Compilation of Semantic Data Archive: A New Method of Learning "Local Culture"

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1. Introduction

In October 2020, Mokpo-si[3] of South Korea and the Center for Digital Humanities at the Academy of Korean Studies[4] launched a database compilation project called **Construction of Mokpo Modern History Archive**[5] to accumulate data and information on Mokpo City's modern history with various forms of digital data such as text, image, geographic information, and 3D models. The large-scale research project, which is conducted by Kim Hyeon, professor at the Academy of Korean Studies, includes a variety of detailed research projects such as a survey and 3D modeling of modern architectural heritage, and collection and archiving of related historical records.

This paper examines the structure and content of the **Mokpo Modern History Archive** implemented as one of the project's detailed tasks, and examines how implementing such a semantic database can contribute to local cultural research and education, and what challenges need to be improved.

KEY WORDS: Mokpo City of South Korea, Modern Architectural Heritage, Semantic Database, Local Culture and History

2. Resources for Archive Data Compilation

In 1894, a treaty was signed between Korea and Japanese to open Mokpo City as a trade port. Under this treaty, Mokpo was opened on October 1, 1897.[6] The fact that the U.S., France, Russia, Germany, Britain and Japan were involved in the provisions of the treaty signed at the time of the opening of Mokpo shows that Mokpo was a city where people from various countries could live. However, since the annexation of Japan and Korea in 1910, most foreigners in Mokpo have been Japanese, and many of the modern architectural heritages related to those Japanese people have remained in Mokpo.

The research team collected data on the modern history of Mokpo City from 85 local or central institutions such as Mokpo City Hall, Mokpo City Cultural Center, Regional Newspaper and Broadcasting companies in Mokpo, National Library, Korea Newspaper Archive, and National Institute of Korean History.

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[3] Mokpo-si is a city with a population of 220,000 located on the southern coast of South Jeolla Province, Korea.

[4] Center for Digital Humanities at the Academy of Korean Studies http://dh.aks.ac.kr

[5] Construction of Mokpo Modern History Archive http://dh.aks.ac.kr/~mokpo/wiki/index.php

[6] 德間一芽, 2010, Construction of a town by Japanese immigrants and their urban lives in Mokpo during the open-port period in Korea, Chonnam National University, 13p

3. Archive Design and Data Compilation

The Archive was designed to make all the information elements be linked to each other, to implement a semantic data archive that can visually show the relationship.

The ontology for implementing data archive used the ekc Data Model[7] (Data Model for the Encyclopedic Archives of Korean Culture) developed by the Center for Digital Humanities at the AKS.

6 humanities researchers (majored in history, literature, and philosophy) who can understand and analyze the content of the historical records participated in the creation of semantic data in accordance with the ontology design. Kim Kwang-woo and Kim Soo-hyeon, the authors of this paper, are humanities majors and digital humanities researchers who acquired data processing technology, so they were able to play a central role in building the semantic database.

The design of the data archive and the numbers of the data nodes collected and organized under this design are as follows:

3-1. Data Classes and Amount of Data

The schema of the Archive was designed with 9 classes including Actor, Event, Place, Architecture, Object, Record, Concept, Digital Asset, and Web Resource.[8] The amount of data currently implemented for each class (until 10 August 2021) is shown in the table below.

Class	Sub Class	description	Nodes (2021. 8. 10.)
Actor	person	people who were involved in historical events of Mokpo City.	201
	group	organizations, institutions, administrative agencies	187
Event		historical events, commemorative events.	2,129
Place		places in the geographic and administrative system related to historic buildings or historical events	192
Architecture		historic buildings chosen for 3D modeling	76
Object		artworks, artifacts, tools, monuments, museum objects	30
Record	literature	books, magazine, newspaper, documents	86
	text	article, text in historical records	3,210
	multimedia conent	old photographs, sound record	4,040
	architectural drawing	drawing, floorplan of buildings	480

[7] EKC: http://dh.aks.ac.kr/Encyves/wiki/index.php/EKC_Data_Model-Draft_1.1

[8] Ontology Class: http://dh.aks.ac.kr/~mokpo/wiki/index.php/Ontology:Class

Concept		concepts, terms to explain historical facts	100
Digital Asset	3D Model	3D modeling data of historic buildings	73
	360° surround VR	aerial and landscape views of the historic places of Mokpo city	192
	still image	photographs of the present details of historical buildings and places	1,100
	video clips	Interview records, visual documentary	175
Web Resource		explanatory text from the Encyclopedia of Korean Culture, Korean Cultural Heritage Portal, etc.	400
total			12,671

3.2 Relation Design and RDF Data Implementation

ets or web resources. Object property vocabulary terms for RDF data creation are as follows.

