

# Korean Culture and Arts Information Network

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## Introduction

The Korean Culture & Arts Information Network (KCAIN) deals with information on cultural-artistic activities in Korea, and allows us to share this information both nationally and internationally with ease through computer and communication technology.

The purposes of KCAIN are:

**Conservation of cultural-artistic information.** Cultural assets are very important components in ensuring and developing a sense of national identity. However, in spite of this importance, it is difficult to conserve these assets. In the case of performances and non-artefactual cultural assets, information is apt to disappear almost immediately after the initial performance. The same is true of "corporeal" cultural properties, since they are vulnerable to the ravages of time and the elements. Like other historical resources, the use of an original is extremely limited because of the possibility of damage or destruction. Furthermore, the duplication of an original is very often legally prohibited. Furthermore, if an original is destroyed partially or totally, it is almost impossible to recover. Unlike scientific or industrial properties, cultural properties become more valuable with age.

**Availabilty of cultural-artistic information.** It is difficult to access the cultural properties because of their uniqueness and rareness. So, the use of those properties is limited to some particular locations or persons, and the information for research and education is not sufficiently available to many other concerned people. It is thus necessary to meet the need of availabilty using such information regardless of time and place.

Expected advantages of KCAIN will be:

A proliferation of cultural activity -

- short term effects:  
more possibilities for the public to enjoy cultural activities;  
indirect support for professional artists; and  
the creation of a national archives of cultural-artistic information.
- long-term effects:  
overcoming cultural dependency on other countries; and  
balanced cultural growth among different localities.

Greater cultural production - Activating cultural production through the development of cultural products.

Cultural-industrial cooperation - Application of cultural information to the world of industry.

Implementation of cultural policies - Use of quantitative and qualitative information to governmental cultural policies.

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## **Project Overview**

### **Configuration of KCAIN**

KCAIN is administered by the Korean Culture & Arts Foundation (KCAF) and supported by the Ministry of Culture. The project began in 1993, and established a ten-year plan composed of the following three phases:

Phase I (1993-1995): Construction of basic environments and prototype

- use of conventional DBMS
- analysis of cultural-artistic information
- formation of information usage mind
- prototyping in KCAF

- preparation of legal and systematic policy

Phase 2 (1996-1999): Activation of a local system

- application of high technology DBMS
- structuralization of cultural-artistic information
- dissemination of cultural-artistic information
- construction of networks between organizations

Phase 3 (2000-2002): Activation of a cultural-artistic information network

- activation of a global system
- reconstruction and popularization of cultural-artistic information

The following organizations are provisionally included and will be incorporated in KCAIN:

The Ministry of Culture  
Korean Culture & Arts Foundation  
National Central Museum  
National Central Library  
Independent Memorial Center  
Korean Public Performance Ethics Committee  
Motion Picture Promotion Corporation  
Seoul Arts Center  
The Korean Traditional Performing Arts Center

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## **Ongoing Projects**

### **A Study on the Development of a Semantic Structure Management System**

The concept of "information," as described in detail by experts in the field, is then converted to a machine-readable format. Structuralized information is required for semantic processing (learning, inference, analogical reasoning, etc). Models should be suitable for representing source information

and its relationships. Information structuring in the real world is organized on the basis of recursion, relativity and overlapping of concepts. Concept relationships are formulated more readily than the actual "source" information. The semantic structural model is a data model based upon an extended hypergraph. This hypergraph is expressed in EBNF(Extended Backus Naur Form). It is a model designed for describing recursion, relativity and overlapping concepts in "real world" terms.

<Representation of information by EBNF>

```
<Term> ::= ('<Entry>') ['{'<Description>{,<Descriptor>}}']
<Entry> ::= <String>
<Description> ::= ('<Synonym>'), ('<Polyseme>')
<Synonym> ::= [<Entry>] {,<Synonym>}
<Polyseme> ::= [<String>] {,<Polyseme>}
<Descriptor> ::= ['<Relation>'] {'<Label>'} {,<Descriptor>}
<Label> ::= (<Entry>{,<Label>} | <Term>{,<Label>})
<Relation> ::= (<Term> | <Entry>)
```

There are many ways to describe concepts in databases, including natural languages. Many databases avail themselves of thesauri (dictionaries of keywords containing semantic relationships among terms and including synonyms or polysemes, which can then be used in information retrieval systems). There has been extensive research on the subject of thesaurus construction. Data description for thesaurus is a sub-set of the semantic structural model. Because technical terms are derived from common words and combined with them, they have many meanings. When these terms are translated, they can generally have more than one meaning. To construct thesauri automatically, it is necessary that terms that have more than one meaning be extracted from an equivalent set, which will consequently grow larger. A set of broader terms is then extracted from the available terminologies. An equivalent set is obtained by using translative relationships with a term which is a leaf node. Broader terms have been extracted by experts, but this is a time consuming and costly procedure. The problems of maintaining a thesaurus are solved by the possibility of extracting broader terms automatically. There are four ways to extract broader terms:

