Conclusions and Future Work

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CONCLUSIONS AND FUTURE WORK

This chapter summarizes the benefits of the work carried out. It includes the analysis of the result as outcome. It also discusses in brief a path to future work that can extend the current work in several directions.

8.1 Work Contribution

The outline of the original contribution to the design of the algorithm, and to ontology mapping process as a whole, includes following:

- An Integrated approach is proposed that takes care of ontology mapping process from the very first step of ontology creation by allowing the user to set and use domain specific context dictionary and allowing the user to set other domain specific thesaurus such as abbreviation and synonym to provide context information to ontology mapping process that improves automation of ontology mapping process.

- It effectively combines the power of vector Space Model, used in Information Retrieval, to generate potential candidate mapping elements to be selected for further processing. Thus it expedites the process by eliminating large number of weak candidate mapping elements.

- It proposes the novel approach of using previously rejected mappings to speed-up the process in addition to re use of accepted mappings.

- Most of the system studied calculates similarity score matrix for all possible mapping elements and then decides about extracting mapping elements based on threshold. The proposed
system does this job in parallel, thereby eliminating rest of the computation if match is found according to user defined threshold for a specific matcher. The system allows the users to set different threshold values for different matchers and sub-matchers.

- It supports extensive configuration of algorithm. User can select matchers and sub-matchers to be included in algorithm and can decide their execution order.
- Several existing algorithm for different matchers are improved so as to apply them to multi-word labels.
- System makes selected matchers and sub-matchers available as a Web Services for the benefit of large research community interested in Semantic Web.
- Allows the users to work in multi-user and multi-session environment.
- A set of heuristic rules with high degree of feasibility is used in Label Matcher and in Structure Matcher to support automation.
- The algorithm includes a basic learning component which takes advantage users’ feedback to improve ontology mapping process in future.

8.2 Benefits of the work

The work particularly solves the following issues involved in the ontology mapping process.

- Enhanced Automation
- User friendly GUI
- Explanation for Suggested Mapping by System
- Multi-User Multi-Session System
- Context based Ontology Mapping Process
- Flexible Configurable Algorithm
The work carried out under this study can be used in Ontology Mapping in Semantic Web, Schema Matching in Data Warehouse, Agent Communication, Semantic Web Service Integration, and in NLP applications that requires string matching. With little modification, proposed algorithm can also be used for automatic evaluation of text based answer sheets in academic domain.

During this study it is observed that very few tools are available for Dot Net Developer community in this area. The proposed system presents engineering contribution to this end, and provides several frequently needed modules which are required by Semantic Web Community who would like to work with Dot Net Architecture. A large developer community is benefitted who needs such matcher library as matchers are made available as Web Services.

### 8.3 Future work

The proposed work in thesis can be extended in many directions. Some of them includes following:

- The VSM is used in algorithm for filtering weak mapping elements, but it may be improved and used as a matcher to find mapping elements whose VSM similarity (cosines score) crosses specified threshold.

- The algorithm needs to be tested for efficiency and effectiveness with large scale real world ontologies.

- The advantage of algorithm configurability with different inclusion of matchers, their order of execution, and with different threshold values needs to be assessed. The evaluation of the algorithm for different combinations of matchers and system parameters, a gigantic job, is yet to be performed.
• The algorithm also needs extensive testing to observe the effect of various language processing activities such as removal of stop words and stemming.

• The algorithm can be improved using knowledge of all components of ontology such as instances and complex relationship. For example, the algorithm can include Instance Matchers that find similarity score based on instances of entity. If instances are not available which is usually a case with ontology, it can be generated using search engine such as Google or Swoogle on the Web.

• The entire application can be upgraded from window based application to Web based application

• All matchers and sub-matcher library code can be made available as Web Services for Semantic Web user community.

• Algorithm can include enhanced learning component capable of reusing experience gained from previous run of an algorithm. For example, every time user accepts or rejects a mapping element, their respective rules used to generate that mapping element may be appreciated or depreciated. Similarly, using some data mining approach, different algorithm configuration can be evaluated for its performance, and may adjust default algorithm accordingly.

• Several individual matchers can be re-implemented with improved algorithm. For example, Linguistic Matcher can include the notion of Word Sense Disambiguation (WSD) to improve its performance.

• The system architecture as a whole can be improved, say for example, user friendly GUI; and can include more features, say for example, assigning mapping pairs to users instead of assigning entire project to user.
**8.4 Concluding Remark**

The thesis has been proposed an integrated approach to ontology mapping process in Semantic Web. It successfully demonstrated the integration of various techniques that can enhance the automation of the process without scarifying the quality of mappings found. At the same time, it also tries to improve efficiency so that the algorithm can be applied to large real world ontologies in real time. The basic objective of the study is to improve automation of the ontology mapping process by augmenting the semantic matching concept and the structure matching concept along with the label matching concept.

However, the intended meaning of ontology depends on the perception of the people who created it, which largely varies, even with other means of communication and exchanging the information, for example, human language such as English. Hence, it is extremely difficult to develop an automation system that can satisfy everybody. Though, this work demonstrates how automation can be achieved in a specific domain using domain knowledge and fine tuning the algorithm. It also shows a method to assist user in semi-automatic mode by suggesting potential mappings along with the explanation for the suggestion.