TTOT-45718 (v4)

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

- Experiments in the Hanyang Time Machine Project -

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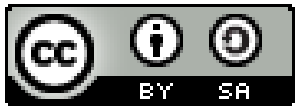

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- Digital humanities is not to pursue the survival strategy of humanities researchers in the rapidly changing digital world.
- It is to be confident in our humanities and find the right way to deliver it to the digital generation.

- "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
- Digitalization: Utilizing the results of computerization to increase the efficiency of the process of what you have been doing ex) Online services of encyclopedias or archival objects; Operation of computerized content management systems. ※ Digitalization only efficienates existing processes and does not change them into new ones
- 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

Digitalization	Digital Transformation
Digitalization of Humanities materials ▪ 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** ▪ 'Digital humanities' is for humanities researchers, teachers, and students to self-directed 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.

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

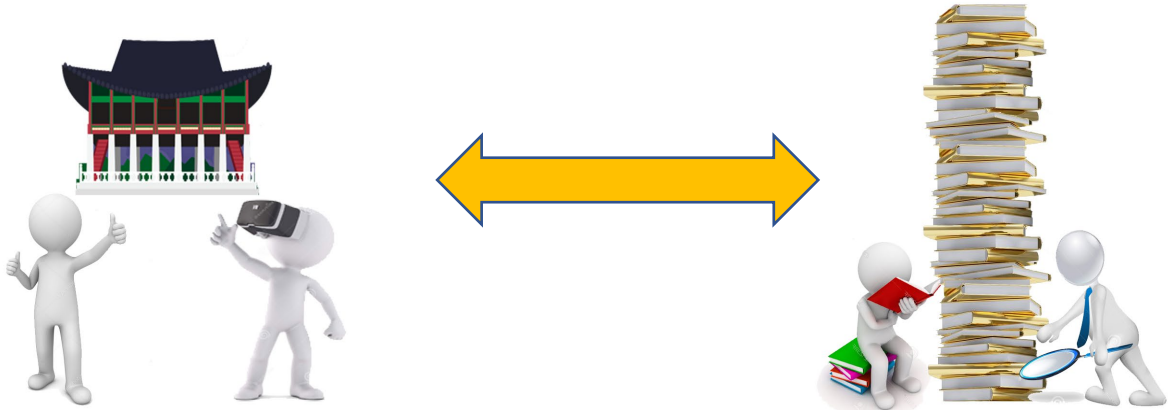
- The “Hanyang Time Machine” is a digital content development project carried out by the Cultural Heritage Administration as part of the “Three innovation strategies for the content industry” promoted by the South Korea government.
- The project, planned to be carried out for three years from 2020, aims 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:

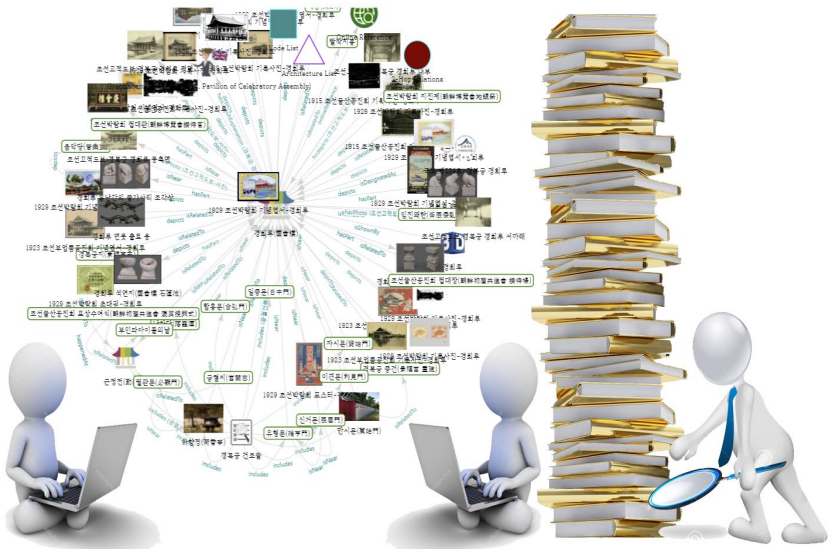
1) Selection of Basic Research Data (literature materials)

↓

2) Selection of Digital Storytelling Topics

↓

3) Semantic Data Curation

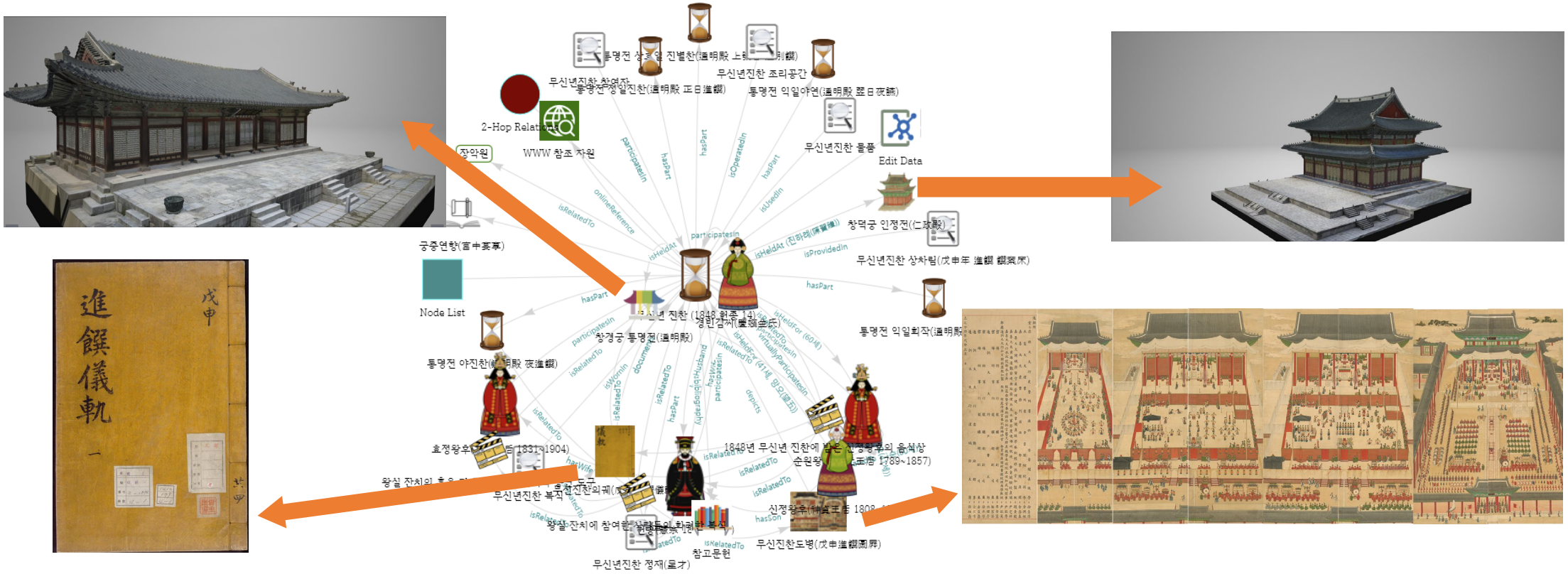


Data Curation in Hanyang Time Machine Project

- 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.

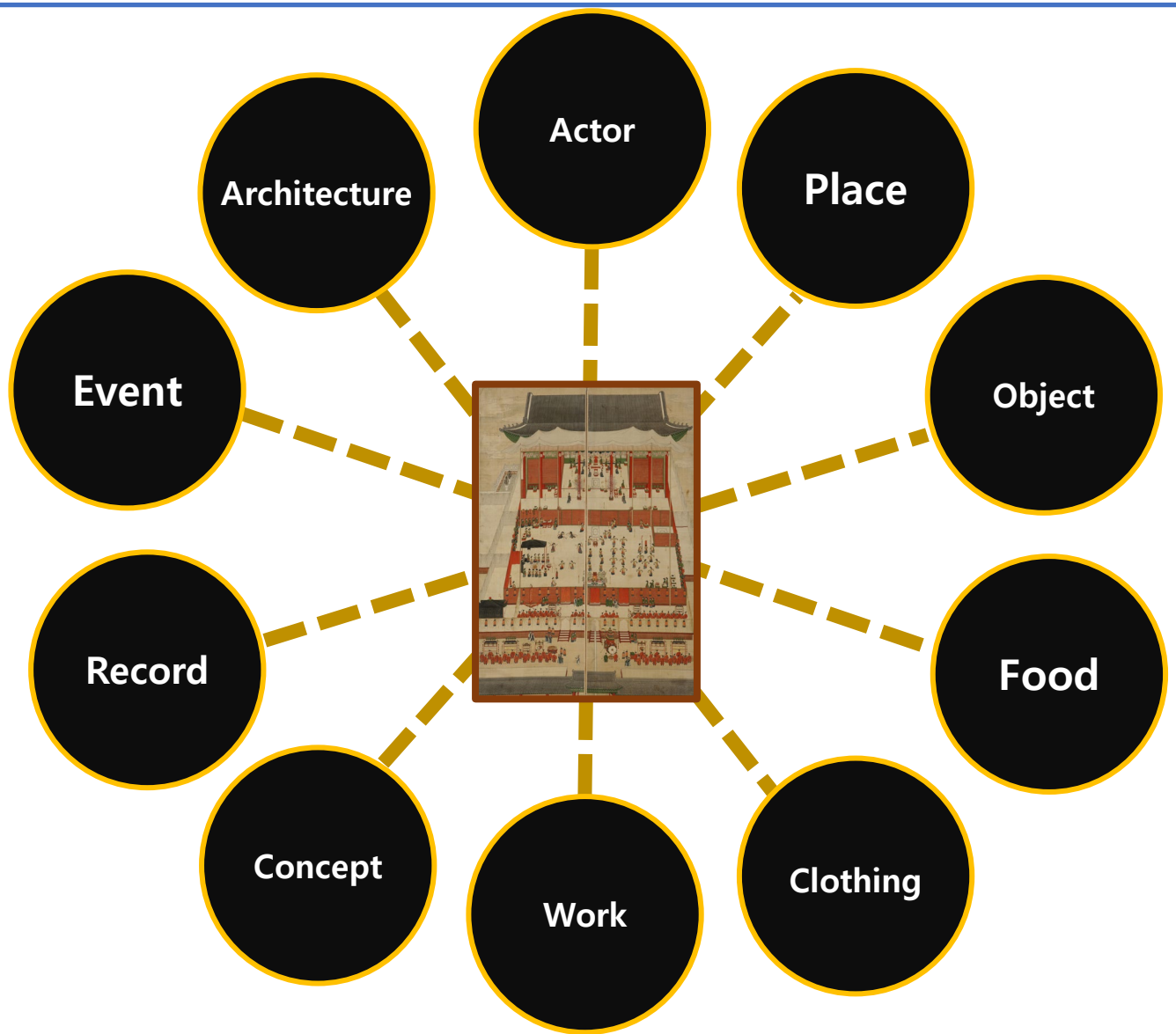
戊申年 進饌 The Royal Feast in 1848

- 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)

