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From Digitalization to Digital Transformation in the World of Classical East Asian Studies

- Experiments in the Hanyang Time Machine Project -

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- Digital humanities is not to pursue the survival strategy of humanities researchers in the rapidly changing digital world.
- It is to be confident in our humanities and find the right way to deliver it to the digital generation.
- "Publish or Perish." This refers to the concerns of humanities researchers.
- "Digital or Disappearing." This is a reference to the future of the humanities studies.
- If the digital generation does not take over our humanities, the studies will inevitably disappear.
- My definition of 'digital humanities' is to teach humanities to the digital generation.

Three Steps of Digital Migration

- Digitization: Allowing the physical shape or property of an object to be represented by digital signals. ex) Computerized input of encyclopedia text / Digital copy production of archival objects
- Digital Transformation: Changing the process itself on the horizon extended by digital technology. Breaking the stereotypes of the old, improving the organization and culture to make the new process ex) Implementing an 'encyclopedic archive' beyond the compartments of encyclopedias and archives

Digitalization vs. Digital Transformation in Humanities Studies

DigitalizationDigital TransformationDigitalization of Humanities materialsDigital Humanities

- focused on transferring the literary resources of research and education to digital media for improving the convenience of using the materials.
- The main agents of this task were information technicians, and people in the humanities field (researchers, educators, and students) were the beneficiaries.
- 'Digital humanities' is for humanities researchers, teachers, and students to selfdirected research and educational activities in a digital environment.
- The goal is to derive new research and education results that were not possible in the past, and to promote the social contribution of humanities.

No matter how much digital data we have, future generations will not be interested in that kind of studies and the studies will not be sustainable, if research process and method are the same as they were before.

1. Introduction

Experiments for Digital Transformation of Korean Classical Studies

- The Academy of Korean Studies has been leading the digitalization of classical Korean studies materials in Korea for the past 20 years. This was done by humanities researchers selecting the resources, and information technicians storing them in database systems.
- Over the past three years (2020-2022) we have tried new experiments. In a digital environment, humanities researchers themselves produced machine-readable data and explored new knowledge from that data.
- I would like to introduce an example of digital transformation of Korean classical studies which we tried as a task of Hanyang Time Machine Project.

Hanyang Time Machine

- The "Hanyang Time Machine" is a digital content development project carried out by the Cultural Heritage Administration as part of the "<u>Three innovation strategies for the content</u> <u>industry</u>" promoted by the South Korea government.
- The project, planned to be carried out for three years from 2020, aims to make Hanyang* City's cultural heritage into 3D data and build an open platform for the private sectors so that mobile carriers, online portals, and digital game producers can use it as various virtual reality contents.



^{*} Hanyang (漢陽): The old name of Seoul; the capital of Joseon (1392-1910)

The Need for Humanities Research in Hanyang Time Machine Project

- The funds for the Hanyang Time Machine project were invested more in reproducing the city's old buildings and streets in 3D virtual reality, but the goal of this project was not to stay in 3D-reproduction of the city's physical shape.
- The goal was to take a step further and view the lives and history of the people who lived in the city through digital data.
- In order to properly understand its historical and cultural significance, it is necessary to explore the related humanities knowledge.



Humanities Researchers' Participation in the Digital Data Production

- The humanities researchers are majoring in history, folklore, anthropology, traditional costumes, traditional food studies, art history, classical Chinese literature, and digital humanities.
- They produced machine-readable data through a series of processes:





Data Curation in Hanyang Time Machine Project

- Humanities researchers acted as data curators and created a 'humanities knowledge semantic data archive.'
- What they did in this project was to collect and analyze historical records, extract meaningful knowledge elements, and create a huge knowledge network that tells the stories of the people of Hanyang.
- Here's an example of the data curation.



戊申年 進饌 The Royal Feast in 1848

In 1848, a feast was held at Changgyeonggung(昌慶宮) Palace in Hanyang to pray for the longevity of King Heonjong's (憲宗, r. 1834-1849) grandmother (純元王后, 1789-1857) and mother (神貞王后, 1809-1890).



