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Database Design for a Hanbok Data Archive: Focused on the Seok Juseon Memorial Museum Collection of Dankook University

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Abstract

This study aims to design a relational database (RDB) structure for the systematic management and academic utilization of hanbok (traditional Korean clothing) artifacts based on collection data from the Seok Juseon Memorial Museum at Dankook University. Joseon Dynasty costume artifacts serve as important historical materials reflecting Korean traditional culture, temporal transitions, and lifestyle patterns. However, artifact information is currently managed individually by each museum, making integrated and in-depth exploration challenging. Particularly, the absence of detailed search functions specialized for the costume domain and non-standardized metadata have led to constraints in academic utilization. To address these limitations, this study structured the data by assigning standardized values to detailed attributes reflecting hanbok characteristics, such as *git* (collar), sleeve, pattern, *mu*, and *ba-dae* (linings). A metadata system capable of tracking the provenience of both excavated and transmitted artifacts was designed. To represent semantic relationships between artifacts and their historical and cultural contexts, a Resource Description Framework (RDF) triple structure was implemented. The constructed database enables linked exploration of temporal characteristics, detailed attributes, and provenance information through complex queries, thereby validating structural consistency and usability. This study presents a practical database design model for the preservation and digital archiving of hanbok artifacts, thus contributing to advances in digital humanities research in cultural heritage.

1. Introduction

Hanbok (synonymous with Korean traditional clothing, encompassing all traditional garments historically accumulated and preserved in Korea to the present day) represents one of Korea’s most significant cultural heritage assets. Culture can be traced through daily life elements such as clothing, food, and shelter, among which clothing (衣) corresponds to hanbok as Korean traditional dress. Hanbok artifacts possess substantial academic value for Korean historical and cultural research. However, the necessity of consulting diverse sources including museum collections, exhibition catalogs, excavation reports, and historical documents to verify specific information increases the complexity of hanbok research.

Currently, domestic museums manage their artifact collections individually, requiring researchers and general users to visit each institution’s website separately. Furthermore, the absence of detailed search functions based on hanbok characteristics (e.g., detailed material and pattern specifications including *git* (collar), *mu* (design motifs), *ba-dae* (linings), fabric structure, and insufficient metadata standardization create limitations in exploring in-depth information about hanbok. Therefore, a data archive that can systematically integrate detailed attribute information and excavation data of hanbok artifacts is essential. The construction of an integrated platform that supports in-depth information exploration and academic utilization of hanbok artifacts through database design based on specialized costume knowledge is required.

Therefore, this study establishes core criteria for database design based on user requirements considering systematic management and research utilization of hanbok artifacts, and proposes an integrated and scalable relational database (RDB) structure. Most importantly, considering that hanbok artifact data constitutes an interconnected structure rather than a collection of individual information, clearly defining relationships between data and explaining these connections is crucial. However, while RDB ensures connectivity between entity relationships, logical explanations of such connections may be limited. To address this limitation, this study applies Resource Description Framework (RDF) triple structures as a complementary approach, thereby establishing a foundation for explaining the context and meaning between hanbok artifacts.

2. Related Work

2.1 Previous Studies in Digital Costume Archives

Research on the digitization and management of humanities data has advanced through various academic approaches and methodologies, with digital humanities gaining attention as an effort to explore humanistic knowledge and maximize its value through digital technologies (Kim, 2016). As part of this trend, various studies in the field of costume history have been conducted focusing on the digitization of hanbok, addressing not only visual representation but also data preservation and utilization possibilities.

Previous research efforts have primarily concentrated on visual digitization and basic database construction. Digital illustrations of wedding dress from Princess *Bokon* (福溫公主) have been implemented (Kim, 2014), while databases of Joseon Dynasty military clothing have been established using conventional file formats (Park, 2014). *Goguryeo* costume information has been designed as a relational database, demonstrating systematic management capabilities (Ahn, 2016). Additionally, metadata models for integrated management of diverse materials including excavation reports and historical documents have been proposed (Park, 2019).

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However, existing studies have primarily focused on database design concepts and metadata utilization methods for cultural heritage materials, with limited attention to practical implementation challenges. Research addressing data structuring based on domain-specific standardization and integrated management system construction remains insufficient. Particularly, empirical studies on detailed attribute management of hanbok artifacts and comprehensive information service development are lacking.