1. Using new coinages
2. Using definitions and explanations
3. Using the existing thesaurus
4. Extrapolating semantic relationships from given expressions

Experiments and examples proved that a semantic model for self-organizing information-base system is useful for composite information. The model has flexible representation, the ability to manage, and manipulate complex information. The representation is used for conceptual structures as well as for full description of information. This thesaurus is compiled and maintained automatically.

## Design of Schema for Drama Information

The database schema for drama information is shown in (Figure 1).

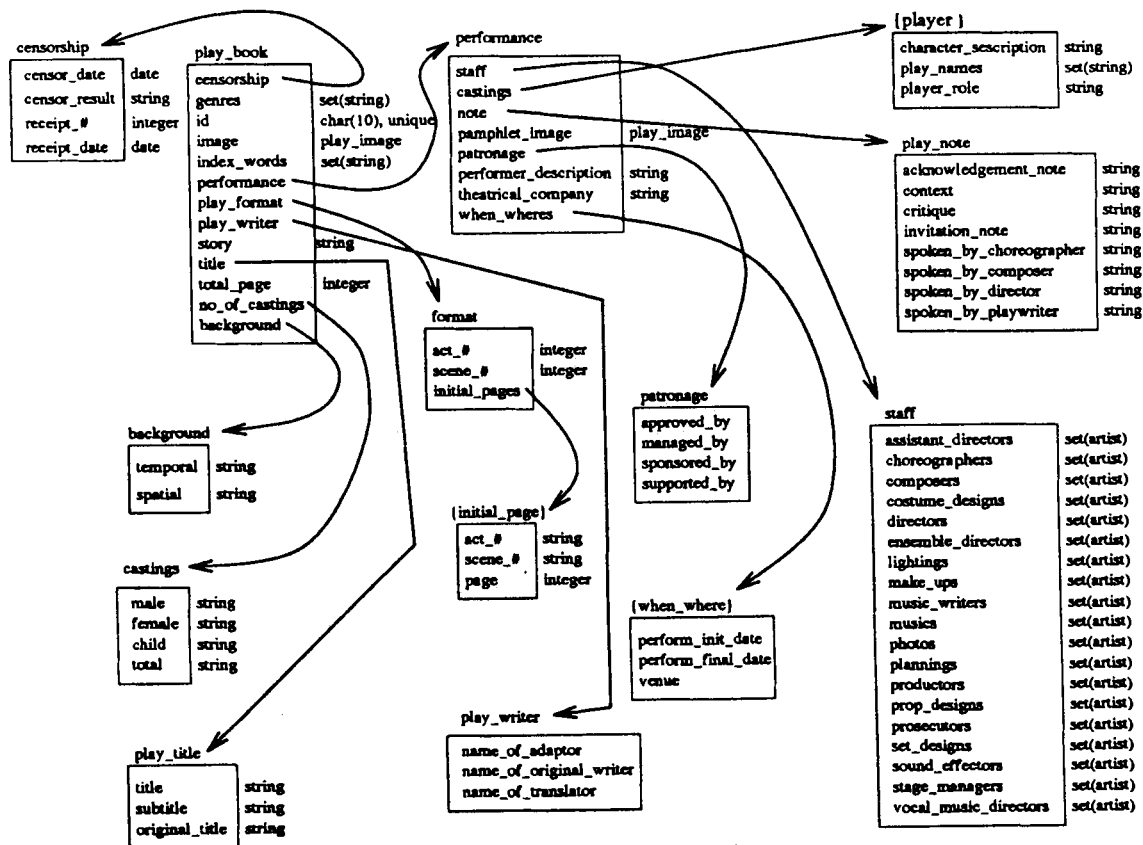


Figure 1: Database Schema for Drama Information

## Development of Hypermedia Model System on Drama Information

### Data Set for Drama

Drama information includes various forms, i.e.:

- Program (Pamphlet)
- Poster
- Ticket
- Drama Play
- Musical Score
- Performance Audio/Video
- Performance Still Image

We can distinguish the above mentioned items by the computerized forms.