NameSpace	Relation	Inverse Relation
dcterms:	A creator B	B isCreatorOf A
ekc:	[s] A writer B	B isWriterOf A
ekc:	[s] A calligrapher B	B isCalligrapherOf A
ekc:	[s] A inscriber B	B isIncriberOf A
ekc:	A translator B	B isTranslatorOf A
ekc:	A annotator B	B isAnnotatorOf A
ekc:	A founder B	B isFounderOf A
ekc:	A constructor B	B isConstructorOf A
ekc:	A reconstructor B	B isReconstructorOf A
ekc:	A renovator B	B isRenovatorOf A
dcterms:	A contributor B	B isContributorOf A
dcterms:	A publisher B	B isPublisherOf A
dcterms:	A rightsHolder B	B isRightsHolderOf A
edm:	A isDerivativeOf B	
edm:	A isSuccessorOf B	
ekc:	A hasOldName B	B isOldNameOf A
ekc:	A isNamesakeOf B	B isEponymOf A
ekc:	A administrates B	B isAdministratedBy A
ekc:	A participatesIn B	B hasParticipant A
ekc:	A documents B	B isDocumentedIn A

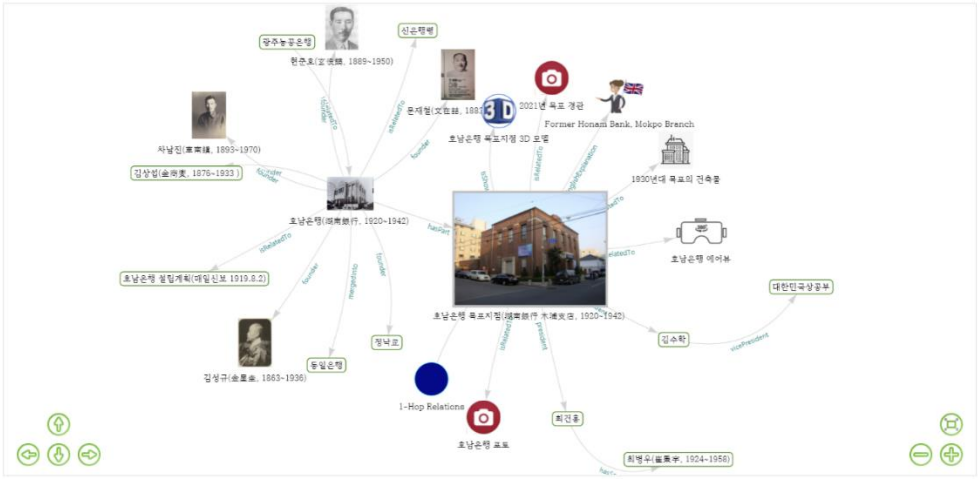
ekc:	A goesWith B	
ekc:	A isUsedIn B	
edm:	A isNextInSequence B	B isPreviousInSequence A
ekc:	A performed B	B isPerformedBy A
ekc:	A isPerformedAt B	
ekc:	A hasExhibitionAt B	
edm:	A happenedAt B	
ekc:	A depicts B	B isDepictedIn A
ekc:	A mentions B	B isMentionedIn A
dcterms:	A references B	B isReferencedBy A
ekc:	A isSteleOf B	B hasStele A
ekc:	A isStupaOf B	B hasStupa A
ekc:	A isEnshrinedIn B	B enshrines A
edm:	A currentLocation B	B isCurrentLocationOf A
edm:	A formerLocation B	B isFormerlocationOf A
dcterms:	A provenance B	B isProvenanceOf A
ekc:	A hasWife B (=isHusbandOf)	B isWifeOf A (=hasHusband)
ekc:	A hasConcubine B (=isHusbandOf)	B isConcubineOf A (=hasHusband)
ekc:	A hasSon B (=isFatherOf)	B isSonOf A (=hasFather)
ekc:	A hasSon B (=isMotherOf)	B isSonOf A (=hasMother)
ekc:	A hasDaughter B (=isFatherOf)	B isDaughterOf A (=hasFather)
ekc:	A hasDaughter B (=isMotherOf)	B isDaughterOf A (=hasMother)
ekc:	A hasAdoptedHeir B	B isAdoptedHeirOf A
ekc:	A hasBrother B	
ekc:	A hasSister B	
ekc:	A hasSonInLaw B (=isFatherInLawOf)	B isSonInLawOf A (=hasFatherInLaw)
ekc:	A hasSonInLaw B (=isMotherInLawOf)	B isSonInLawOf A (=hasMotherInLaw)