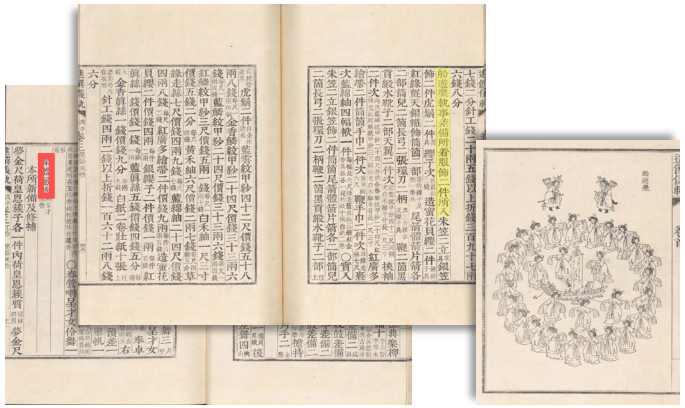
Class Design for Data Curation of the Royal Feast in 1848

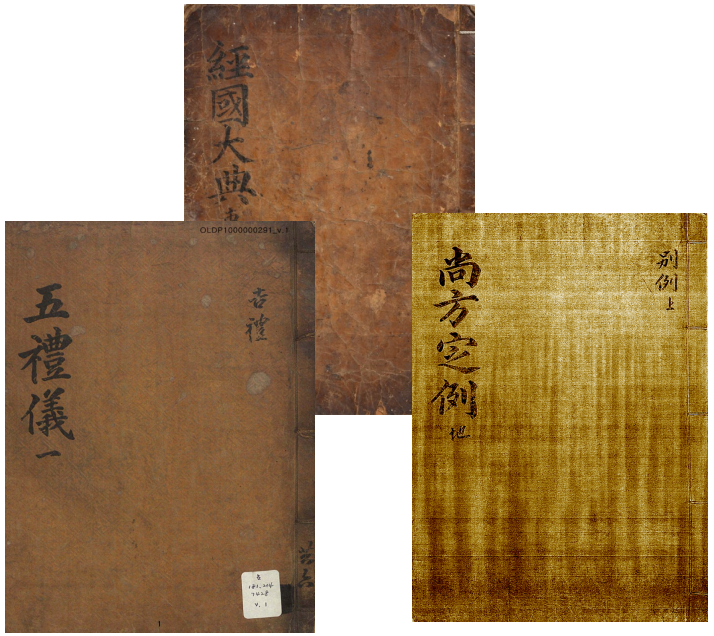


‘Clothing’ worn at the Royal Feast in 1848*

❖ 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

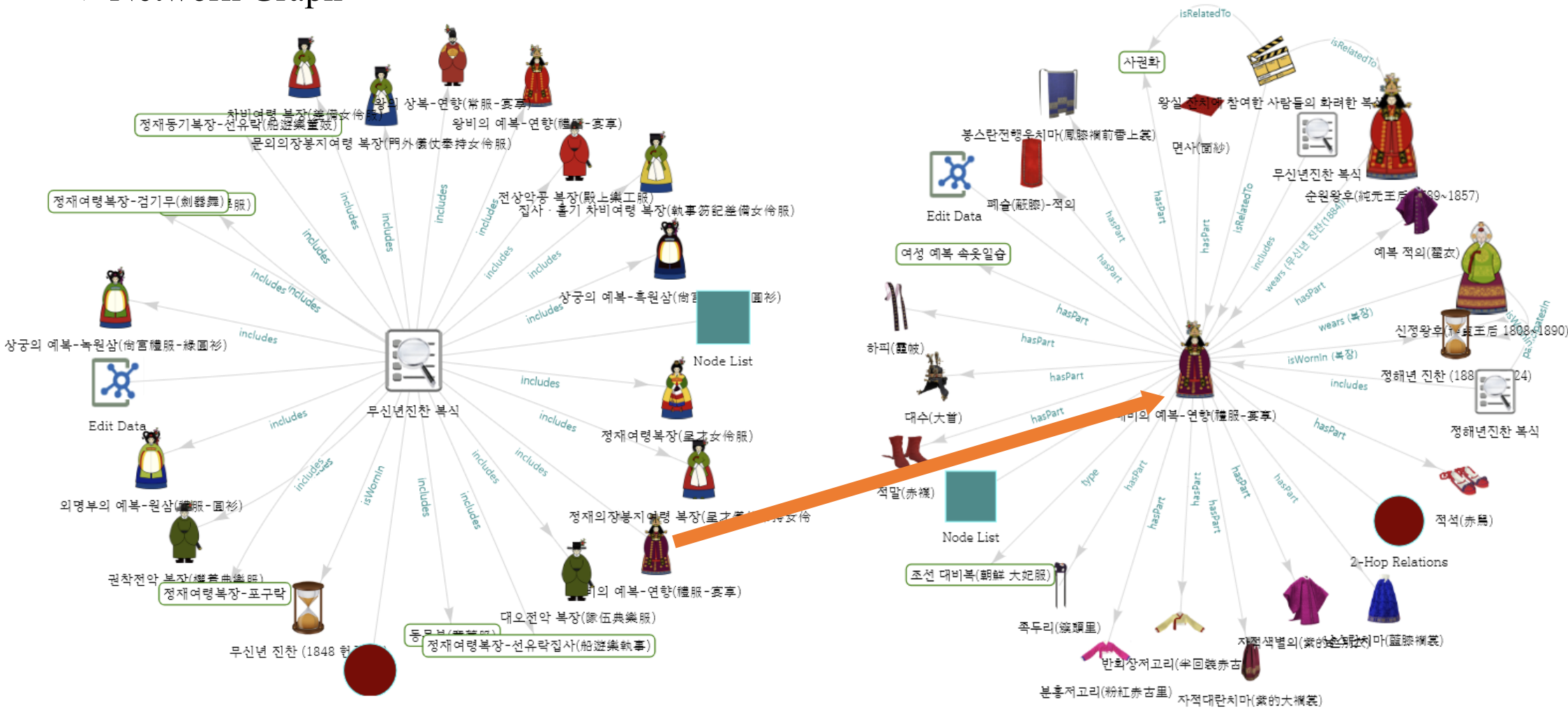
‘Clothing’ worn at the Royal Feast in 1848

❖ Object properties for individual objects in ‘Clothing’ class

Relation	Domain	Range	Inverse Relation	Attribute	Note
wears	Actor	Clothing>Costume			[Actor] A wears [Costume] B
isWornIn	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
hasPart	Any	Any	isPartOf		[Costume] A includes [Clothing Item] B as a part

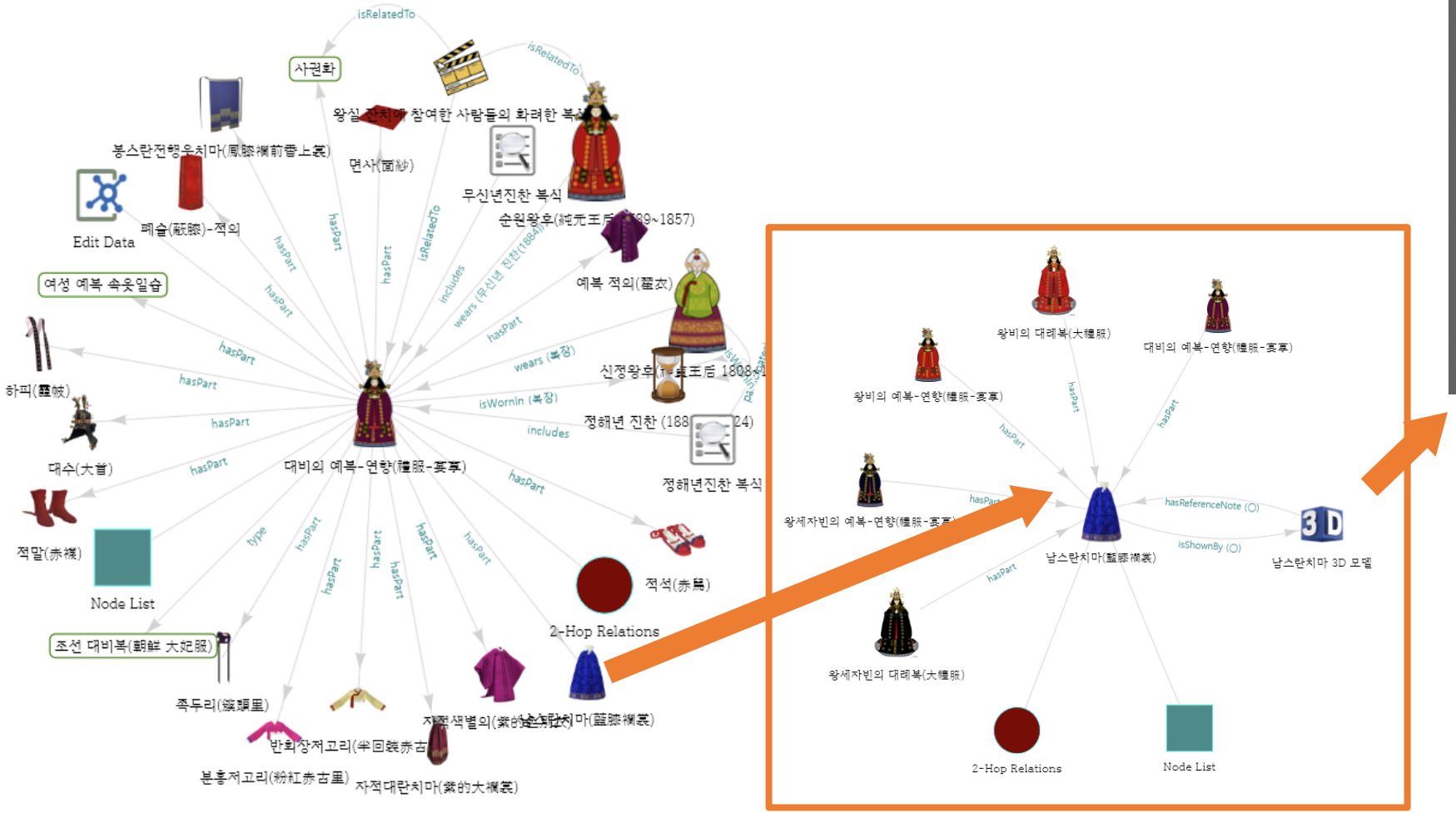
‘Clothing’ worn at the Royal Feast in 1848