- Bibliography DataBase
- Text : Tagged Text file
- Image: .gif or .tif file
- Audio: .au file (SUN audio file format)
- Video: MPEG file

### Design Criteria

Hypermedia Model System on Drama Information consists of three parts: Database Part, Keyword Retrieval Part, and Hypermedia Part. We use the following tools and programs for each part.

- Database Part: Unisql
- Keyword Retrieval Part: Unisql, Dictionary, Thesaurus
- Hypermedia Part: Mosaic (or Netscape), NVR Player (MPEG play)
- GUI(Graphical User Interface): OpenInterface toolkit

The Keyword Retrieval Part is composed of indexing and retrieval (Figures 2 - 4). We used a controlled vocabulary indexing method, and a boolean retrieval method. This is because drama and performance have a genre-related vocabulary which is varied and often complex.

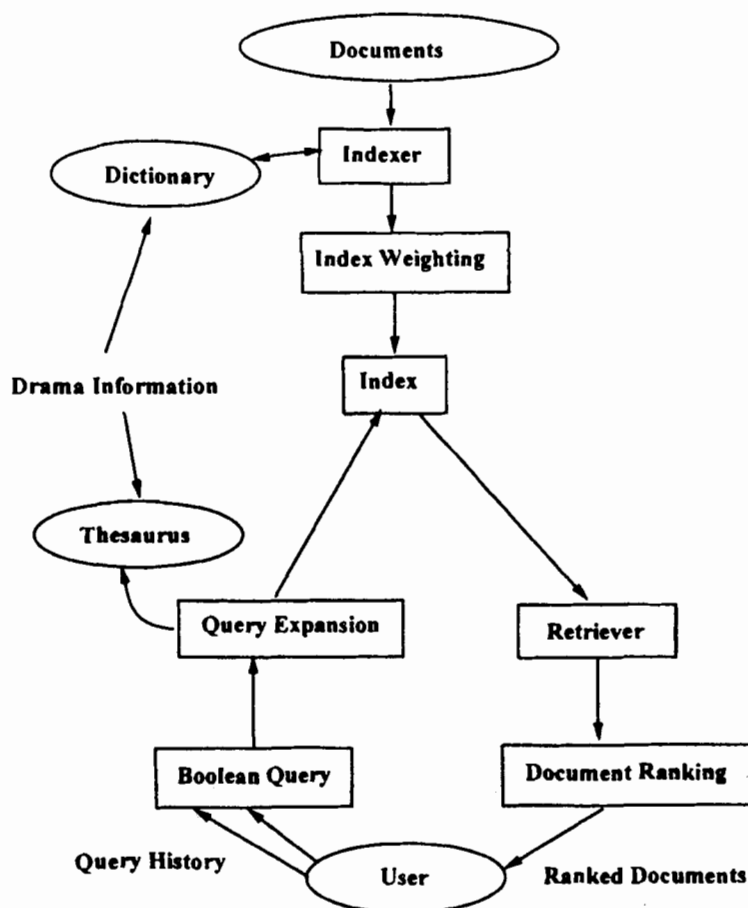


Figure 2: Block diagram of Keyword Retrieval Part

**Design of Indexer.** The construction of a dictionary is important in a controlled vocabulary indexing method. The dictionary is a text file which includes a controlled vocabulary for the drama domain. The contents of this dictionary cover the name of casts, staffs, writers, dramatic companies, theaters, nations, cities, titles, and terms specific to the world of drama. We use this dictionary to extract keywords from a bibliographic text file. Those keywords are imported in the DB schema in Unisql. The schema of keyword indexing structure is as follows.

Keyword: string

Document\_No: set of string (Documet\_Nos)