This study addresses these limitations by focusing on practical digital information service implementation and prototype development. The research aims to bridge the gap between conceptual database design and actual implementation by developing a user-centric system that maximizes search functionality and usability for hanbok artifact exploration.

2.2 Hanbok Artifact Information Services

The construction of comprehensive knowledge systems for integrated management has emerged as an important task since the late 2000s (Weikum et al., 2009), and the necessity of providing advanced search functions and intuitive interfaces in digital cultural heritage environments has been increasingly recognized. However, current museum collection information services are primarily limited to roles such as providing exhibition-related information, artifact introduction, promotion, and announcements, rather than offering systematic archive functions, presenting several limitations.

Some museums do not provide search filters, while e-museums support various search options but lack functionality for applying multiple items within individual filters or deselecting specific items from selected options (Yoo, 2023). Furthermore, even when utilizing detailed search functions through classification categories, costume information is distributed across various filters such as ‘clothing culture’, ‘social life/ceremonial life’, ‘religious beliefs’, ‘culture and arts’, and ‘military’, causing inconvenience for users conducting single keyword searches. As illustrated in Figure. 1, the composition and arrangement of search filters lack intuitiveness.

Figure 1. Filtering search interface for the eMuseum collection

The National Palace Museum subdivides categories into ‘costume’, ‘clothing’, and ‘royal costume’, but ambiguity in the classification system is evident, as shown in Figure. 2. The National Museum of Korea employs broad categories of ‘nationality/period’, ‘excavation site’, and ‘material’, but also lacks costume-specific attributes.

The Kyung Woon Museum supports keyword search functionality; however, as demonstrated in Figure. 3, data utilization is limited when searching for the broader term ‘silk’ does not retrieve results for specific silk-related materials.

Comprehensively, most museums categorize periods as ‘Joseon’, ‘Korean Empire’, ‘Japanese Colonial Period’, and ‘Post-

Figure 2. Retrieval system for the National Palace Museum collection demonstrating classification ambiguity in costume categories.

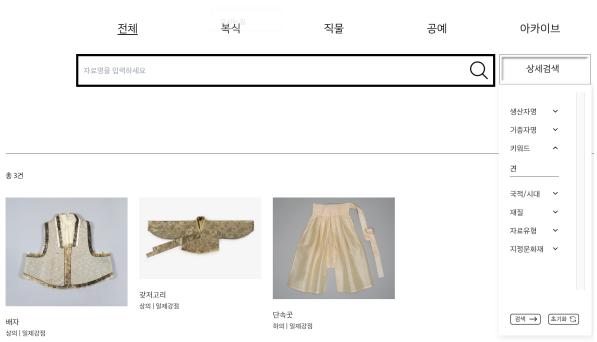

Figure 3. Search limitation example from Kyung Woon Museum showing restricted results when using broader material terms.

Liberation’, making it difficult to trace detailed changes in Joseon Dynasty excavated costumes. While textile types are distinguished, subdivision at the weave structure level (紗, 羅, 綾, 緞, etc.) is not implemented, presenting limitations for academic analysis. These systemic deficiencies highlight the need for domain-specific database structures that can accommodate the detailed attributes and complex relationships inherent in hanbok artifacts.

2.3 Seok Juseon Memorial Museum Collection Information Service

The Seok Juseon Memorial Museum at Dankook University, which serves as the research subject of this study, has contributed to the preservation and research of Korean history and culture since its establishment as the Central Museum in 1967. Following the donation of 3,365 artifacts by Dr. Seok Juseon in 1981, the museum has conducted distinguished research in traditional costume studies. In 1999, the Central Museum and Seok Juseon Memorial Folk Museum were integrated to develop into a comprehensive museum encompassing archaeology and costume fields. Currently housing approximately 40,000 artifacts, the collection includes 100 items designated as national heritage, including *Ahn Jung-geun*’s calligraphy (Treasure No. 569-21) and Princess *Deok-on*’s court robe (Important Folklore Cultural Heritage No. 1).

The Seok Juseon Memorial Museum maintains extensive collections spanning archaeology/art, folklore/costume, and rubbings, operating an online collection information service based on these materials, as shown in Figure. 4. Collection data comprises artifact photographs, collection classification, period, dimensions, and descriptions. However, several limitations are evident in terms of costume artifact exploration and utilization.