Details of the event were recorded in 『戊申進饌儀軌』(The Royal Protocols of the Joseon Dynasty: Record of the Royal Feast in 1848), and the scenes of the feast were depicted in 「戊申進饌圖屛」(Screen Painting of the Royal Feast in 1848)

Class Design for Data Curation of the Royal Feast in 1848



✤ Source texts and materials:

『戊申進饌儀軌』:「儀衛」,「工伶」,「樂器風物」,『經國大典』,『國朝五禮儀』,『尙方定例』, portraits, and museum collections



* curator: Kim Hyun-Seung, Ph.D. student at the Academy of Korean Studies

Object properties for individual objects in 'Clothing' class

Relation	Domain	Range	Inverse Relation	Attribute	Note
wears	Actor	Clothing>Costume			[Actor] A wears [Costume] B
<u>isWornIn</u>	Clothing	Event/Concept			[Costume] A is worn in [Event] B
isDepictedIn	Any	Record/Object	depicts		A is depicted in [Record/Object] B
isMentionedIn	Any	Record	mentions		A is mentioned in [Record] B
documents	Record	Event			[Record] A is documentation of [Event] B
<u>hasPart</u>	Any	Any	isPartOf		[Costume] A includes [Clothing Item] B as a part





✤ Hyperlink to 'Hanyang Time Machine Wiki' Text



'Food' served at the Royal Feast in 1848*

Source texts



* curator: Lee So-young, Ph.D. student at the Academy of Korean Studies

'Food' served at the Royal Feast in 1848

Object properties for individual objects in 'Food' class

Relation	Domain	Range	Inverse Relation	Attribute	Description
hasDart	Food>Menu	Food>Individu		Hight of	[Menu] A include [Individual Food]
		al Food		Individual Food	В
hadingradiant	Food>Individ	Food>Ingredie		Amount of	[Individual Food] A uses [Ingredient]
nasingredient	ual Food	nt		Ingredient	В
icCornishadWith	Food>Menu	Object			[Menu] A is garnished with
		Object			[Decoration Object] B
<u>isProvidedIn</u>	Food>Menu	Event			[Menu] A is provided in [Event] B
isSomodIn	Food>Individ	Object			[Individual Food] A is served in
	ual Food	Object			[Object:bowl/dish] B
	Food>Individ				[Individual Food/Menu] A is served
<u>isServedOn</u>	ual	Object			on [Object: food table] B
	Food/Menu				
<u>isServedTo</u>	Food>Menu	Actor			[Menu] A is served to [Actor] B

'Food' served at the Royal Feast in 1848*





'Food' served at the Royal Feast in 1848*

Hyperlink to 3D Model



'Food' served at the Royal Feast in 1848

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	문서 토론 위기 환집 역사보기 📌 더 보기 ✔ hanyang2 검	<u>स्</u> Q	재혀물 저	예작 정!	보 [편지]		
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이 문서 인용하기 인쇄/내보내기 책 만들기 PDF로 다운르드 인쇄용 판	Definition [편집] 승아, 농아, 전북, 하상, 낙지, 당, 돼지고기와 소고기, 내장류, 도라지, 미나리, 무, 오아, 버섯류 등을 넣고 왜토랑(일본 된장, 미스)스, 남비전골음식이다, 「무신 진찬의궤,(1848)에 따르면 통명전 역일회작,대전 진어발반과에 오른 승기야당 1그릇에는 내하에서 준비한 남며, 소원반이 따른다. 승기야당에 들어가는 재료는 수야 노야 각 반미, 생복 생활 각 5개, 낙제 반급, 단제 3수, 저타근자은 각 반부, 전복 3개, 6 두태 각 1부, 홍황 10개, 강고도야 1개, 길경·생종수근 각 반단, 청근 2개, 청과 반개, 표고-석아능이 각 1합, 녹말·진말·진유 각 1승, 계란 15 액트장 5합, 실백자·호초말 각 2적이다. Semantic Data [편집]	덕어 즉석에서 끓여먹는 국어서 준비하 주최	"화로(火 慮)"(유물 번호 민 속 300당 30	3D-승		n): 높이 20cm, 지튭 40cm 'www.nfm.go.kr/common/data/home/relic/detailPopup.do?seq=PS0100200100105645200000@	κ
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Hyperlink to 'Hanyang Time Machine Wiki' Text