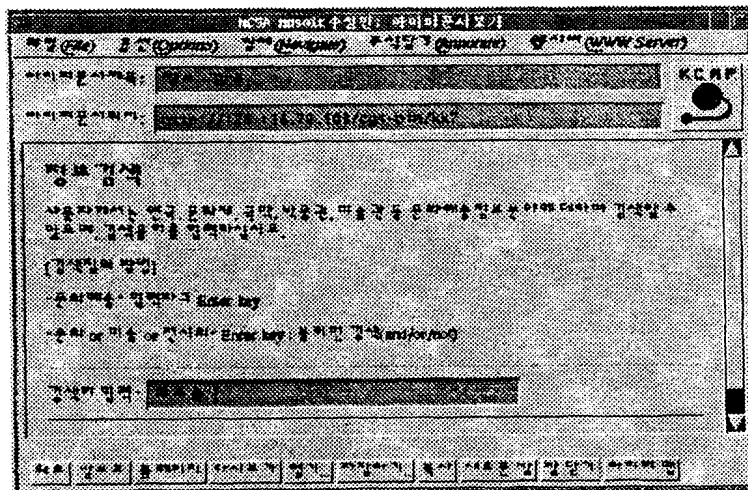


Figure 3: Keyword Retrieval Part in Mosaic

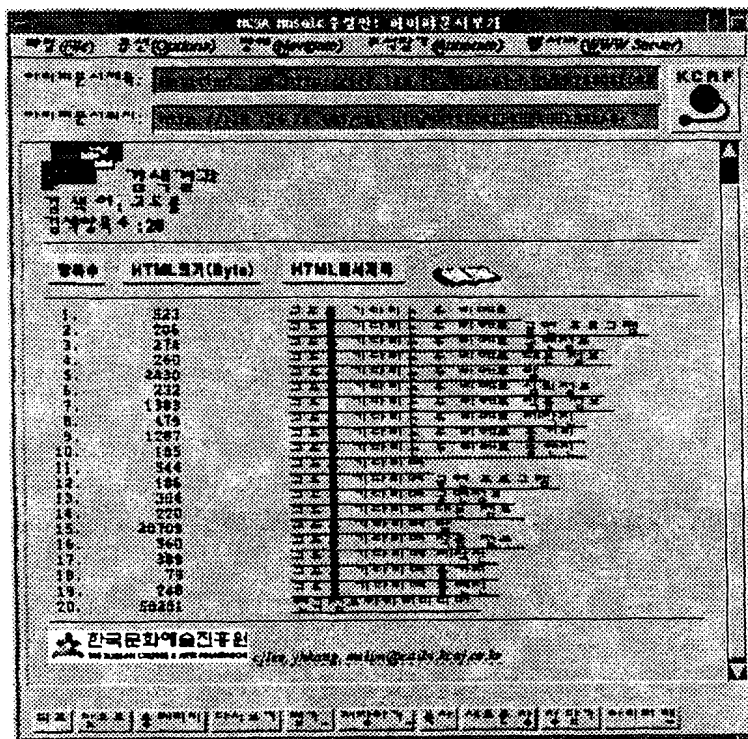
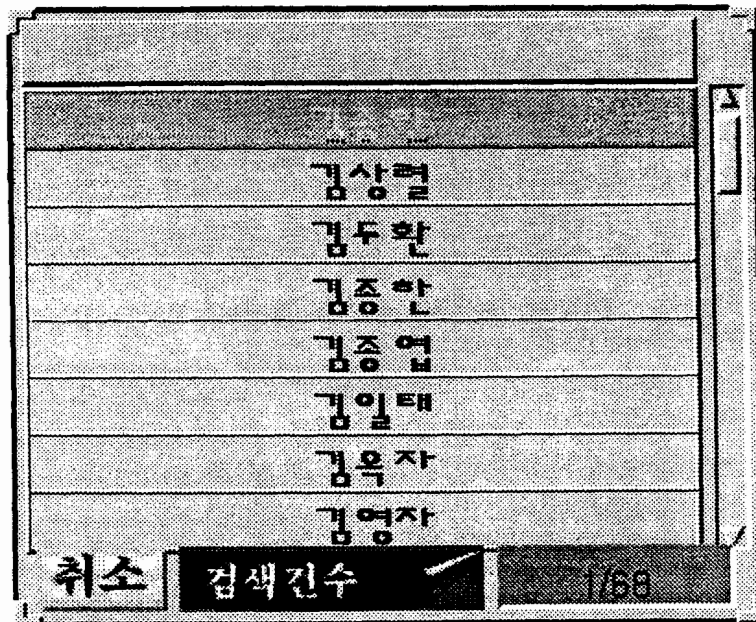


Figure 4: Keyword Retrieval Result Part in Mosaic



**Design of Retriever.** Using boolean retrieval methods, we provided a keyword reference window and a thesaurus reference window to facilitate usage for novices. The user selects boolean operators (and, or, not) with a choice button. Users can access the system easily; there is no need for prior computer literacy. If the user does not know what keywords are available, or if they don't remember an exact index term, the keyword reference window can provide help (Figure 5).



*Figure 5: Keyword Reference Window*

The thesaurus reference window provides more terms related to the search terms, allowing users to expand their queries. It also provides user-feedback for the next query session. There are relations such as NT (narrow term), BT (broad term), RT (related term), and SYN (synonym) in our thesaurus as in a general thesaurus. We have added relations such as AU (Authority), WR (write) to our thesaurus (Figure 6).