First, insufficient detailed search functionality is observed. While hanbok artifacts are categorized by period from Paleolithic to

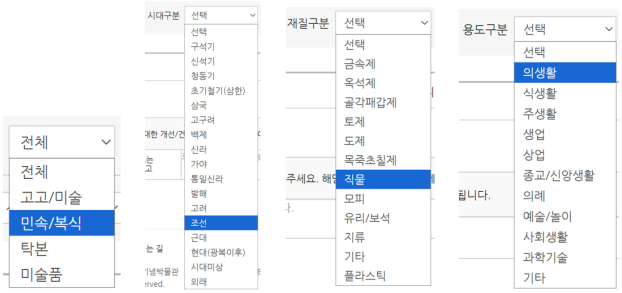

Figure 4. Retrieval system interface for the Seok Juseon Memorial Museum collection showing current search functionality and classification structure.

modern times, approximately 80% of hanbok artifacts are concentrated in the Joseon period category, resulting in overly broad classification. Despite most materials being textiles, they are comprehensively categorized alongside metallic, jade, and ceramic materials, without subdivision according to textile types or weave structures. Usage classification also presents limitations, with over 90% categorized as ‘clothing culture’, making it difficult to identify specific contexts and purposes.

Second, inconsistency in costume information classification is evident. While categories such as period, material, and usage appear intuitive, practical searching presents difficulties. For example, the complete set of gold-decorated court robes worn by late Joseon civil official *Sim Dong-sin* (沈東臣) includes ceremonial garments such as *jeokcho-ui*, *cheongcho-ui*, *hun-sang*, *hu-su*, and *pae-ok*. Despite being ceremonial costumes, these artifacts are not retrieved when searching under the ‘ceremony’ category, as demonstrated in Figure. 5.

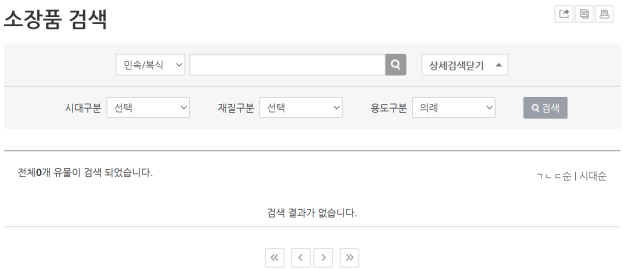

Figure 5. Search limitation example showing ceremonial costume artifacts not appearing in ceremony category results, highlighting classification inconsistency.

Third, the absence of multiple condition selection functionality is problematic. Users cannot simultaneously select multiple criteria, requiring repetitive searches to explore artifacts under various conditions.

These issues are not unique to the Seok Juseon Memorial Museum but are commonly observed across major domestic museum information services. Specifically, four critical limitations were identified: (1) limited data integration that fails to reflect interconnectivity among collection items, (2) restricted and inconsistent search functionality that does not meet user requirements, (3) reduced interoperability due to inconsistent metadata design across institutions, and (4) absence of costume-specific search functionality and multiple condition search capabilities. Consequently, this study aims to construct a database that enables efficient artifact searching based on hanbok-specific attributes.

3. Method

3.1 User Requirements for Hanbok Artifact Information Services

Museum artifact information has traditionally been classified according to broad categorical systems such as costume, painting, furniture, and documents. However, under current systems, efficient exploration of desired artifact information is challenging without precise knowledge of item names. For instance, searching for “costumes of the *Haepyeong Yun* clan” cannot yield results based solely on this keyword. Users can only obtain desired information when they know the specific costume worn by the *Haepyeong Yun* clan and when it matches the exact collection name in the database (e.g., embroidered *jeogori*).

To provide essential information required by users, primary user groups were identified, including costume scholars, graduate students, and museum curators. The anticipated user requirements encompass temporal characteristic analysis, excavated costume information provision, comparative and statistical analysis among artifacts, and hanbok attribute-based search functionality.

