans. Ind. Inf.*, vol. 8, no. 3, pp. 631–638, 2012.
- [15]. L. D. Xu, W. Viriyasitavat, P. Ruchikachorn, and A. Martin, "Using propositional logic for requirements verification of service workflow," *IEEE Trans. Ind. Inf.*, vol. 8, no. 3, pp. 639–646, Aug. 2012.