Source texts



* curator: Park Hyeon-Jeong, Ph.D. student at the Academy of Korean Studies

Object properties for individual objects in 'Object' class

Relation	Domain	Range	Inverse Relation	Attribute	Note
<u>isUsedIn</u>	Object	Event/Concept	uses	Timespan of Event	[Object] A is used In [Event] B
goes With	Object	Object			[Object] A is used with [Object] B
isDepictedIn	Any	Record/Object	depicts		A is depicted in [Record/Object] B
isMentionedIn	Any	Record	mentions		A is mentioned in [Record] B
hasInscription	Object	Text			[Object] has Inscription: [Text] B
<u>currentLocation</u>	Object/Record	Place	isPartOf		[Object] A is currently housed/located in [Place:musum/archives]
formalLocation	Object/Record	Place	isPartOf		[Object] A was housed/located in [Place:musum/archives] in the past



Hyperlink to 3D Model



✤ Hyperlink to 'Hanyang Time Machine Wiki' Text



Source texts:

『戊申進饌儀軌』:「儀註」,「樂器風物」,「工伶」,『呈才舞圖忽記』,『樂學軌範』,「戊申進饌圖屛」



* curator: Lee Han-Na, Ph.D. student at the Academy of Korean Studies

Object properties for individual objects in 'Work' class

Relation	Domain	Range	Inverse Relation	Attribute	Note
hasPerformance	Event	Work	isPerformedIn		[Event] A has [Performance] B
isPerformedAt	Event/Concept	Place			[Performance] A is Performed at [Place] B
isPerformedBy	Event/ Work>Performance	Actor			[Event/Work] is Performed by [Actor]
appearsIn	Actor	Work>Performance			[Actor] A appears in [Performance] B
<u>plays</u>	Actor	Object			[Actor] A plays in [Object:musical Instrument] B
isPreviousInSequence To	Event/Work/Conce pt	Event/Work/Concept	isNextInSeque nceTo		A precedes B (in temporal or logical sequence)
<u>isUsedIn</u>	Object	Event/Concept	uses	Timespan of Event	[Object] A is used In [Event] B
goes With	Object	Object			[Object] A is used with [Object] B
isDepictedIn	Any	Record/Object	depicts		A is depicted in [Record/Object] B
isMentionedIn	Any	Record	mentions		A is mentioned in [Record] B

* Network Graph



Hyperlink to 3D Model



✤ Hyperlink to 'Hanyang Time Machine Wiki' Text



Ontology: EKC Data Model

- As shown in this example, the royal feast was a very comprehensive event.
- Each individual researcher examined specific areas according to her interest. However, the digital data can be linked together to form a comprehensive network. And the networked data gives a holistic view of the overall event.
- This was possible because we defined an ontology in advance and created data based on this ontology. <u>An ontology is a kind of blueprint for digital constructions</u>.
- The ontology schema for Hanyang Time Machine data curation is based on the EKC (Encyclopedic Archives of Korean Culture) data model.

EKC Data Model v. 2022

 The EKC Data Model was first established in 2016 by the Center for Digital Humanities at AKS and has been expanding every year.

* The domain of EKC ontology: historical facts and contexts of traditional Korean culture

- The research team enacts a draft ontology to be applied to the data curation of a new project at the time when the basic research materials and story topics are selected.
- A task force is in charge of managing the ontology vocabulary—monitoring the use of ontology;
 determining, enacting, and disclosing new vocabulary when requested.



Class Design in the EKC Data Model v. 2022



Data Curation Support Systems

- Center for Digital Humanities at AKS developed digital-based research support systems and conducted data compilation work in that environment.
- There are two support systems that we used for collaborative data curation.
 - ✓ Hanyang Time Machine Wiki
 - ✓ Semantic data management software





Hanyang Time Machine Wiki

- 'Hanyang Time Machine Wiki' is a wiki-based online collaboration system for researchers' data curation.
- Research references such as the list of basic literature, story topics, and ontology supplementations are released through this wiki system,
- and all data generated during the data curation process is recorded on the wiki page of this system so that other researchers can share it.