To fulfill these functional requirements, integration between visual elements of the user interface and structured data is essential. A systematic approach to user requirement analysis was conducted through consultation with domain experts and review of existing research methodologies in digital cultural heritage systems. The identified requirements include temporal analysis capabilities for examining stylistic changes and characteristics across different historical periods, particularly within the Joseon Dynasty which constitutes the majority of the collection. Additionally, detailed excavation context information including burial sites, associated artifacts, and provenance data is crucial for academic research and authentication purposes. Statistical comparison capabilities among artifacts based on various attributes such as construction techniques, materials, and decorative elements are essential for scholarly investigation. Advanced search functionality incorporating hanbok-specific characteristics including collar types, sleeve configurations, decorative patterns, and construction details represents a critical requirement for specialized research applications.

Accordingly, a web interface design incorporating detailed search and multiple condition selection functionality is presented in Figure. 6, proposing the design direction for the hanbok artifact database.

The proposed interface design addresses the limitations identified in existing systems by providing intuitive navigation, comprehensive filtering options, and seamless integration of visual and textual information. This approach forms the foundation for the subsequent database structure design and implementation strategy.

3.2 Database Design for Seok Juseon Memorial Museum Collections

This study targeted 355 costume artifacts from the 449 ’folklore/costume’ collections published on the Dankook University Seok Juseon Memorial Museum website as of October 2024, excluding folklore items such as scissors and bone needles. The database design was based solely on information recorded in the detailed collection pages, supplemented when necessary by

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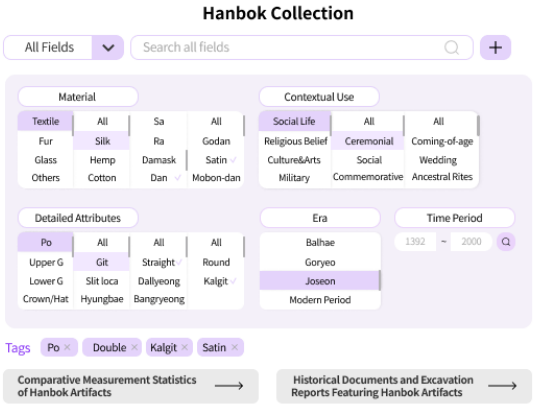

Figure 6. Researcher-designed web interface for hanbok artifact analysis and search, implemented with Figma, demonstrating advanced filtering and multi-criteria selection capabilities.

reliable sources such as the National Institute of Korean History database. For instance, since chronological estimation represents a critical attribute, missing information regarding royal birth and death dates in the person entity modeling process was supplemented using verified sources such as the “Annals of the Joseon Dynasty” database from the National Institute of Korean History. Additionally, data regarding costume characteristics such as color, patterns, git types, and sleeve configurations were added only when visually discernible.

Entity composition is summarized in Table 1, and the semantic relationships between entities are illustrated in Figure. 7. The term ‘relationship’ here represents semantic connections between entities rather than mathematical relations in the relational model.

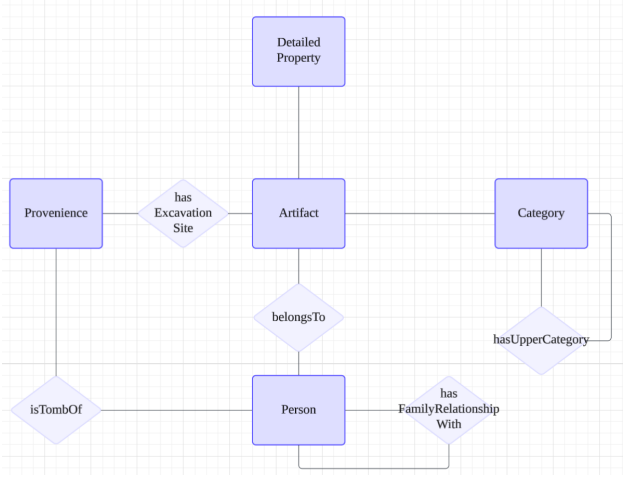

Figure 7. Researcher-designed entities and semantic relationships showing the interconnected structure of the hanbok artifact database.

Each entity was assigned semantic-based unique identifiers reflecting the characteristics and costume scholarly context of the respective objects, rather than simple sequential numbers. For example, artifact_id was generated by combining the collection institution and unique numbers extracted from the URL of the webpage where the artifact is registered, ensuring that the identifier itself contains provenience and contextual information.

