A New Coherent and Extendible Model for encoded health care information System

Kulvinder Singh Mann Associate Professor, GNDEC Ldh. And Dr Harsh Sadawarti, Principal RIMT

Abstract— **We have developed a coherent, extendible model that permits structured, encoded health care information which could support patients as a decision support system, to be exchanged between computer applications while preserving by integration of two most extensively used standards in medical world i.e. HL7 and DICOM. These standards are disparate and have evolved in isolation of each other. In hospitals and medical fraternities only one standard can effectively and seamlessly provide interoperable environment. The formats of both the standards are distinct. To overcome this disparity a bridge has to be created between both the standards that can convert information into interoperable data for medical fraternities..**

Index Terms—**DICOM, HL7 Standards, PACS, EHR.**

I. INTRODUCTION

To Computer Aided Diagnosis stating that CBIR is a field of rising interest for the application in computer aided diagnosis (CADx). It exploits the visual information hidden in the images and facilitates the identification thus proving a second opinion. A comprehensive representation of CBIR resulted in a standard format using established clinical infrastructure with all referenced comparable examinations supporting a bridge from CBIR to CADx. In this paper the general IRMACON viewer that represents results from CBIR systems and coded as a DICOM structure reporting document for CADx was introduced [1]. The implementation of image retrieval in medical applications (IRMA) as a distributed development platform is fundamental for an efficient interdisciplinary knowledge transfer. The distributed IRMA architecture provides location and access transparency for its resources resulting in automatic distribution to all participating work groups, including automated replication functionality. IRMA drastically simplifies the co-operation of the interdisciplinary development team and vastly improves communication and evaluation process resulting in much shorter development cycles for new medico-diagnostic methods [2]. work done by various scientists in the field of CBVIR/CVIR which is the most vivid research areas in the field of computer vision in the last 10 yrs. Large and steady growing amounts of visual and multimedia data, and the development of the internet created thematic access methods that offer more that offer more than simple text-based queries or requests based on matching exact database fields. A large number of programs and tools have been developed to formulate and execute queries based on visual or audio content to help people browse large multimedia repositories. But no general breakthrough has been achieved with respect to large varied databases [4].CBIR can be extremely useful for computer-aided diagnosis(CAD). CBIR has not been established in clinical practice yet. As a widely unattended gap of integration, a unified data concept for CBIR-based CAD results and reporting is lacking . They suggested a system applied to CAD should integrate their results in a picture archiving and communication system enviornment such as Digital Imaging and Communications in Medicine (DICOM) structured reproting documents. The proposed CBIR data concept may foster the promulgation of CBIR systems in clinincal enviornments and thereby, improving the diagnostic process [5]. that introduction of key technologies and standards for successful operation ensures high level of confidence in such systems. Usage of digital multimedia information in medical applications open possibilities for advanced, flexible and

distributed architecture of healthcare services and support interoperability. Medical images are considered to be the most complex form of digital data and incur storage cost, Correct understanding of processes, underlying standards and procedures are important [6]. The Information sharing within or cross enterprise is the core need of each enterprise to fully benefit from the existing technologies as it allows utilizing the resources efficiently and on the other hand it expidates the processes of enterprise.HL7 is removed healthcare standard information ,it provides transportation specification .It discussed the technical details including architecture, design and implementation of web service component that implement HL7 Web Service Profile (HL7 WS-BP), which is a part of the transportation subsystem of the HLH project[8].

II. PROBLEM FORMULATION

As the health services worldwide have been evolving, global issues related to quality and standardization are being raised in medical fraternities. Over the years numerous standards were envisaged, drafted and implemented by the experts of health care industry. Health organisations aiming to have quality eco system started adopting standards like DICOM and HL7 and lots others. Individual standardization of medical systems occurred but this lead to a situation where standards were competing with each other as many parallel and contemporary standards came into practice. This also lead to situation in which one standard now required integration/bridging to overcome the limitations as well as achieve seamless communication across various health organisations and their departments.

In our research we propose integration or bridging of two most extensively used standards in medical world i.e. HL7 and DICOM. These standards are disparate and have evolved in isolation of each other. In hospitals and medical fraternities only one standard can effectively and seamlessly provide interoperable environment. The formats of both the standards are distinct. To overcome this disparity a bridge has to be created between both the standards that can convert information into interoperable data for medical fraternities.