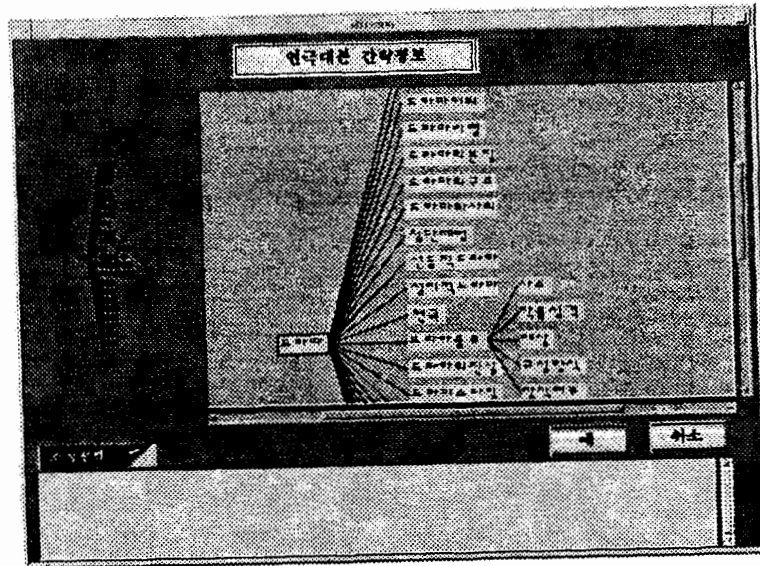


Figure 6: Thesaurus Reference Window

The user can select “and,” “or,” and “not” boolean operators with a “choice button.” A query history is displayed in one session (Figure 7).

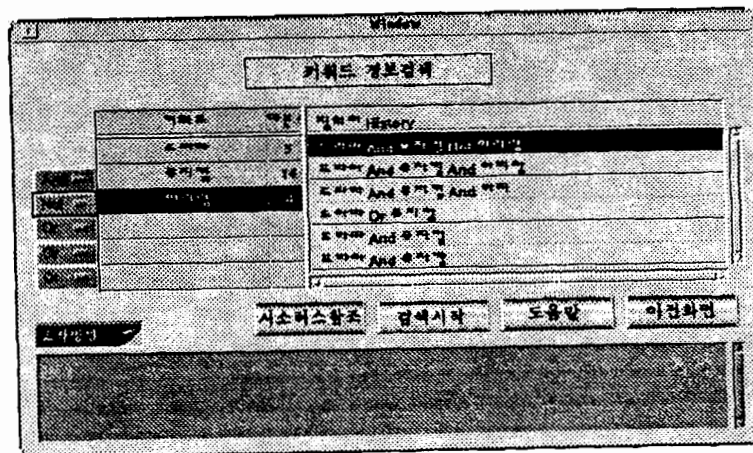


Figure 7: Boolean Query Window

The simple result window is as follows (Figure 8).

제목	작가	연출	공연	가격
SUOR ANGELICUS	루치아	이훈민	국립극단	T-900,000
SCHONSTE BLUES	루치아	이훈민	국립극단	T-900,000
ROMEO ET JEANNE	루치아	이훈민	국립극단	T-900,000
THEATRE ETAT	루치아	이훈민	국립극단	T-900,000
THE LITTLE PRINCE	안토와네트	이훈민	국립극단	T-900,000
THE LITTLE HUI	루치아	이훈민	국립극단	T-900,000
MY FAT FRIEND	루치아	이훈민	국립극단	T-900,000

Figure 8: Simple Result Window

### Design of Drama Hyperdocument (HyperDrama)

Finally, users can navigate in drama hyperspace through the use of drama metaphors. Drama hyperdocuments are implemented through HTML (used in WWW).

**Drama Metaphor.** Drama Metaphor is designed to imitate a “real” event in an virtual environment, such as recreating the experience of seeing a play. In most cases, the theater-going experience unfolds as follows:

- (1) looking at theater posters
- (2) buying tickets
- (3) reading the playbill
- (4) watching the play

If the viewer wants more information about the play, he or she will

(5) find a text of the play

(6) in case of the musical, get its score.

**HyperDrama (HTML Hyperdocument).** The structure of HyperDrama is based on drama metaphor.

- Image: poster, ticket, pamphlet
- Title
- Censorship
- Play Writer
- Performance
  - Patronage
  - Staff
  - Music List (Musical)
  - Casting
    - Image of Leading Role Cast
    - Video of Leading Role Cast
  - Notes
    - Invitation
    - Author Note
    - Composer's Note (Musical)
    - Director's Note
    - Choreographer's Note
  - Drama/Play
    - Synopsis
    - Play Text
    - Play Images
    - Musical Score Image (Musical)
    - Audio
    - Video

In addition to the hierarchical structure, cross linking is possible. The link to Performance Video from an anchor of "Leading Role Cast" is also possible from the anchor of Play Text. To navigate HyperDrama-space, NCSA Mosaic can be used (Figure 9).