The designed diagram (Figure. 7) was used as reference for understanding and adjusting the database structure. Following database construction, reverse engineering was performed to generate the final ERD presented in Figure. 8.

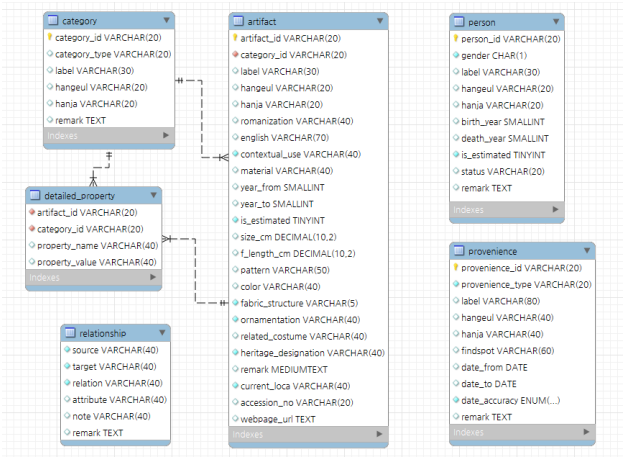

Figure 8. Entity Relationship Diagram created using MySQL Workbench, showing the implemented database structure

Due to space limitations, only selected key attributes are described in detail.

(1) **is_estimated** indicates whether artifact dating is estimated, set to ‘0’ (False) when both ‘year_from’ and ‘year_to’ are specified, and ‘1’ (True) when only one is specified or estimated periods such as ‘early Joseon’ or ‘late Joseon’ are recorded.

(2) **fabric_structure** represents structural characteristics of textiles, adopting the term ‘structure’ instead of the commonly used ’composition’ in costume studies, as terms like ‘layered’, ‘single’, and ‘quilted’ describe the framework formed by fabrics beyond simple material composition.

(3) **category_id** represents hanbok artifact categories based on several criteria: 1. *Han-sam* (汗衫) originated as court terminology for undergarments during the Joseon Dynasty, evolving into cylindrical fabric accessories worn around wrists in the late Joseon period. Current collections classify these as ‘*han-sam*_upper garment’ while allowing future expansion to ‘*han-sam*_accessory’. 2. *Kwaeja* (快子) was used as an alternative term for *jeonbok* (戰服) or *dapho* (搭護), with *jeonbok* renamed to *dapho* after the *Gapsin* coup(甲申政變, 1884). Considering structural similarities and mixed usage, the category was established centering on *dapho* to encompass *jeonbok* and *kwaeja*. 3. *Hakchang-ui* (academic robes with black lower borders), which served as daily ceremonial dress for scholars, expanded to middle garments worn under court robes and ceremonial dress after the 19th century. Therefore, *baekcho-ui* and *cheongcho-ui* are distinguished as ‘*baekcho-ui* (middle garment)’ and ‘*cheongcho-ui* (middle garment)’ respectively. 4. Items not directly included in the collection list but connected as ‘related_costume’ are included in the category.

(4) **category_type** is currently set to costume for all data, but was added to accommodate non-costume data such as historical documents and excavation reports considering database extensibility. Since hanbok artifacts have hierarchical structures like *jeogori*-type garments (*jeogori, dangui, jang-jeogori, gyeonmagi, jeoksam*, etc.), relationships between upper and lower level items are defined with the predicate ‘hasUpperCategory’ and managed through the ‘relationship’ entity.

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Entity	Table Comment
Artifact	Core entity storing collection artifacts, encompassing both transmitted and excavated costumes. Designed to manage costume categories and detailed attributes by costume type.
Category	Designed to systematically organize the broad categories of hanbok artifacts with hierarchical structure. Categories are limited to costume items appearing in the Seok Juseon Memorial Museum, defined based on artifact purpose and form.
Detailed Property	Includes detailed attributes for traditional costume items such as upper garments, robes, trousers, *hyungbae* (insignia), and accessories, providing a structure for systematic management of complex costume artifact data. Additionally, designed to allow easy expansion without requiring entity structure changes when new artifacts are added or attributes modified, constructed to enhance space utilization efficiency by including various attribute values within a single entity.
Person	Contains basic personal information, with related information accessible through the ‘relationship’ table.
Provenience	Designed to contain diverse and accurate source information, currently including ‘excavation’ and ‘donation’ as source types.
Relationship	Core entity designed based on ontology principles, adopting RDF triple structure to define interconnectivity between data elements. Three components are defined as entity attributes, with Source attribute performing the subject role, Target attribute the object role, and Relation attribute the predicate role in RDF triples. Predicate values include ‘hasUpperCategory’, ‘belongsTo’, ‘hasFamilyRelationshipWith’, ‘isTombOf’, and ‘hasExcavationSite’.