III. PROPOSED MODEL

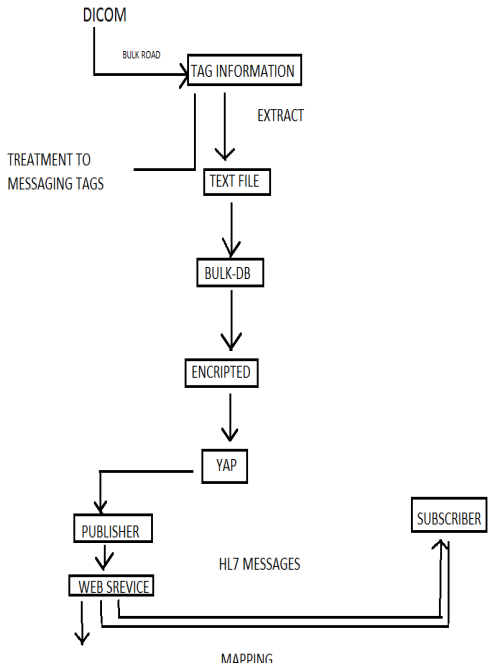
- Develop a dataset of DICOM images and store them in a file system.
- Using sequential indexing technique index them by looping through the folder of DICOM images.
- Create a DICOM info object for each image and read tag for each DICOM image.
- Read patient structure. modality structure etc. For each DICOM image.
- Save based on indexing sequence develop in step 2 the patient, modality structure etc. Data structure in excel sheet.
- Develop regular expression based rule engine for extracting information from previous step sheet.
- The rules are basically confirmatory in nature with respect to HL7 standard and help us to conform to both DICOM and HL7 standard so that bridging can be done. This engine should be open ended engine which can incorporate new versions of DICOM and HL7.
- Run the engine rule and finally create a mapping file which contains the mapping DICOM tags with respect to HL7 elements.
- Take care of non matched and missing values. If there are non matching values in either of side ignore those pairs and proceed further to create final mapping.
- If there are mandatory elements in HL7 and there is no corresponding values in DICOM such cases must be handle with care and also symbols must be assigned for such values which signifies that HL7 elements are available but does not have value since our bridge is from DICOM to HL7.
- Develop a SOAP simple object access protocol base web services to publish the

ISBN: 978-1-61804-111-1

mapped file which would require following operations.

I. Insertion of mapping in storage schema.
II. Updation of mapping in storage schema.
III. Deletion of mapping in storage schema.
IV. Retrieval of data from schema.

IV. WORKING MODEL



V. CONCLUSION AND FUTURE SCOPE

A content management system must be implemented for all large scale multimedia services as the demand grows and the variety of multimedia clients in use increases. Service providers need to be able to reuse both the content and the content management system. It is not economically viable to manually control content flow from creator to end user, and besides, manual intervention does not necessarily mean better quality. Better content management also means that the content can be found and used again, or traded for commercial gain. The goal of medical image databases is to provide an effective means for organizing, searching, and indexing large collections of medical images. There are multiple systems in place that support communications for public health labs, the clinical community, and state, and local health departments. However, most of these systems operate in isolation. Numerous benefits will start accruing as parts of the system are built and integrated into the business processes of the local health services. The implementation of a unifying system will further improve access to laboratory data and response protocols, advanced capabilities for rapid notification of public health partners, response agencies, the media, and the general public. There will be an enhanced capability to train public health staff and a uniform data exchange standard for exchanging data between the public health partners. Real-time collection of data from heterogeneous healthcare systems, program area modules, consolidation, and cross-indexing of data, integrated directory infrastructure for public health personnel and identity management, integration of related healthcare, and patient data from heterogeneous systems into a common interface, provide access through a ubiquitous Web-based portal that will obviate the necessity of client-side implementations of application systems, provide a mechanism to disseminate critical and public-interest information to the community in general are additional benefits.