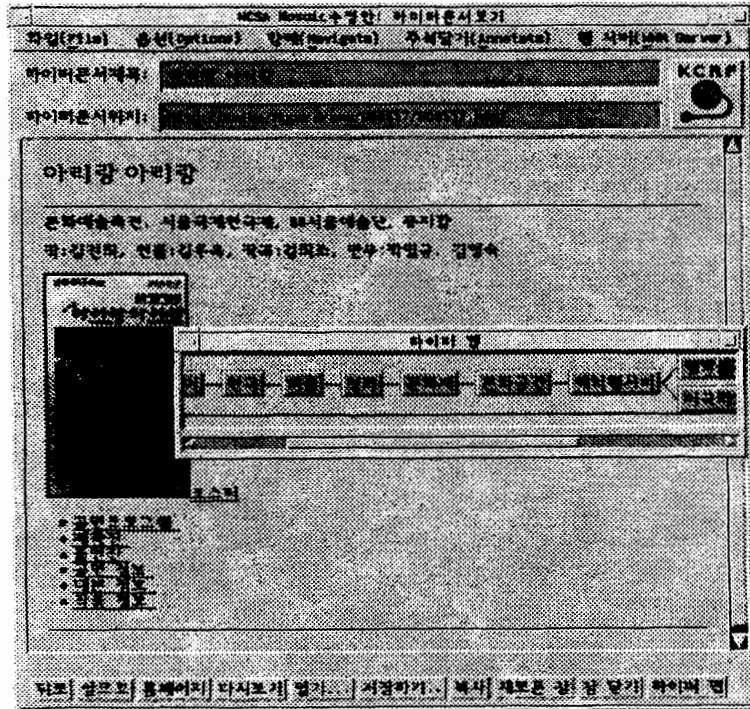
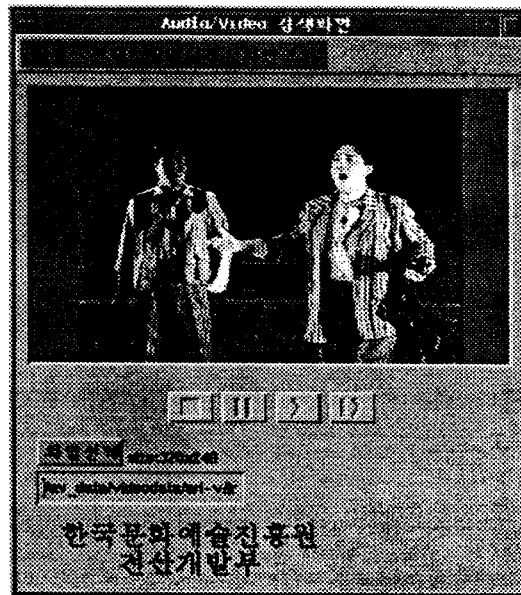


Figure 9: Mosaic Window

If a user wants to watch the video, he/she may use an MPEG player which runs MPEG captured video (Figure 10).



*Figure 10: MPEG player Window*

### **Further Research**

We plan to further research the fields of weighted indexing and document ranking, enlarging drama data, full text retrieval, expanding drama knowledge (dictionary, thesaurus), hypermedia object handlers, and navigation tools.

### **Retrieval Engine for Unformatted Data**

Previous approaches to information retrieval are based on text and numeric data. It is difficult to retrieve information in the fields of photography, music, film, etc. Cultural and artistic information is related to multimedia data such as text, graphics, still image, moving picture and sound. It is widely varied, with large amounts of information, and unformatted data. In this field, new information retrieval methods are required for extracting media-related features.

At first, we gather scanned images and author them. We then develop an information retrieval engine for unformatted data. The engine consists of three subsystems: a feature extractor, an indexer and a retrieval engine. In order to construct the feature extractor, we analyse the data type and evaluate feature value. We adapt the automatic indexing method to improve retrieval accuracy and efficiency. In this phase, we normalize the source image and detect the edge after thinning procedures. The indexer assigns the index value to each image as the feature value. A visual interface plays an important role in

multimedia information systems. The user can retrieve some data by sketching the image through mouse and touch screen. The query processor handles the sketch input. In retrieval phase, the retrieval engine finds all candidate data which have similar feature values.

