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An Effective Approach for Development of Regional Medical Information System Using XML Technology

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Abstract

The system proposed here accepts XML-documented patient records and transforms them into a common schema through the style sheet. Because we adopted an XML format, the users of this system will easily get the information exchanged among medical facilities. The characteristics of this system include; (1) automatic creation of an appropriate structure of database from the XML schema information for each hospital, enabling to store any records of XML format for which XML schema information is known in advance, (2) facilitation of a dynamic control of information flow by introducing an idea of standardized interface structure, (3) reduction of the costs at which regional medical information systems are built up and (4) increase of the number of hospitals sharing this DB of patient records by exploiting a common XML schema.

Keywords:

medical informatics, databases, information storage and retrieval

Introduction

XML is useful for both display of data (e.g., in a web browser) and also for electronic data interchange messaging between systems. Many trials other than those of our research are reported for structuring medical records with XML. In the United States, HL7 (Health Level Seven) is generally used to exchange medical information, and HL7 v2 messages have been translated into XML format; v3 messages will be exclusively in XML. In Japan, electronic medical records that are equipped and operating with an XML interface include OpenDolphin and Wine. Also expected to make an appearance are MML-supporting electronic medical records that are being newly sought in connection with a cooperative system of the Tokyo Medical Association (HOT Project).

Electronic exchange of medical for information among hospitals, it is necessary to standardize data formats. In Japan, however, exchanges of medical information are still underdevelopment, resulting in few hospitals which actually have their medical information exchanged with each other [1].

We proposed here an effective approach, for development of the regional medical information system and sharing patients DB among hospitals.

Methods

XML text Viewing and editing

We can create and edit XML files in a text format using the XML Schema design view of XMLspy (released by Altova).

Developing XML-to-XML Mappings

To develop an XML-to-XML mapping, what needs to get done is simply to load XML document and XML Schema in MapForce (released by Altova) and to drawn drag connecting lines between the elements or attributes of the source and target.

Generating Program Codes

MapForce generates XSLT style-sheets program codes for marshalling medical data from the source to the target content model. All code generated by MapForce can easily be used in XML data transforming.

Results

Exchange technology of medical information survey

There are no standards for medical information using XML interface, other than the MML until now in Japan. In European countries, the most popular standard is the Electronic Data Interchange (EDI) according to the UN/EDIFACT (United Nations/Electronic Data Interchange For Administration, Commerce and Transport standard) which is the message exchange standard for trading established by the United Nations to allow exchange of structured data. Furthermore, the Netherlands has developed a protocol called MEDEUR for medical purpose using the EDIFACT standard. The medical association in

the Netherlands is managing this system. In the United States, the Health Level Seven (HL7) is generally used to exchange medical information, and the HL7 SGML/XML Special Interest Group is developing the HL7 Document Patient Record Architecture. The MML is mainly designed to describe comprehensive medical information. In contrast, the HL7 is designed to exchange the database for each specific purpose (use case). Since many trials other than MML and HL7 are reported for structuring medical records with XML increasing need to transform one markup to another markup develops. ASTM E31.25 subcommittee, "XML DTDs for Health Care" is formed to enhance existing levels of interoperability among the various XML/SGML standardization efforts, products and systems in health care.

The rules for the exchange technology of the medical information are already in place. However, it is expected that various challenges and difficulties will happen at the next step when we start to use these technology in the medical information system [2]. Easy-to-use and the inexpensive system are hoped for as a medical information exchange system.

In the next stage of the survey of exchange technology of medical information, we will focus on a verifying effectiveness of the XML interface as the exchange standard while checking problems from implementation.

Proposed system architecture

As shown in Figure 1, although it was necessary to convert into common format on the client side, there were some problem in the user operation and in the cost. On the other hand, proposed system that to do data exchange in an integrated server is seem to be a ideal method. We expect that current problem can be solved (Fig.1).

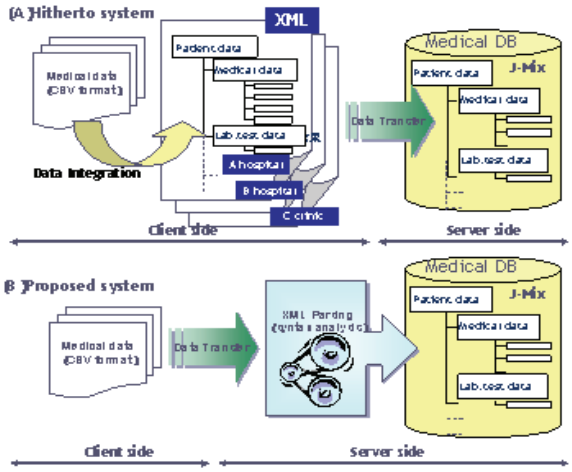

Figure 1 - Schematic diagram of Comparison between hitherto system and proposed system

XML schema design

First, to establish an analytical procedure of the medical data, the medical facilities were classified into the types of university hospitals, clinics, and National Hospitals. Medical information used by a certain medical facility type was described in terms of XML (XML document). Second, our XML schema was designed according to the types of university hospitals, clinics, and National Hospitals and data modeling (start XML schema). Furthermore, XML schema provides common medical information to each medical facility type (sample XML schema). Finally, we are aiming at making a model of XML schema for medical records that can be used in common with each medical facility group (model XML schema, as shown in the Figure 2 below. The XML element in this research was selected referring to J-Mix which is standardized medical terminology in Japan.

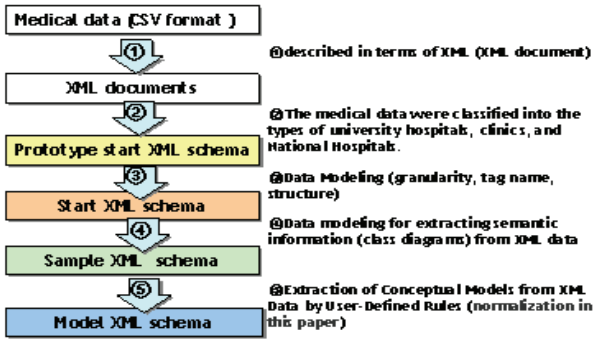

Figure 2 - Schematic diagram of making an model XML schema that can be used in common with each medical facility group

Conclusion

Our approach is also good for the infrastructure to improve the quality and accessibility of health care and to enable the delivery of integrated health care services (Fig.2). In the future, the technological approach for implementing the regional medical information system is based on XML, while its underlying capabilities allow for dynamic navigation according to personalized end-user preferences and authorities.

References

[1] Honda M, Yamanobe Y, Nakayama Y, Sudo H, andYanase K. Development of regional medical information system - using XML technology-. Japan Journal of Medical Infomatics 2005: 25(1): 1-5.

[2] Honda M, and Yamanobe Y. On the current problems of user authentication for EMR in HIS, MEDINFO 2004, M.Fieschi et al.(Eds), Amsterdam:IOS Press, 1644, 2004