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고유 링크	이재열 편찬 항목	2021년 11월 16일 22:14	이재열@				데인제국 사가 항목과 위목의 사제 표확을 전쟁이던 무역권으로 쓰였던 옷으로 원세근 흔역한 참여있음.	고유 링크 문서 정보			
분석 정보 이 문서 인용하기	이한나 편찬 항목	2021년 9월 09일 10:49	이한나@				중선도감 ☞ 중선도감(重建都監) (●)	이 문서 연용하기			
000000000	장경호 편찬 항목	2021년 11월 08일 12:47	장경호🖌				<u>http://db.aks.ac.kr/sillokwiki/index.php/중건도감(重進都監)</u> 역사 고조대 지저(首昭)과 견으구(廣演室) 두이 주거우 다다한 이시 과처	연쇄/내보내기	양이재(書始齋), 역수공 소속 건물로서, 대한제국 시기 황족과 귀족의 자제 교육을 전달하던 수학원으로 쓰였던 장소, 1905년(광무 9년)에 지었다. '양이'는 몸을 수양하고 마음을 운항 한 수학은 지하는 것이 같은 것이 다. '양이'는 몸을 수양하고 마음을 운항 같은 것이 하는 것이 않는 것이 같은 것이 하는 것이 않는 것이 하는 것이 않는 것이 하는 것이 않는 것이 하는 것이 않는 않을 않는 않는 것이 않는 것이 없다. 않은 것이 않는 것이 않는 것이 않는 것이 않는 것이 없다. 않는 것이 않는 것이 않는 것이 않는 것이 않는 것이 않는 않는 것이 않는 않는 것이 않는 것이 않는 것이 않는 않는 것이 않는 것이 않는 것이 않는 것이 않는 것이 않는 않는 않는 않는 않는 것이 않는 것이 않는 것이 않는 것이 않는 않는 것이 않는 않는 않는 것이 않는 것이 않는 것이 않는 않는 않 않는 않		
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Network Data Management Software

- Center for Digital Humanities at AKS developed data management software that can manage semantic data consisting of nodes and links in real time,
- and trained individual researchers who perform data curation to directly use the system.

.* Semantic Network Data Management Studio (SN-DMS):

- Visualizes semantic data that follows the Resource Description
 Framework (RDF) format in the form of a network graph
- 2) Provides a semantic navigation function that searches for data and expands the connections to related data on the network graph
- 3) Performs data management tasks such as adding, updating, and deleting nodes or links of the semantic network



RDF Data Creation

- The way we chose to convert humanities knowledge into digital data is to create Resource Description Framework (RDF) triples by extracting the contextual elements and relationships from the text recorded in the old literature.
- Over the past three years, we have created about 75,000 nodes and 100,000 links of data. Users visiting Hanyang Time Machine Data Archive will be able to find numerous stories about the Hanyang people's culture in the semantic network that these data make up.
- Hanyang Time Machine Semantic data can be used by anyone for research, education, or commercial digital product development. (<u>Cultural Heritage</u> <u>Administration</u> will soon release the data.)

Creation of Learning Data for Korean Culture AI

- The RDF data we are creating is a conversion of humanities knowledge from a form that was ambiguously contained in written human language into explicit data that computers can recognize. This can be used as primary learning data for the deep-learning process of AI.
- This data will contribute to the development of artificial intelligence that can help people study traditional Korean culture.



Data Curation: A Humanities Education Method for Digital Natives

- However, the achievement of this project, which I think more important than those utilization effect, is that we experimented intensively with the method of data curation to explore Korea's traditional culture and achieved satisfactory results.
- Junior researchers who participated in the project were able to immerse themselves in the world
 of classical literature through data curation activities and learn a lot.
- Senior researchers, who have been studying Korean history and classics for decades, also said they were able to discover what they missed in the past through data curation activities.
- Most importantly, we were able to see the possibility of a new learning method that allows young students of the digital native generation to explore Korea's traditional culture in a digital language familiar to them.

Digital Transformation in the World of Classical East Asian Studies

- As shown in the example of this presentation, classical studies by data curation presents the possibility of collaborative research beyond the walls of the major. Future digital native researchers will be able to cross the boundaries between countries in this way.
- Traditional cultures of China, Japan, Vietnam, and Korea, which used Classical Chinese as the language of global communication, have many similarities and relationships with their uniqueness. Classical East Asian studies conducted in a digital environment will enable the exploration of East Asian culture in a convergent open space.
- If we have a vision for trans-East Asian classical studies, future researchers who will realize it should be educated to have the capabilities of digital-based learning and research. I hope the experience of the Hanyang Time Machine project can be a reference for this task.



Thank You!