❖ Network Graph



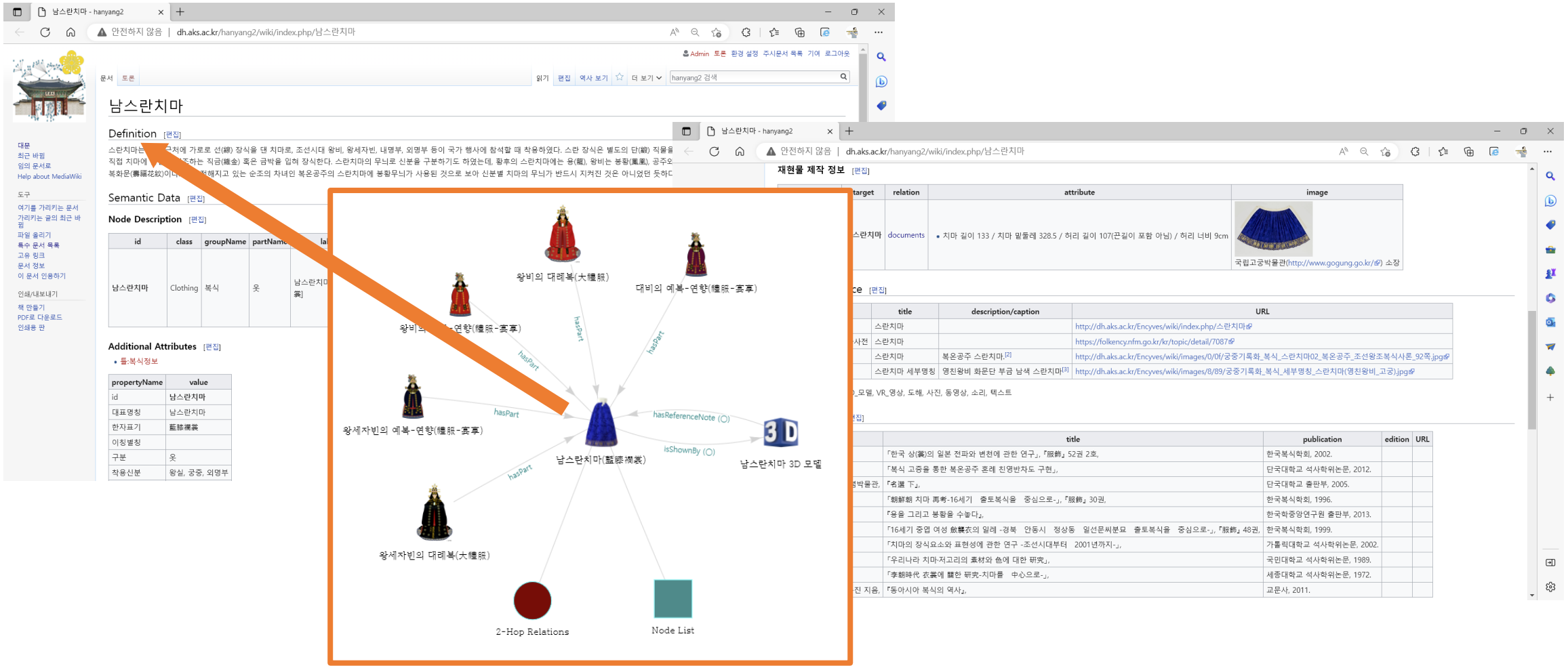
‘Clothing’ worn at the Royal Feast in 1848

❖ Hyperlink to 3D Model



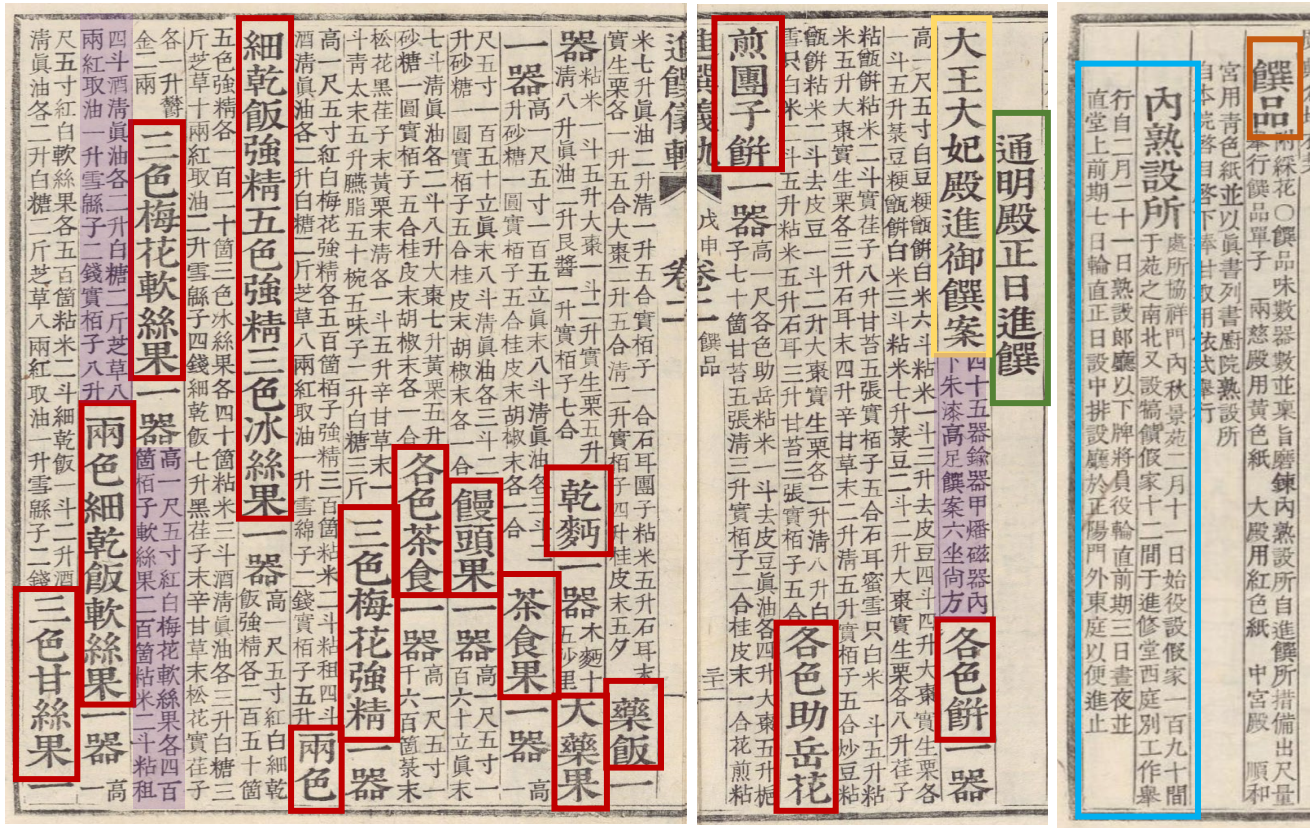
‘Clothing’ worn at the Royal Feast in 1848

❖ Hyperlink to ‘Hanyang Time Machine Wiki’ Text



‘Food’ served at the Royal Feast in 1848*

❖ Source texts



『戊申進饌儀軌』「饌品」

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

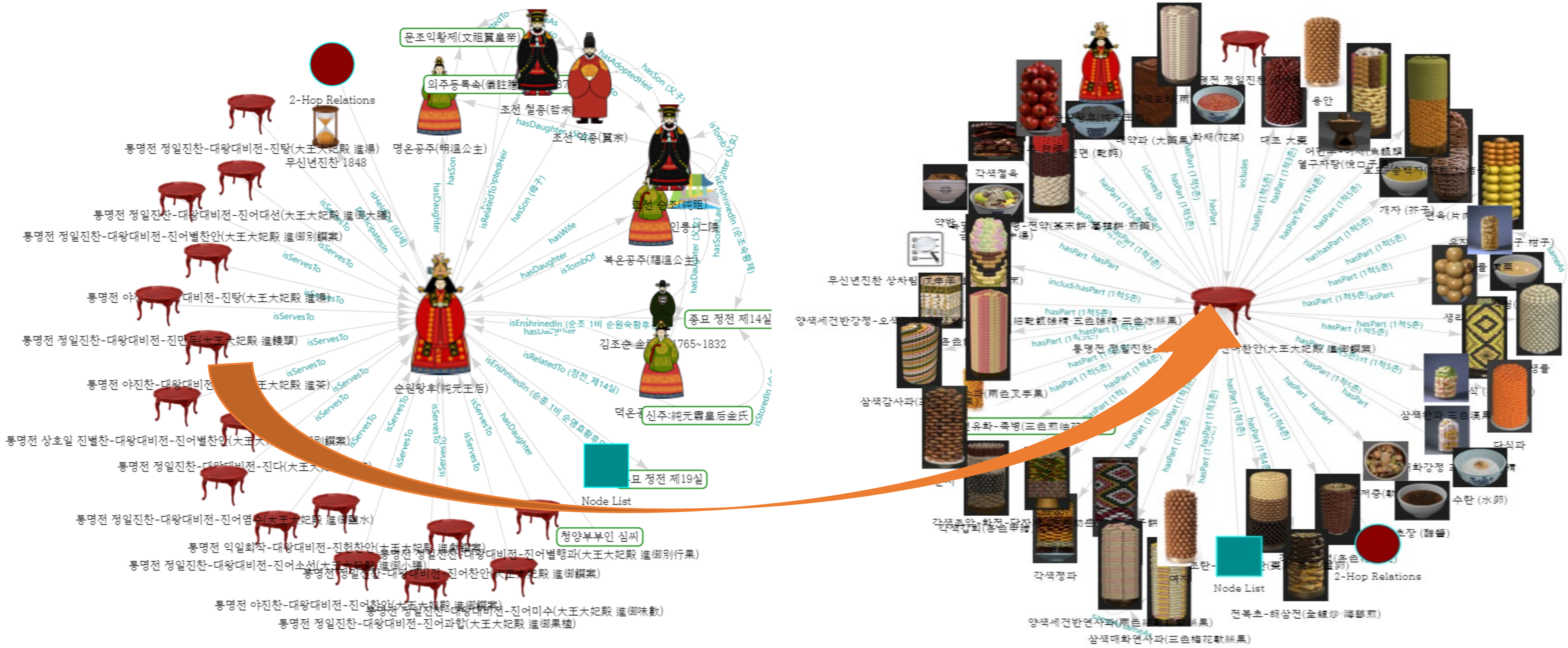
‘Food’ served at the Royal Feast in 1848