Table 1. Entity structure and descriptions for the hanbok artifact database.

(5) **contextual_use** represents artifact purpose, comprehensively expressing the context and usage of specific data or attributes. Special garments are designated by purpose only without separate costume item definitions according to established rules (e.g., *beop-ui* (法衣) for monks).

(6) **provenience_type** encompasses any source information regarding artifact location or origin, currently including ‘excavation’ and ‘donation’ as source types.

(7) **property_name** represents attributes that artifacts may possess (e.g., sleeve characteristics, fastening methods, *git*, trouser styles, *mu*, *ba-dae*, slit locations of *po*, *han-sam*, *hyungbae*).

3.3 Costume Terminology Standardization for Database Implementation

The data standardization process involves identifying and defining standard words, standard domains, standard codes, and standard terminology. This section specifically aimed at semantic standardization of standard words and standard terminology.

Based on the original collection descriptions from the Seok Juseon Memorial Museum website, it was confirmed that terms with identical meanings but recorded in different forms, as well as words with similar meanings, coexist within each attribute. This study collected original texts without separate processing or modification, but organized these terms to ensure consistency in semantic interpretation and analysis.

Following the restructuring of materials according to entities and attributes defined in the ERD of Figure. 8, duplicate or similar words were identified in the ‘contextual use’, ‘size’, ‘material’, ‘pattern’, ‘color’, ‘fabric structure’, ‘ornamentation’, and ‘property value’ columns, which could cause confusion in the interpretation process of artifact data. Accordingly, metadata preprocessing was performed by maintaining the data structure while replacing only data values with standardized terminology. The terminology standardization work was conducted by defining rules based on “Traditional Colors of Korea”, “Five Thousand Years of Korean Textiles”, and related previous studies, with consultation from Professor Yeon-Woo Choi of the Department of Traditional Costume at Dankook University.

Due to space limitations, only major rules are presented as follows, rather than describing all standardization rules in detail.

(1) **Material** was recorded based on outer fabric, with mandatory specification when fur was included. For costume items other than upper and lower garments, all materials were recorded.

(2) **Pattern** recorded only patterns appearing on the base fabric, with combined patterns separated into individual patterns when two or more were combined. For example, *jeoplyu-mun* (butterfly and pomegranate pattern) was recorded as *jeop-mun* (butterfly pattern) and *seokryu-mun* (pomegranate pattern).

(3) **Size** was recorded focusing on artifact length, height, and vertical measurements, applying item-specific criteria. Upper garments, lower garments, shoes, and socks were recorded based on length, while skirts were recorded as total length excluding the skirt band. For front-short-back-long (前短後長) or front-long-back-short (前長後短) configurations, back length was used as the standard, and headwear was recorded based on horizontal length or circumference.

(4) **Color** was organized from outer fabric by area proportion (e.g., body → *gyeonmagi* → *kkeutdong* (cuffs) → ties), with *dongjeong* (white collar trim) added only when not white. When colors were not specified, only visually identifiable colors were recorded and for excavated artifacts with no remaining color, ‘*sang-saek*’ meaning faded yellowish color was applied. Furthermore, according to “Traditional Colors of Korea”, *durok-saek* is classified as a yellow series color; however, Princess *Deok-on*’s *Dang-ui* and *Jang-ot* (Figure. 9) are recorded as durok-saek but appear closer to light green in modern terms based on photographic evidence. Since light green refers to pale green, researchers determine and record the appropriate color between green and yellow based on photographic assessment. The same approach applies to *geumhyang-saek*.