## **Development of Three-Dimensionnal Database System for Culture and Art Information**

### **Introduction**

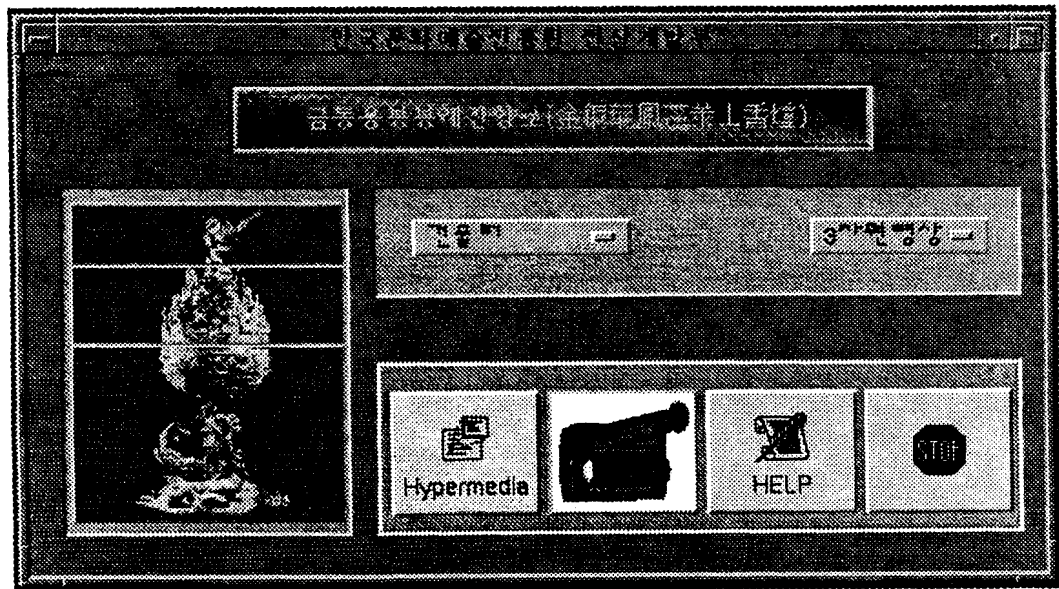
Three-dimensional database system for indexing of cultural assests:

- Wire-frame Modeling
- Surface Modelling
- Solid Modelling
- Texture Mapping
- Animation
- Rendering

(See example of the Paekche Gilt-bronze Pongnae-san Incense Burner)

### **Three-dimensional Computer Graphic Presentation System**

The reconstruction system mainly consists of two parts: a preprocessing part and a reconstruction processing part. In the preprocessing part, it is digitized by an image scanner (2D), and 3D candidate components of an object scene are extracted from the 2D elements. The special exhibition of the Paekche Gilt-bronze Pongnae-san Incense Burner includes a three-dimensional computer graphic presentation system and a multi-media information system for the artefact using computer graphics and hyper-media techniques.