❖ Object properties for individual objects in ‘Food’ class

Relation	Domain	Range	Inverse Relation	Attribute	Description
hasPart	Food>Menu	Food>Individual Food		Hight of Individual Food	[Menu] A include [Individual Food] B
hasIngredient	Food>Individual Food	Food>Ingredient		Amount of Ingredient	[Individual Food] A uses [Ingredient] B
isGarnishedWith	Food>Menu	Object			[Menu] A is garnished with [Decoration Object] B
isProvidedIn	Food>Menu	Event			[Menu] A is provided in [Event] B
isServedIn	Food>Individual Food	Object			[Individual Food] A is served in [Object:bowl/dish] B
isServedOn	Food>Individual Food/Menu	Object			[Individual Food/Menu] A is served on [Object:food table] B
isServedTo	Food>Menu	Actor			[Menu] A is served to [Actor] B

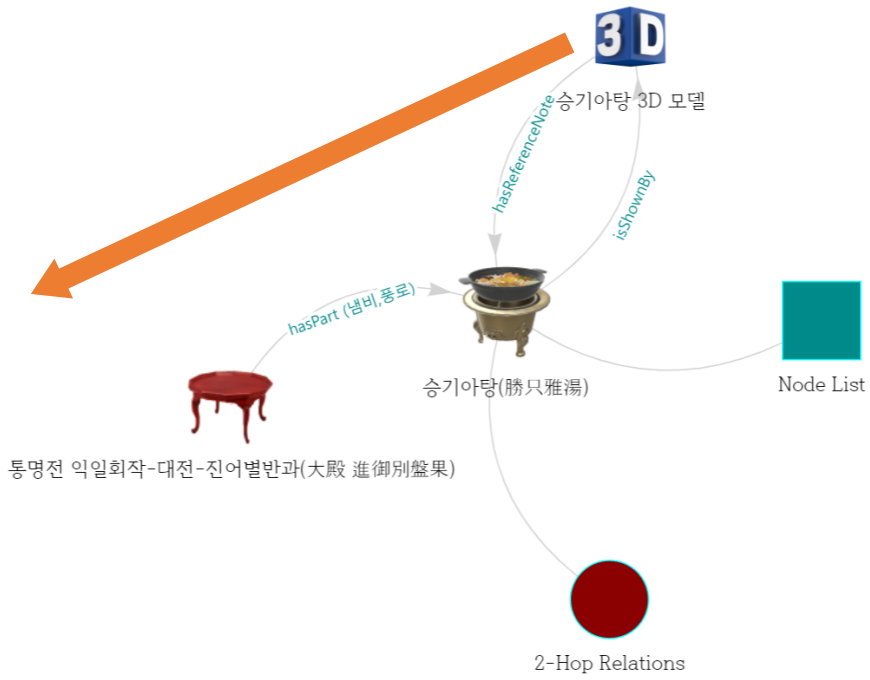
‘Food’ served at the Royal Feast in 1848*

❖ Network Graph



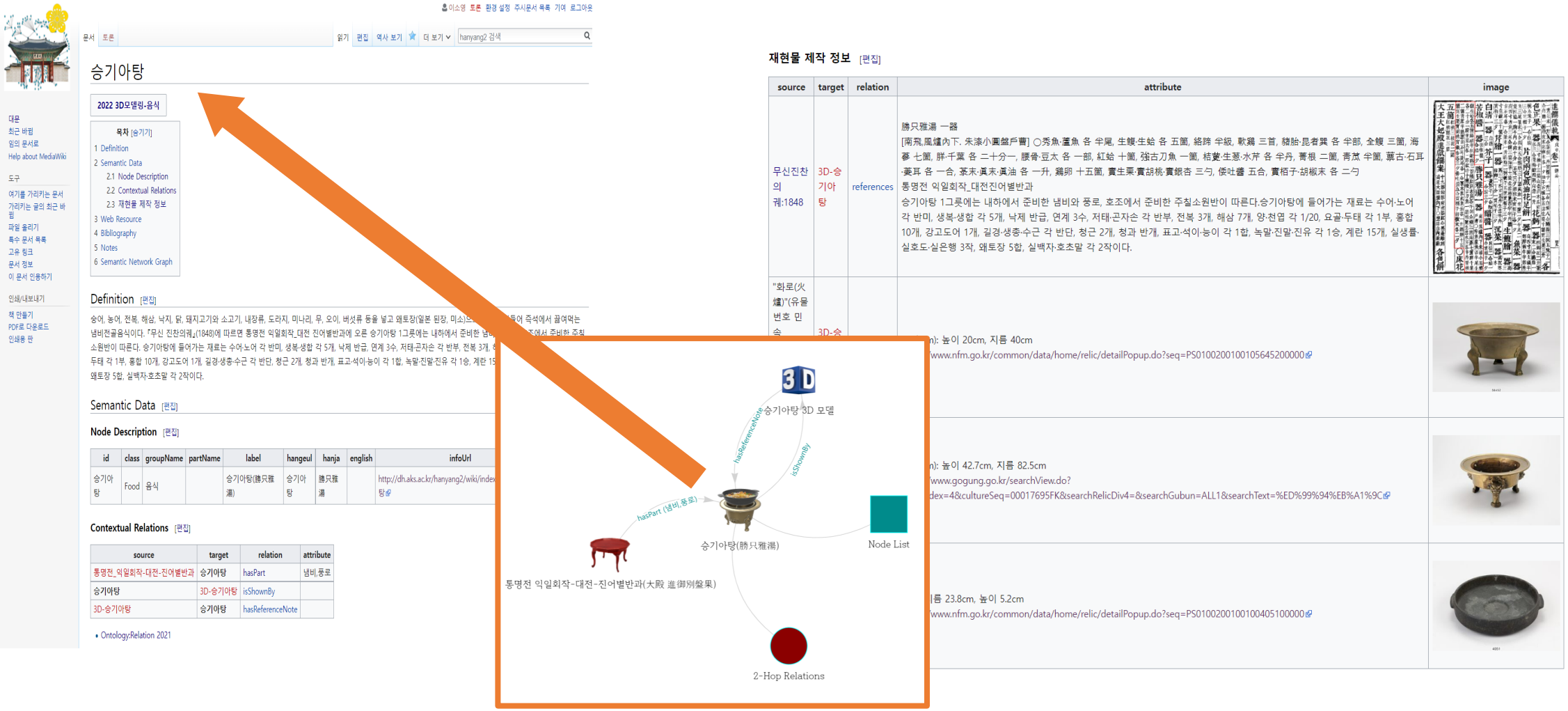
‘Food’ served at the Royal Feast in 1848*

❖ Hyperlink to 3D Model



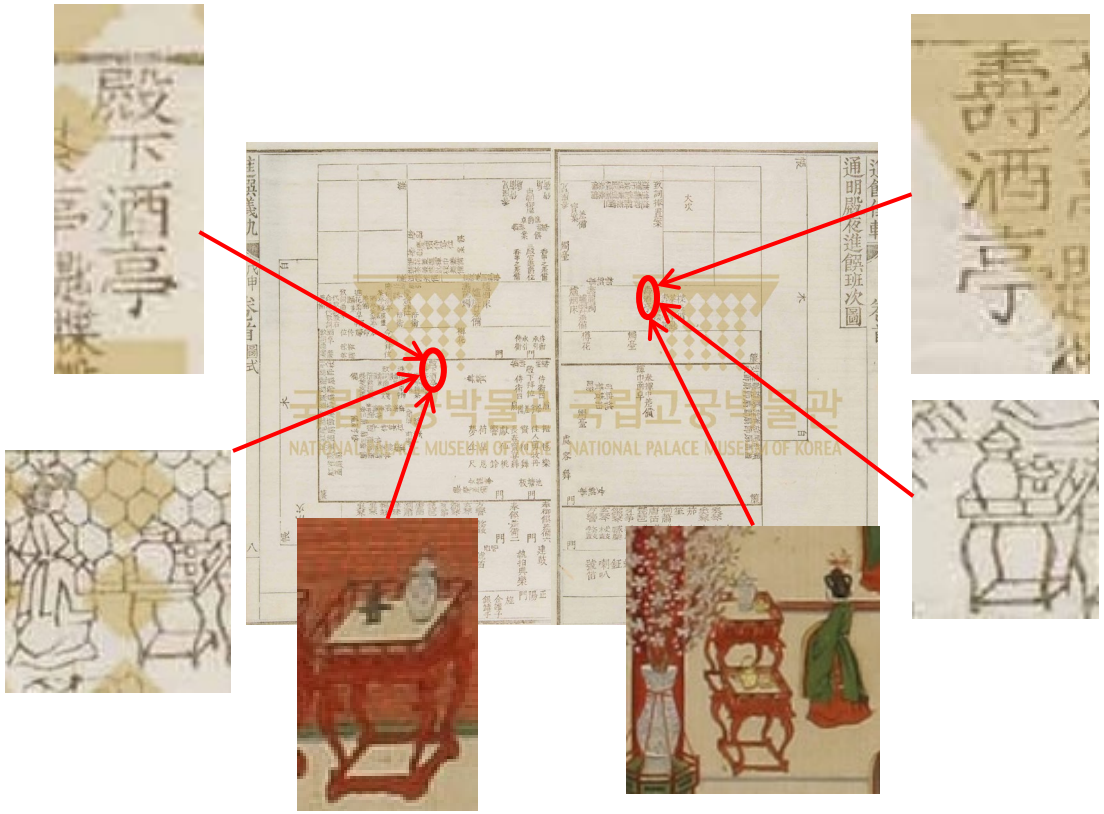
‘Food’ served at the Royal Feast in 1848

