CHAPTER 10
CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

This work contributes to both theory and practice of the HIS in many aspects.

(1) The reference architecture called SIGA was presented for integrating the HIS that solves the semantic heterogeneity.

(2) The ontology-based metadata dictionary was proposed as an abstract representation of the metadata dictionary structure. The modeling technique for deriving the ontology-based metadata dictionary was also presented.

(3) The use of formal definition to represent ontology-based metadata dictionary components designed based on object-orientation and set theory entail application extension to any real world implementation.

(4) The transformation of ontology-based metadata dictionary to XML-based metadata dictionary representation was presented to demonstrate how the proposed ontology-based metadata dictionary could be applied in a practical implementation. Choosing XML technology to express the contents of metadata dictionary renders maximal interoperability across heterogeneous systems which, in turn, offers system scalability by virtue of XML constructs. As such, metadata dictionary content management can be achieved by means of flexible XML data model.

(5) The proposed metadata dictionary scheme also provides a mapping mechanism to associate user's requests posed at the conceptual level with the physical level, allowing direct access to stored information without loss of general query formulation. Such a conceptual-to-physical connection permits a straightforward means to plug-in/out autonomous information sources without affecting the overall system configuration.

(6) The proposed metadata dictionary is applied to a practical case study and query processing to demonstrate the model realization.

(7) The unified access to the HIS, by means of the metadata dictionary, combines multiple schemas of various sources into an integrated schema. Some governing frameworks (in the form of formal rules and algorithms) have been instituted to ensure that proper information is being stored and retrieved, whereby eliminating semantic heterogeneity.

Additional benefits precipitated from this work will encompass the transformation from theoretical foundation to actual implementation by means of XML technology. This is a significant connection that will bridge the gap between theory and practice. Information querying and retrieving from heterogeneous information sources can be realistically accomplished through XML document that is constructed from the ontology-based metadata dictionary. As a consequence, the semantic heterogeneity is eliminated.

10.2 Recommendations

This work still needs to be enhanced in various aspects, namely,

(1) The preliminary design of SIGA supports only structure and semi-structure sources. It has to be extended to support unstructured data sources.

(2) The query processing design still lacks optimization capability to enhance query processing efficiency.

(3) The proposed ontology-based metadata dictionary can be enriched with advanced ontology language such as RDF/RDF Schema (Brickley and Guha, 2000; Lassila and Swick, 1999) to enhance XML universal expressive power and syntactic interoperability (Decker, Melnik, Harmelen, Fensel, Klein, Broekstra, Erdmann and Horrocks, 2000) toward machine-processable Semantic Web (Decker, Melnik, Harmelen, Fensel, Klein, Broekstra, Erdmann and Horrocks, 2000; Fensel, Harmelen, Horrocks, Mcguinness and Patel-Schneider, 2001; Hendler, 2001; Horrocks, 2002).