REFRENCES

1. **Amato, Giuseppe, Falchi, Fabrizio, Rabitti, Claudio Gennaro Fausto and Savino, Pasquale (2001),"** ***Improving Image similarity Search Effectiveness in a Multimedia Content Management System*****".**
2. Atnafu, Solomon, Chbeir, Richard and Brunic, Lionel (2002),"*Content based and Metadata Retrieval in Medical Image Database*", Proceedings of the 15th IEEE Symposium on Computer Based Medical Systems (CBMS 2002).
3. **Curtis, Katherine, Stent ford, Paul W. Foster Fred (1999),"*Metadata - the Key to Content Management Services*" IEEE Publications.**
4. Feng, D., Siu, W. C. and Zhang, H. J. Eds. (2003)," *Multimedia Information Retrieval and Management: Technological Fundamentals and Applications*".
5. Forstadius, Jari and Löytynoja, Mikko (2003)," XML in Dynamic Multimedia Content

Management", Media Team, University of Oulu, Finland.

6. **Hausheer, David, Stiller, Burkhard (2003),"*Design of a Distributed P2P-based Content Management Middleware*".**
7. **HL7 and Spatial Interoperability Standards for Public Health and Health Care Delivery, an ESRI ® White Paper, January 2009.**
8. **Hong, SHAO, Wen-cheng, CUI and Li, TANG (2005)," *Medical Image Description in Content Based Image Retrieva*l", September 1-4, 2005, Proceedings of 2005 IEEE Engineering in Medicine and Biology, 27th annual conference, China.**
9. Huff, Stanley M. (2000), "Clinical *Data Exchange Standards and Vocabularies for Messages"*, Intermountain Health Care, UT.
10. **Indrajit, Surg Cdr I.K., Verma Col B. S. (2007)," *DICOM, HL7 and IHE: A basic primer on Healthcare Standards for Radiologists*", Indian J Radio Imaging / May2007 / vol. 17.**
11. **Interleaf (1999)," *Putting XML to Work: Advantages of Content Management* ", white paper, sponsor member of the Organization for the Advancement of Structured Information Standards.**
12. **Kambiz, Houshiaryan, Kim, IL Kon, Kwak, YunSik, Hune Cho Oosterwij k. H. (2006), "Ontology for Patient Medical Record in Healthcare Organizations".**
13. **Kim, Hangkyu, Park, Chang-Sup, Park, Byunghee Ji-Youn, Joon Jung Yoon (2007),"*A Multimedia Content Management and Retrieval System Based on Metadata and Ontologies*", multimedia and Expo, IEEE International Conference.**
14. **Kim, Jinman, Feng, David Dagan, Cai1, Tom W. and Eber, Stefan (2002)," *A Solution to the Distribution and Standardization of Multimedia Medical Data in E- Health*",** Australian Computer Society, Inc.
15. Malaxa, Valentina and Douglas, Ian (2005)," *A Framework for Metadata Creation Tools",* Volume 1, 2005 Interdisciplinary Journal of Knowledge and Learning Objects.
16. **Matellanes, A., May, A., Villegas, P., Snijder, F., Kobzhev, A., Dijk, E.O. (2005),"*Architecture for Multimedia Content Management*", an AceMedia Project.**
17. **Mazurek, Cezary, Stroinski, Maciej (1999), "*Digital Library for Multimedia Content Managemen*t".**
18. Mehmood, Y., Javed, M. Y. (2009),"*Efficient Metadata Loading Algorithm for Generation and Parsing of Health Level 7 Version3 Messages* ", International Conference on Emerging Technologies.
19. Müller, H., Michoux, N., Bandon, and D., Geissbuhler, A. (2004), "*A review of content-based image retrieval applications – clinical benefits and future directions*", International Journal of Medical Informatics 73, pp: 1-23.
20. Sardar, Murari Mohan, Basuli Krishnan, Naskar, Saptarshi (2008)," *Content Based Image Retrieval System*", ACM Ubiquity, Volume 9, Issue 32.
21. Wei, Chia-Hung, Li,Chang-Tsun, and Wilson, Roland (2006),"*A Content-based Approach to Medical Image Database Retrieval ".*
22. Williams, Clay E. (1997), "*Language for generating HL7 reformatting programs*", Proceedings of 19th Annual Conference of IEEE, Engineering in Medicine and Biology Society, 1997.
23. Yun, Jihyun, Kim, Ilkon (2002)," *Message Exchanging Model for Hospital Information System*", Korea Health 21 R&D Project, Ministry of Health & Welfare, Republic of Korea (02-PJ1-PG6-HI03-0004).