❖ Hyperlink to ‘Hanyang Time Machine Wiki’ Text



‘Object’ used at the Royal Feast in 1848*

❖ Source texts



『戊申進饌儀軌』

「戊申進饌圖屛」

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

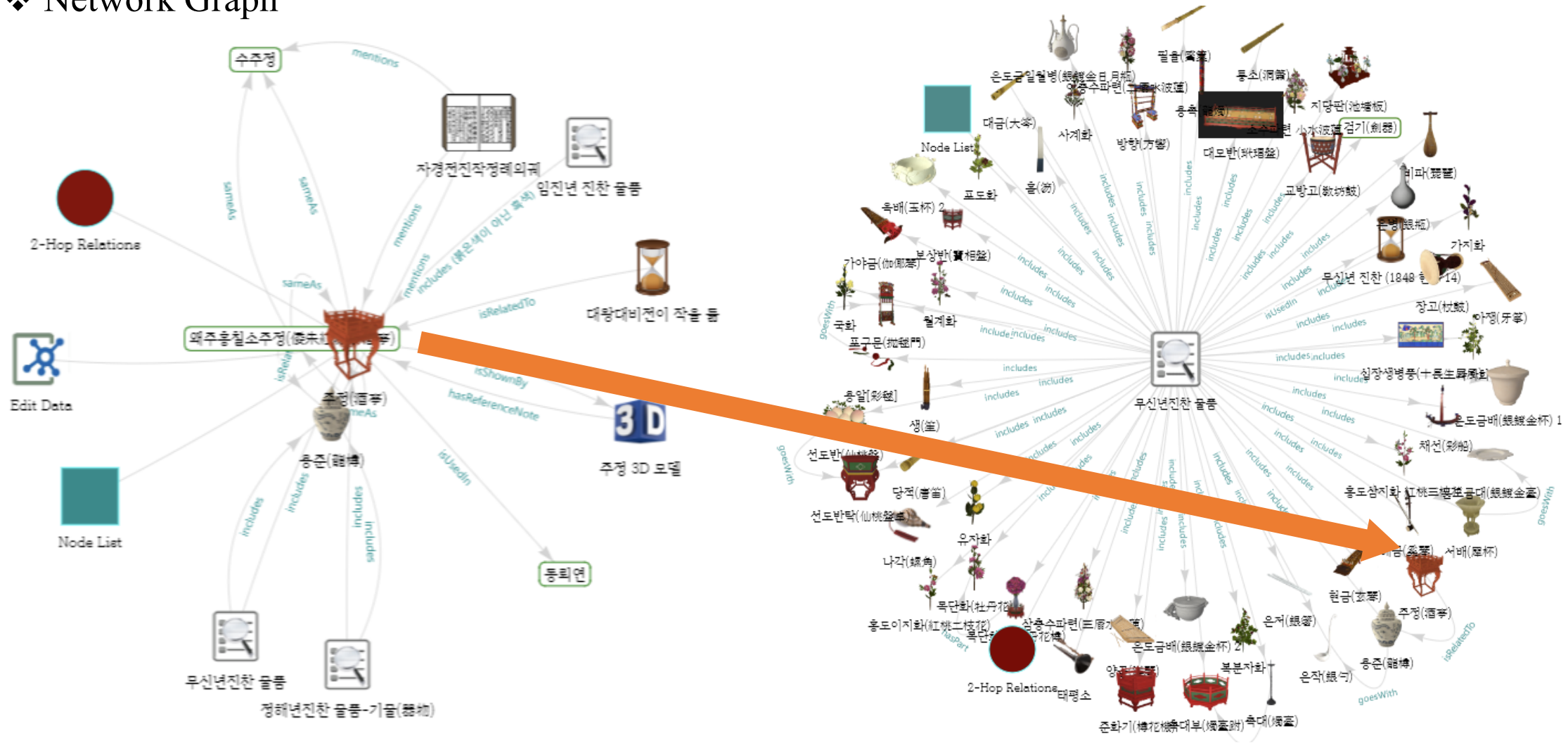
‘Object’ used at the Royal Feast in 1848

❖ Object properties for individual objects in ‘Object’ class

Relation	Domain	Range	Inverse Relation	Attribute	Note
isUsedIn	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
currentLocation	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

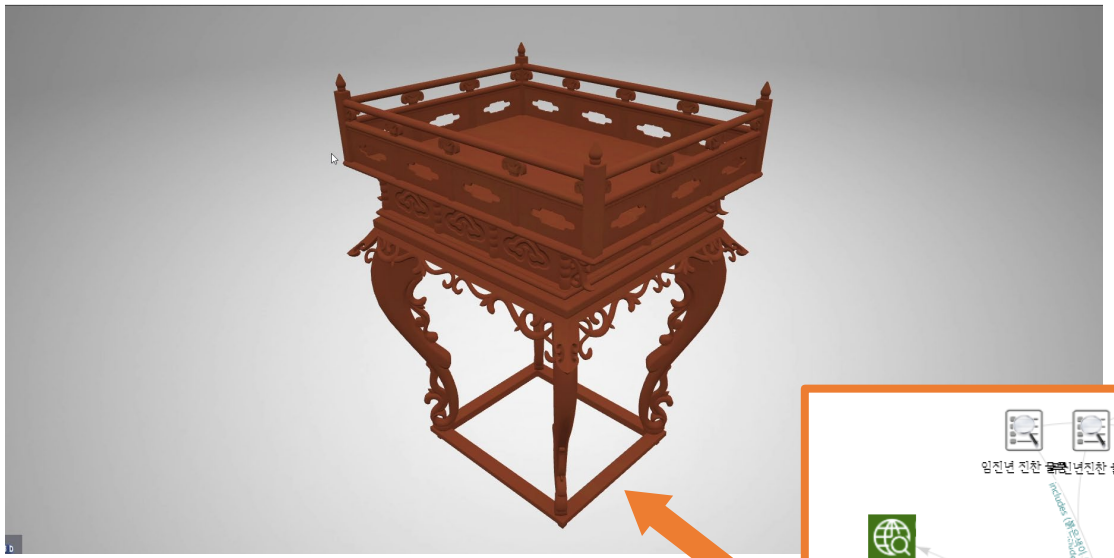
‘Object’ used at the Royal Feast in 1848