ekc:	A hasDaughterInLaw B (=isFatherInLawOf)	B isDaughterInLawOf A (=hasFatherInLaw)
ekc:	A hasDaughterInLaw B (=isMotherInLawOf)	B isDaughterInLawOf A (=hasMotherInLaw)
ekc:	A hasDescendant B	B isDescendantOf A
ekc:	A isLineageKinOf B	
ekc:	A isAffinalKinOf B	
ekc:	A hasDisciple B (=isMasterOf)	B isDiscipleOf A (=hasMaster)
ekc:	A hasOwner B	B isOwnerOf A
ekc:	A hasSubject B	B isSubjectOf A
ekc:	A servesAs B	
ekc:	A wasOrdainedBy B	B wasPreceptorOf A
foaf:	A knows B	
ekc:	A isFellowOf B	
dcterms:	A hasPart B	B isPartOf A
foaf:	A member B	B isMemberOf A
owl:	A sameAs B	
ekc:	A isNear B	
ekc:	A wears B	B isWornBy A
dcterms:	A type B	
edm:	A isRelatedTo B	B isRelatedTo A
edm:	A isShownAt B	
edm:	A isShownBy B	

4. Semantic Network and Data Visualization

Since all the data in the Archive is implemented as semantic data based on RDF, the relationship between the data nodes can be represented as a network graph as shown below, and a new network graph can be created centered on another node on the network. In this way, it is a meaningful feature of this data archive that allows us to know what historical, social, and cultural context all the elements of knowledge in the database are in.

The example below illustrates this utility of semantic data archive. Honam Bank Mokpo Branch of, the central node of this graph[9], was established in Mokpo City in 1929. The graph below not only shows who the bank's founders are, but also provides information on each of the founders' human relations, activities, and what traces they had left in the history of this city.



[10] [Figure 1] Network graph centered on the node of Honam Bank, Mokpo branch.

Mokpo Modern Cultural Resources Archive data includes not only textual information but also photographs, VR, and 3D data, allowing users to obtain specific information and explore data interestingly.

[Figure 2] Examples of 3D Model Data: Honam Bank Mokpo Branch and Japanese Consulate Mokpo[11]

5. Conclusion

Semantic databases create multi-directional links between fragmented information elements and allow users to explore broader, deeper knowledge. In addition to providing digitized research resources, this archive of the modern history of Mokpo is expected to serve as a local cultural education content that allows students and citizens of Mokpo City to understand the history and culture of their hometown in more depth. Citizens may be

[9] http://dh.aks.ac.kr/cgi-bin/encyves/Story02.py?db=s_okehkim&project=mokpo&key=호남은행

[10] Explain about Honam Bank Network graph: https://youtu.be/alKoqdbszm4

[11] 3D Model Data: http://dh.aks.ac.kr/~mokpo/wiki/index.php/3D_Model_Home

able to develop new cultural activities based on their understanding of culture in the history of their hometown obtained through this archive.

This semantic data archive is a database with various advantages and values of utilization compared to conventional bibliographic data archives. However, from the perspective of researchers who participated in this database compilation project, there are a number of challenges that need to be improved to increase the potential values of this archive.

The most deficient aspect of the current archive is that many of the data nodes provide only basic information and the related details do not exist. For example, a Japanese resident who first built or owned a building that remained a modern cultural heritage of Mokpo City is known only for his name and occupation, but no more information is available. Such information may be more likely to be found in the remaining records in Japan than in Mokpo or Korea.

In order to make the knowledge information in this archive richer and more valuable, I think that Japanese researchers interested in the history of modern cities in East Asia should take their data and participate in this research project together. The archive also expects to provide a digital research environment to Korean and Japanese scholars where they can discover common interests and conduct collaborative research activities.

6. Reference

[1]. Center for Digital Humanities at the Academy of Korean Studies http://dh.aks.ac.kr

[2]. 德間一芽, 2010, Construction of a town by Japanese immigrants and their urban lives in Mokpo during the open-port period in Korea, Chonnam National University, 13p

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[5]. Honam Bank Network graph
http://dh.aks.ac.kr/cgi-bin/encyves/Story02.py?db=s_okehkim&project=mokpo&key=호남은행

[6]. Explain about Honam Bank Network graph: https://youtu.be/alKoqdbszm4

[7]. 3D Model Data: http://dh.aks.ac.kr/~mokpo/wiki/index.php/3D_Model_Home