(5) The rules for **contextual use** are as follows: 1. *Sahyang* (麝香) is used for both medicinal and fragrance purposes, so both uses are reflected. 2. Decorative use is not included in the accessory category and is classified as such only when decorative function is emphasized as an accessory. 3. Children’s clothing inherently contains prayer attributes by manufacturing purpose,

Figure 9. *Dang-ui*(Ceremonial long Jacket of Princess) *Deok-on*) on the left, *Jang-ot*(Coat-Style-Veil) on the right, Seok Juseon Memorial Museum

so ‘prayer use’ is not separately specified. 4. *Jobok* (official’s red silk robe) is not limited to court attendance use, so it is used as a term referring to the complete set of *jobok*.

This systematic terminology standardization ensures data consistency while preserving the semantic richness and cultural specificity inherent in traditional Korean costume terminology. The standardized vocabulary serves as the foundation for accurate data retrieval and meaningful cross-artifact comparisons within the database system.

4. Results

4.1 Database Schema Design

To ensure data accuracy and consistency, key artifact characteristics-such as colors, patterns, and *git* types were systematically organized and entered into the database. The database was constructed and populated using MySQL and Heidi SQL. In this implementation, entities were mapped to tables, attributes to columns, and rows to tuples. Although table names are typically formed by combining subject area abbreviations or standard word abbreviations for entity names, this study adopted the approach of using entity names and attribute names directly to provide intuitive understanding. The column names, data types, key constraints, and relationships of the generated tables can be verified in Figure. 8.

The database schema was implemented in accordance with established relational design principles, while specifically addressing the requirements of hanbok artifact management. Each table was designed with appropriate primary keys, foreign key relationships, and data type specifications to maintain data integrity throughout the system. The naming convention prioritized clarity and user comprehension over conventional abbreviation practices, facilitating easier maintenance and future development by domain experts who may not possess extensive database administration experience.

4.2 Management System for Detailed Attribute Information

While this study targeted collections cataloged on the Seok Juseon Memorial Museum website, extensibility was considered to accommodate other types of artifacts beyond costumes. Specifically, columns such as category_type, property_name, and property_value support integration across various data types, enabling data management through the creation of ‘views’, ‘common table expressions (CTE)’, or physical tables as needed. For example, by utilizing MAX(CASE WHEN ...) statements to pivot values corresponding to property_name into attribute-based column formats, representative values for each attribute can be aggregated to generate virtual entity tables.

Using this approach, virtual table configurations become possible, such as a virtual ‘upper garment’ table composed of columns including ‘*git*’, ‘sleeve classification’, ‘sleeve characteristics’, ‘fastening method’, ‘width_cm’, and ‘*hwajang*_cm’, and a virtual ‘*po*’ table containing ‘slit_cm’, ‘slit_loca’, ‘*mu*’, ‘*hyungbae*’, and ‘*han-sam*’. This structure enables processing and analysis of characteristic information from various artifact groups in an attribute-centered normalized format, providing advantageous approaches in terms of data expansion and query efficiency.

The implemented management system demonstrates several key advantages for cultural heritage data organization. First, the attribute-value pair structure maintains flexibility while preserving semantic relationships between costume characteristics. Second, the pivot functionality enables dynamic reconstruction of traditional tabular views without compromising the underlying normalized structure. Third, the extensible design accommodates future incorporation of additional artifact categories and their specific attributes without requiring fundamental schema modifications. This approach effectively balances the need for structured data organization with the inherent complexity and variability of cultural heritage information, providing a robust foundation for both current operations and future system evolution.

4.3 Database Requirements Verification through Query-based Analysis

To verify whether the constructed database meets user requirements, representative user question scenarios were established and actual queries were written. Specifically, for scenarios such as ‘excavation site and tomb owner information for specific items (e.g., shoes)’ and ‘distribution status of 17th century excavated costumes with clearly identified tomb owners’, JOIN and GROUP BY statements were utilized based on ‘hasExcavationSite’ and ‘belongsTo’ relationships. The results of the first scenario using SQL are shown in Table 2, and Figure. 10 presents the visualization of the second scenario’s results [3] through a pie chart using Grafana (open-source analytics and interactive visualization web application). Both experiments demonstrate that the constructed database effectively supports detailed information provision through complex search conditions and visual data analysis.

The query-based verification demonstrates the database’s capability to handle complex relational queries effectively. The first scenario successfully retrieved comprehensive information linking specific artifact categories with their excavation contexts and associated historical figures. The second scenario enabled statistical analysis and visualization of temporal distributions, proving the system’s utility for scholarly research applications. These results confirm that the semantic relationship structure implemented through RDF triples effectively supports both detailed information retrieval and aggregate data analysis requirements identified during the user requirement analysis phase.