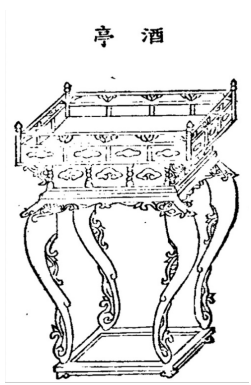
❖ Network Graph

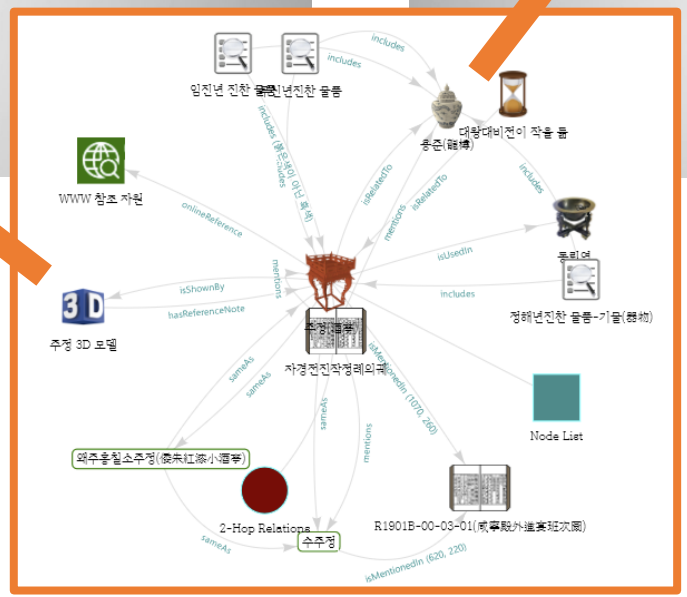


‘Object’ used at the Royal Feast in 1848

❖ Hyperlink to 3D Model

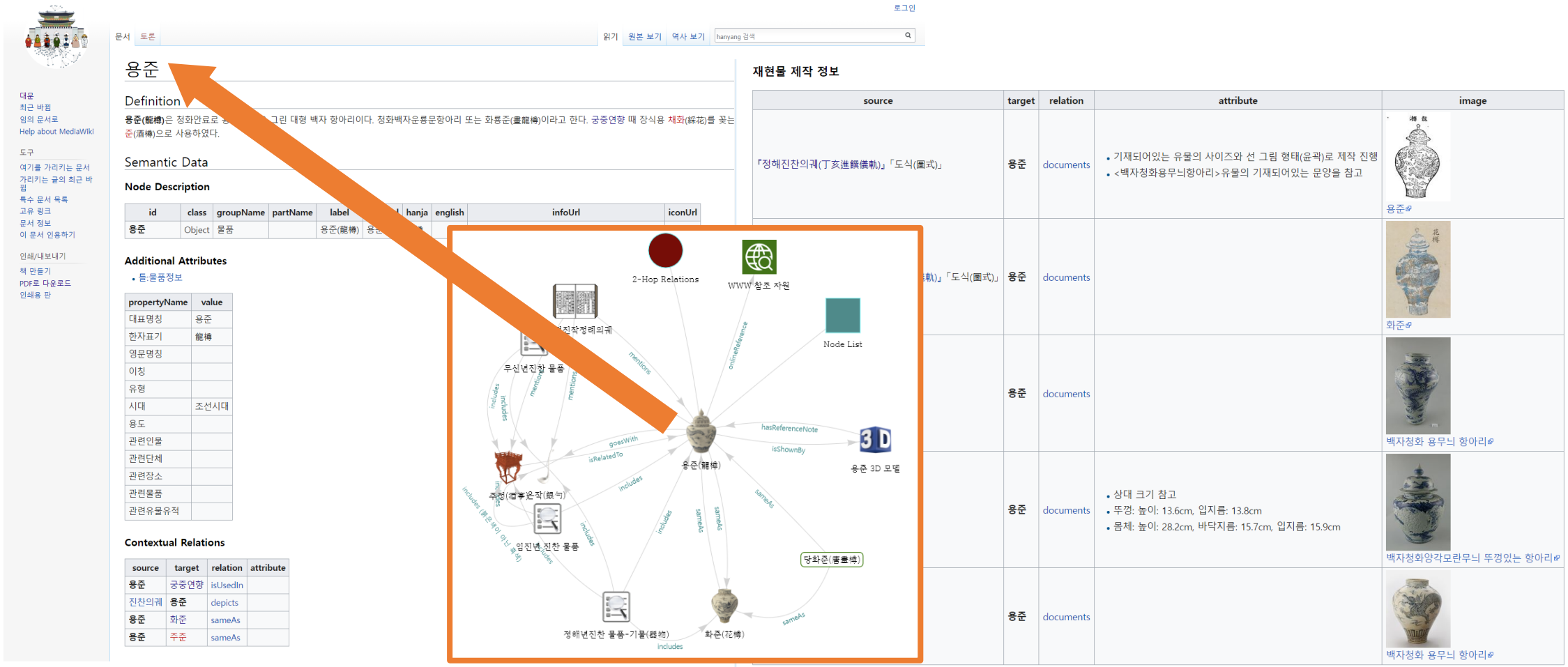






‘Object’ used at the Royal Feast in 1848

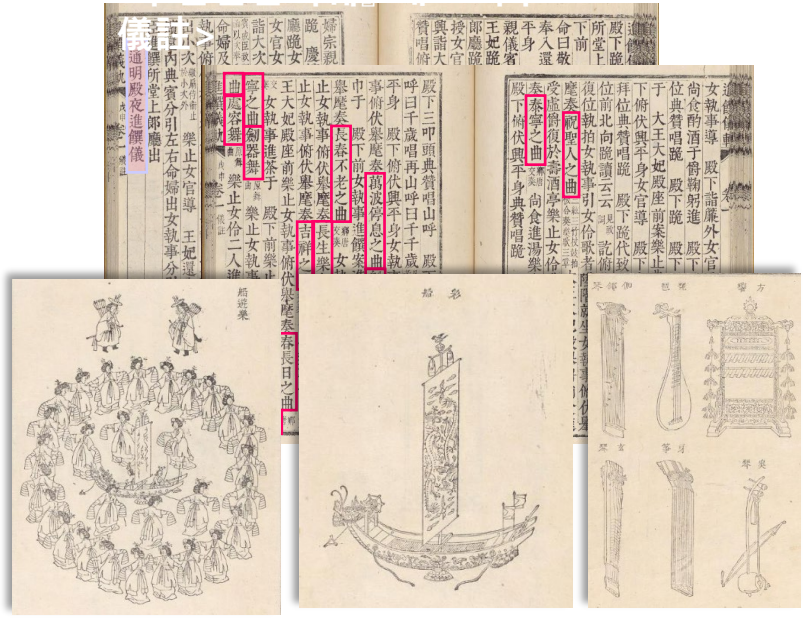
❖ Hyperlink to ‘Hanyang Time Machine Wiki’ Text



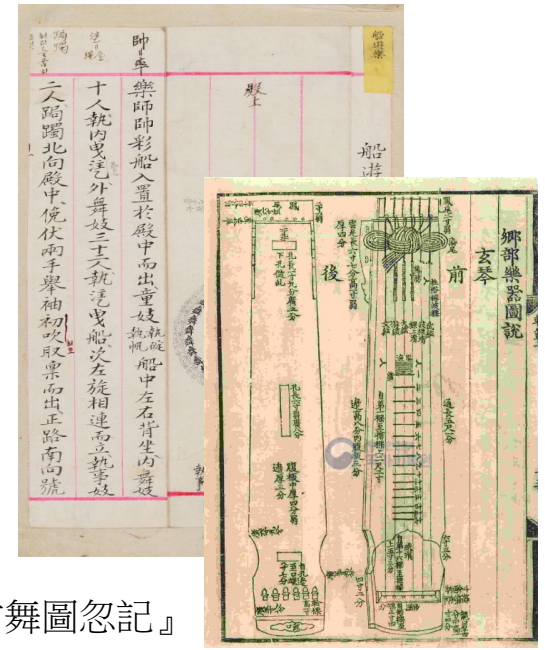
‘Work[performance]’ performed at the Royal Feast in 1848*

❖ 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」

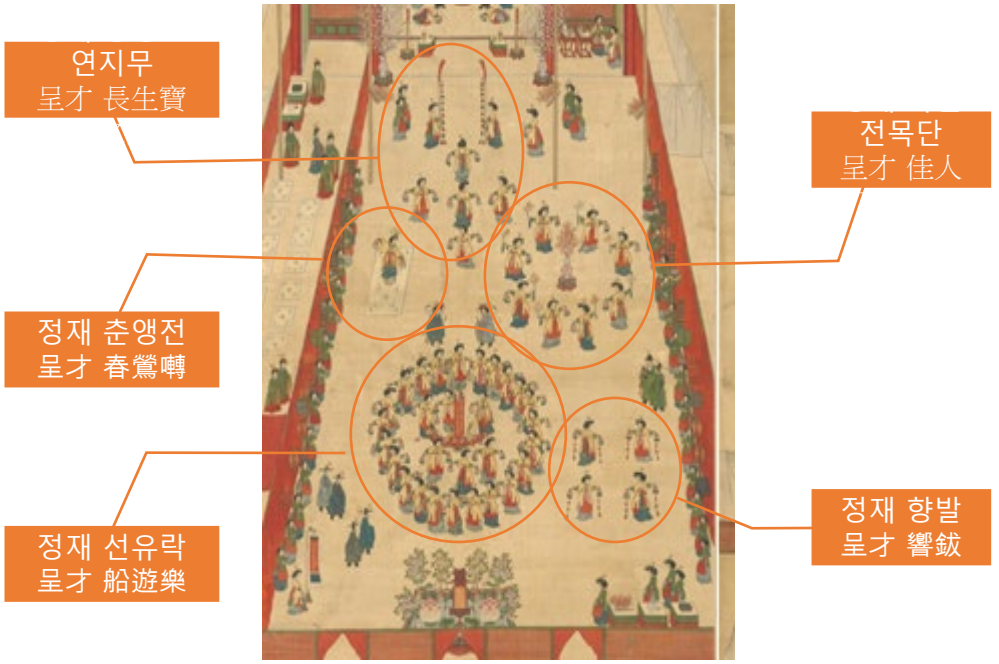


『戊申進饌儀軌』



『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

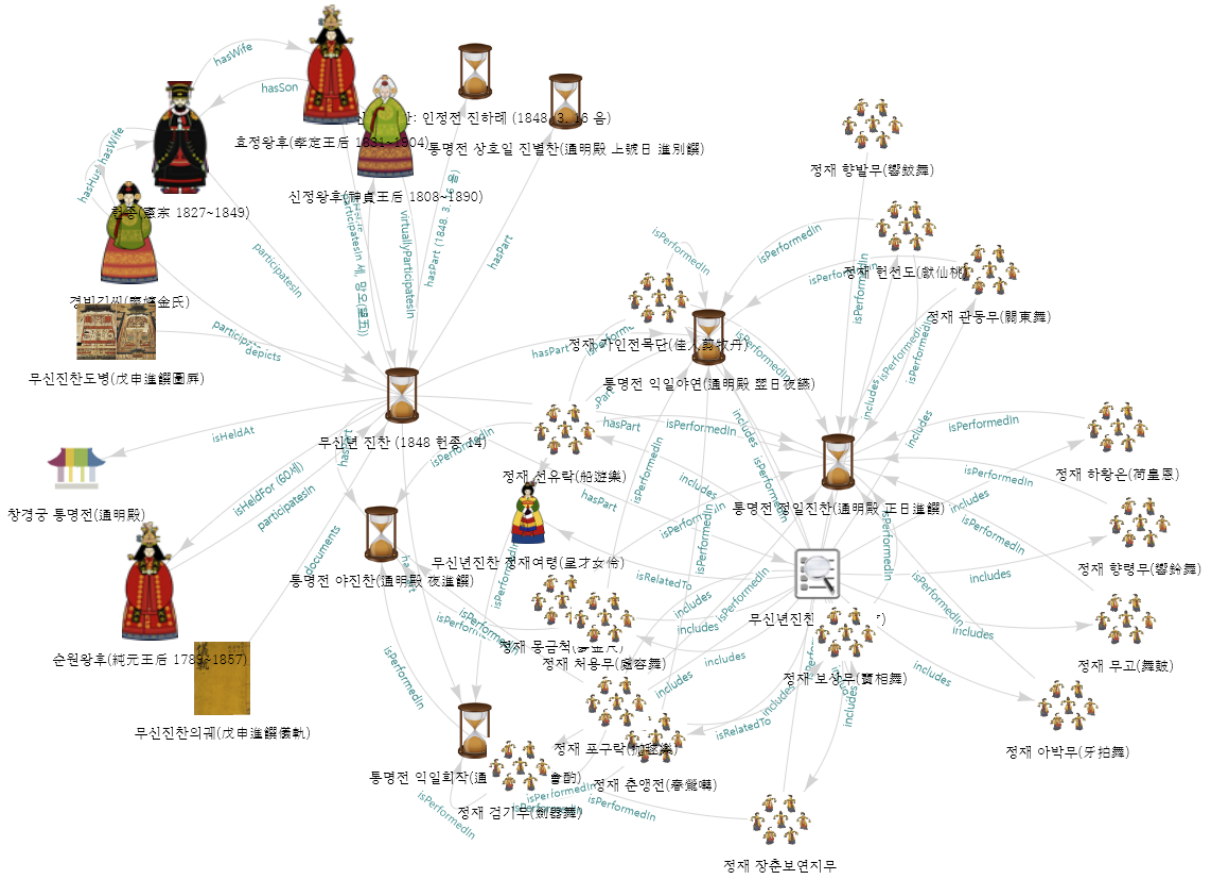
‘Work[performance]’ performed at the Royal Feast in 1848

❖ 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
plays	Actor	Object			[Actor] A plays in [Object:musical Instrument] B
isPreviousInSequenceTo	Event/Work/Concept	Event/Work/Concept	isNextInSequenceTo		A precedes B (in temporal or logical sequence)
isUsedIn	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

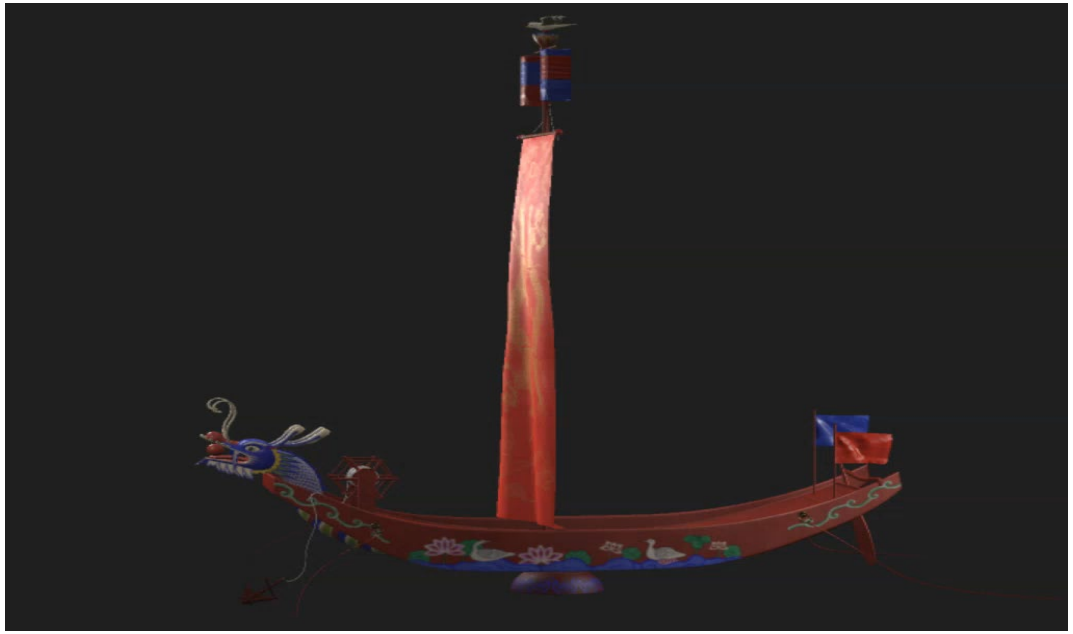
‘Work[performance]’ performed at the Royal Feast in 1848

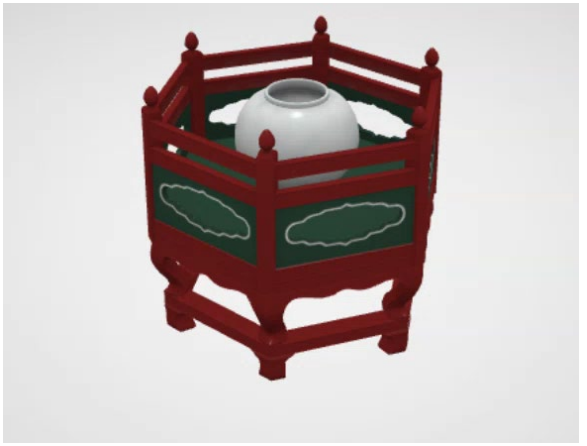
❖ Network Graph

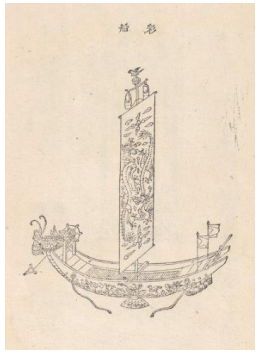


‘Work[performance]’ performed at the Royal Feast in 1848

❖ Hyperlink to 3D Model

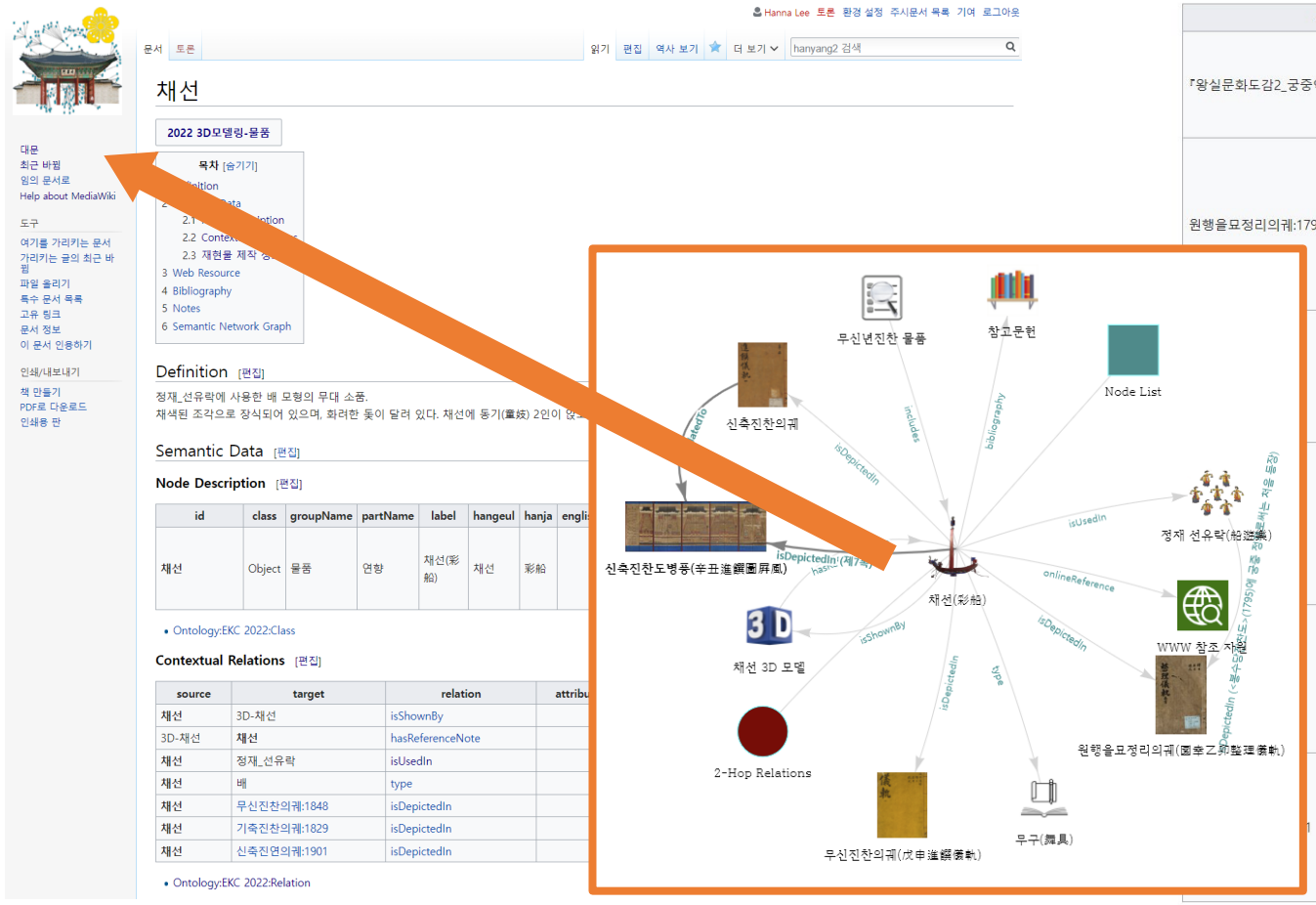






‘Work[performance]’ performed at the Royal Feast in 1848

❖ Hyperlink to ‘Hanyang Time Machine Wiki’ Text



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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. An ontology is a kind of blueprint for digital constructions.
- 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

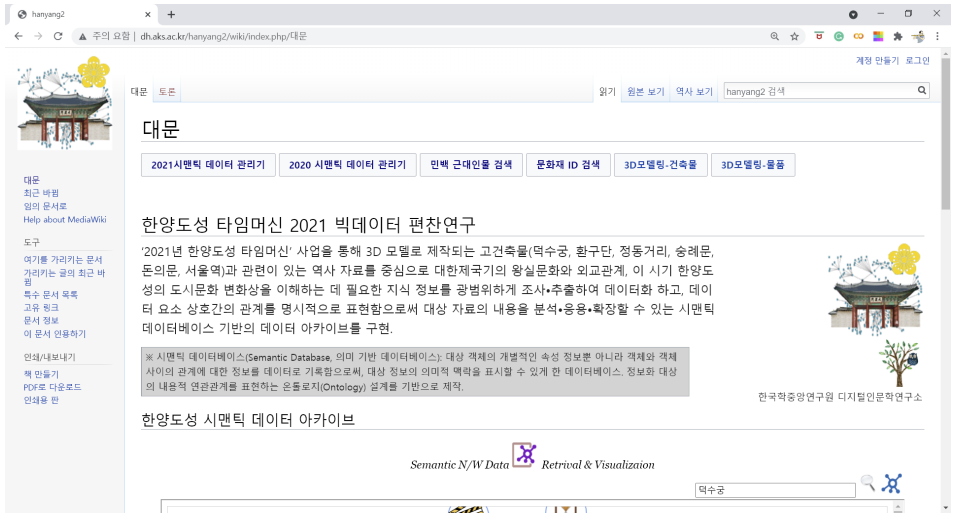
- The research team enacts a draft ontology to be applied to the data curation of a new project at the time when the basic research materials and story topics are selected.
- A task force is in charge of managing the ontology vocabulary—monitoring the use of ontology; determining, enacting, and disclosing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

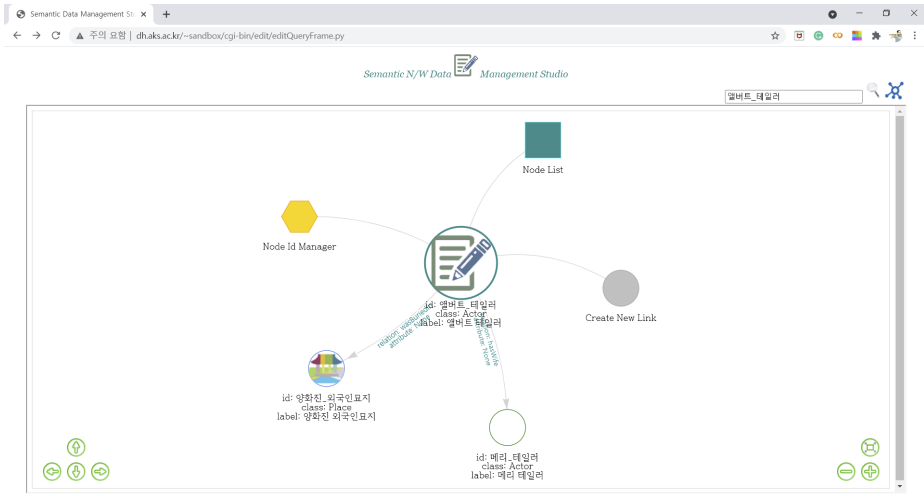
Class Design in the EKC Data Model v. 2022