5. Conclusion

For systematic management and utilization of costume history research, this study standardized common characteristics of hanbok artifacts (purpose, size, material, pattern, color, etc.) and

[1] The year indicated after each person’s name refers to the year of death (沒年).

Category_id	Artifact_id	Label	Hanja	Source	Find Spot	Related Person	Relation
Category: Shin	Seokjuseon-B009345	Shin	鞋	Tomb of the Gangneung Kim clan	San 17, Isadong, Dong-gu, Daejeon, South Korea	Kim of Gangneung (d. 1520)	Tomb owner
Category: Shin	Seokjuseon-B010319	Jipsin	草履	Tomb of the Gobu Yi clan	Bonghwang-ri, Dongjin-myeon, Buan-gun, Jeollabuk-do, South Korea	Yi of Gobu (d. 1620)	Tomb owner
Category: Hye	Seokjuseon-B008878	Unhye	雲鞋	Tomb of Lee Ik-jeong	Sangam-dong, Mapo-gu, Seoul, South Korea	Lee Ik-jeong (d. 1782)	Tomb owner
Category: Hwa	Seokjuseon-B009139	Hwa	靴	Tomb of Lee Ik	Sangam-dong, Mapo-gu, Seoul, South Korea	Lee Ik (d. 1746)	Tomb owner

Table 2. Query results showing footwear artifacts with excavation sites and related person information.

Person	Count	Percentage
Haepyeong Yun-1701[1]	15	22.1%
Shin Gyeongyu-1633	10	14.7%
Lee Ik-1746	10	14.7%
Sunheung Ahn-1609	6	8.8%
Gobu Lee-1620	5	7.4%
Kang Daeho-1624	3	4.4%
Yun Seoneon-1628	3	4.4%
Lee Ikjeong-1782	3	4.4%
Pyeongyang Jo-1620	3	4.4%
Namyang Hong-1584	2	2.9%
Song Siyeol-1689	2	2.9%
Lee Byeon-1731	2	2.9%
Munhwa Yu-1685	1	1.5%
Lee Heonchung-1603	1	1.5%
Lee Hongmang-1637	1	1.5%
Jeong Yangwoo-1647	1	1.5%
Total	**68**	**100%**

Table 3. Distribution of 17th century excavated costume artifacts by tomb owner.

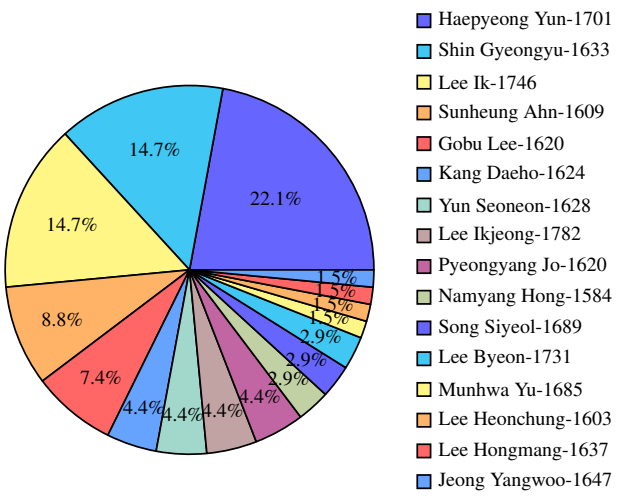

Figure 10. Distribution of 17th-century excavated hanbok artifacts by tomb owner. The chart was originally generated via Grafana linked to the artifact database, but reproduced in LaTeX for publication due to localization limitations.

designed a system that enables detailed searches through attributes differentiated by item type (*git*, sleeve, *mu*, *ba-dae*, etc.). Furthermore, the system implements provenience management and establishes semantic linkages between data through relation columns that perform predicate roles in RDF triple structures. This supports complex searches across various attributes and conditions while enabling flexible responses to the addition and modification of new attributes.

This database not only enhances data management and search efficiency for hanbok artifacts but is also extensible as a digital management system for other types of artifacts, and is expected to contribute to the activation of costume data-based research in the future.

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