Object Properties in the EKC Data Model v. 2022

Data Curation Support Systems

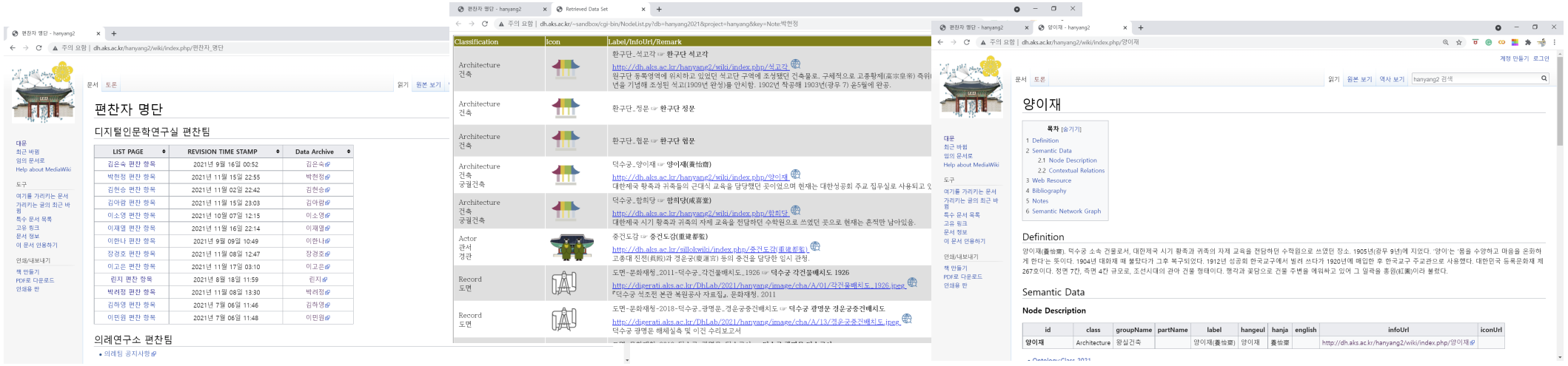
- Center for Digital Humanities at AKS developed digital-based research support systems and conducted data compilation work in that environment.
- There are two support systems that we used for collaborative data curation.
  - ✓ Hanyang Time Machine Wiki
  - ✓ Semantic data management software





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.

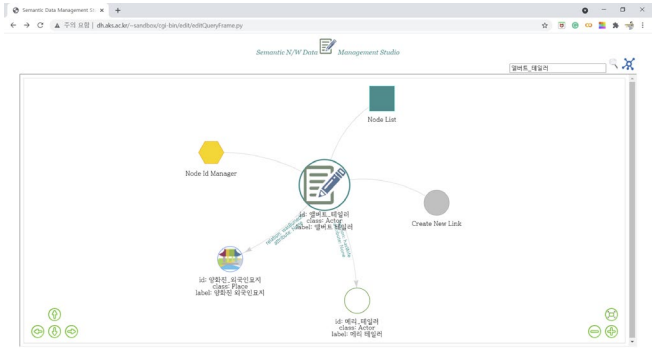


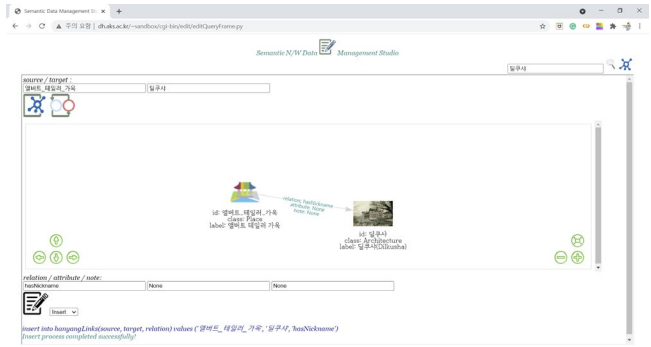
Network Data Management Software

- 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):**

1) 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





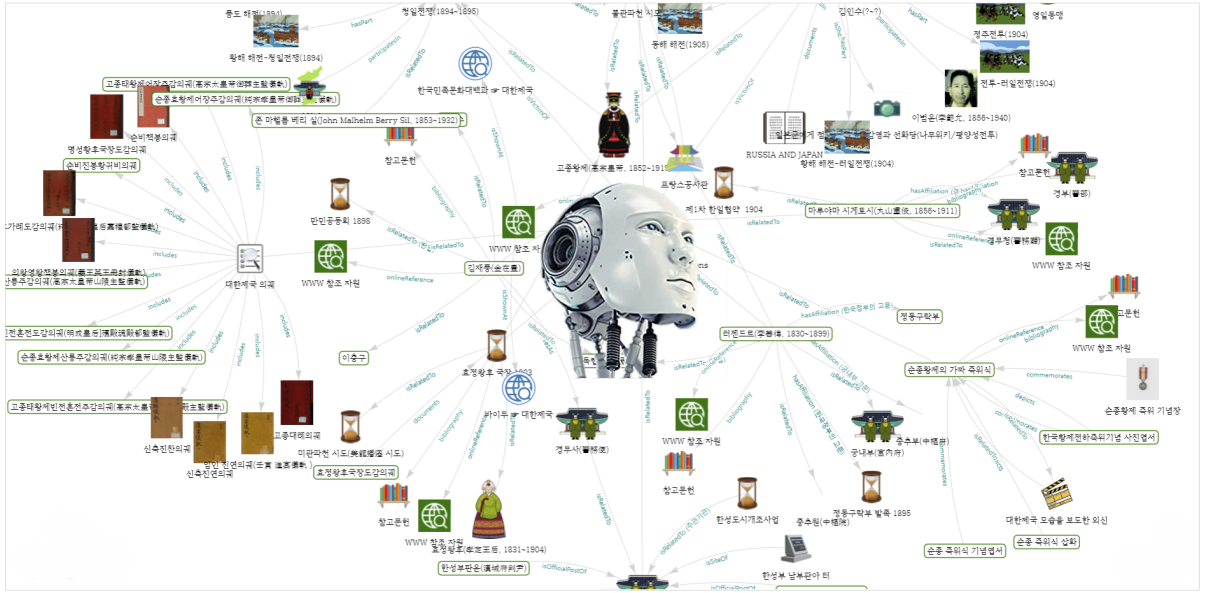
RDF Data Creation

- 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. (Cultural Heritage Administration 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.

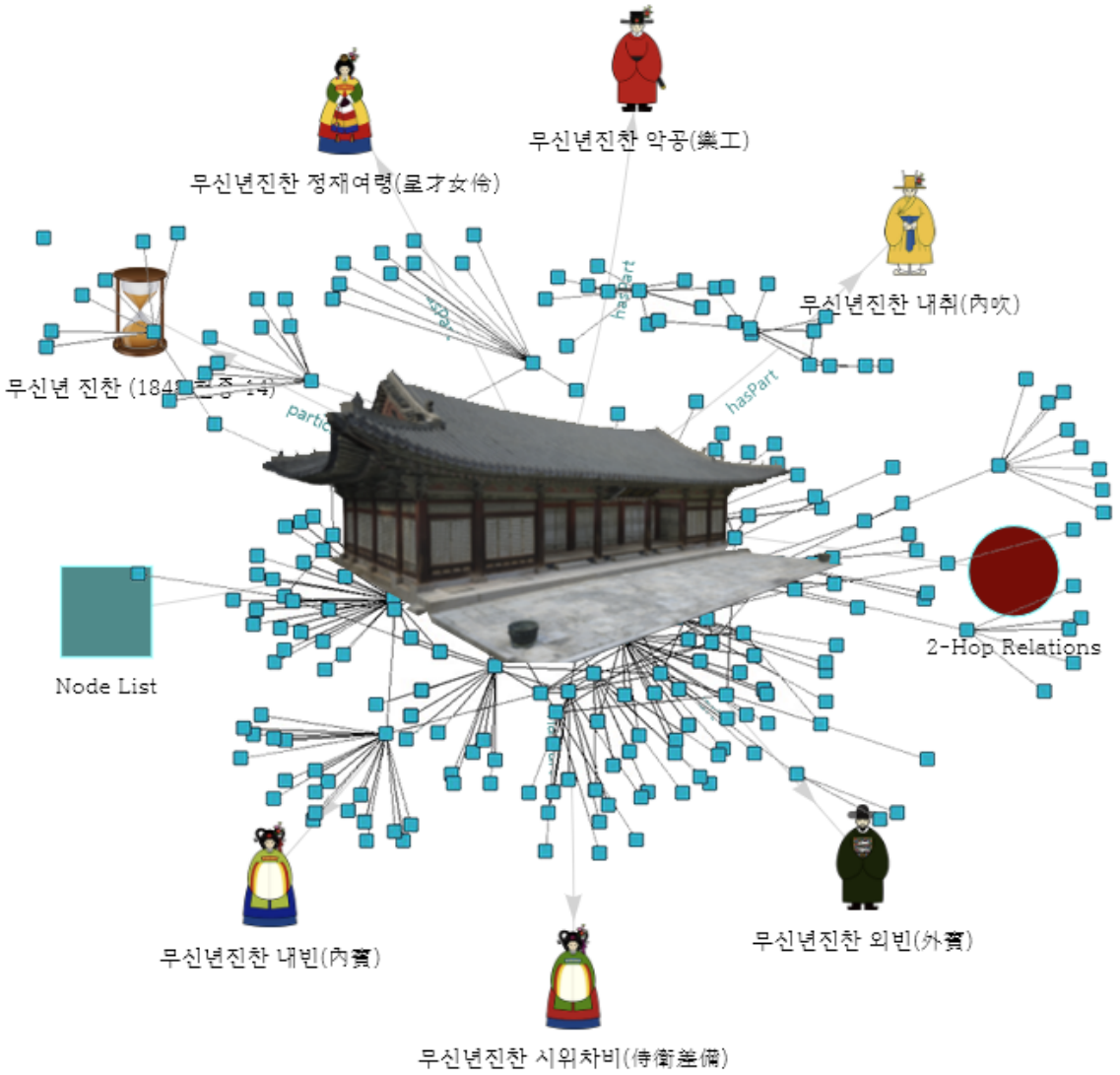


Data Curation: A Humanities Education Method for Digital Natives

- 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.


무신년진찬 정재여령(呈才女伶)
무신년진찬 악공(樂工)
무신년 진찬 (184
hasPart
hasPart
무신년진찬 내취(內吹)
Node List
2-Hop Relations
무신년진찬 내빈(內賓)
무신년진찬 외빈(外賓)
무신년진찬 시위차비(侍衛差備)

Thank You!