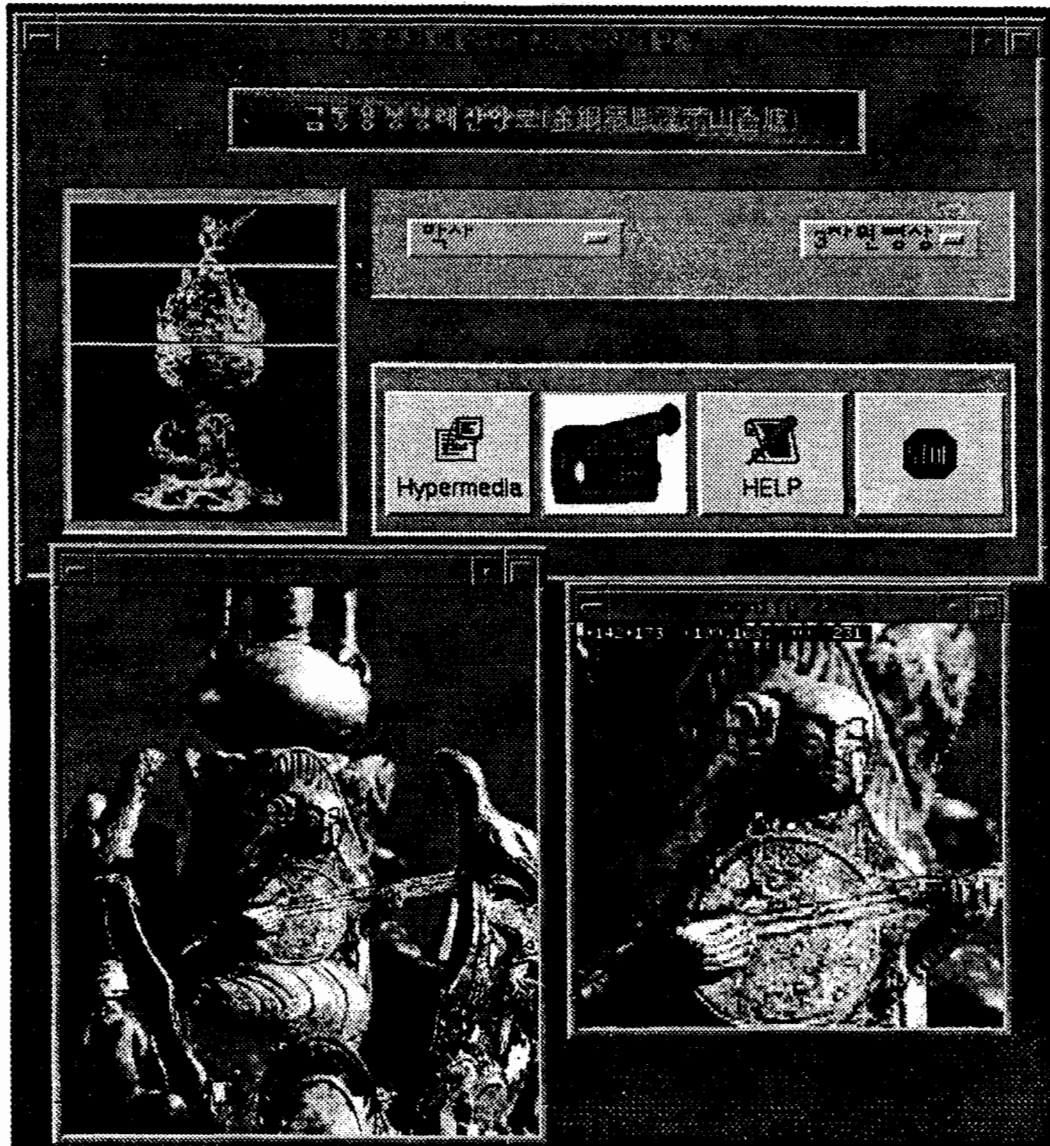


*Figure 11: Main menu*

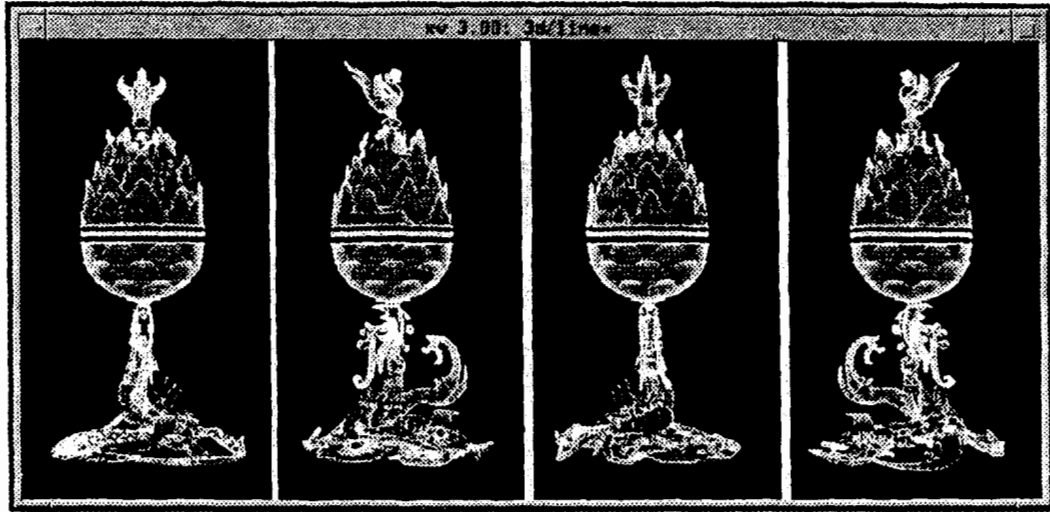
### **Development of Full-Text Database for Theatrical Performance Documentation**

This is a three-year plan which started in 1994 and ends in 1996. It is easy to hoard up drama data after a performance but difficult to retrieve that information because it is often located in more than one site. Therefore, a system for archiving and creating finding aids for theatrical performance/drama is required. We plan to gather as many as 5,000 plays (close to half a million pages). Our goal of the first year (1994) was 1,000 plays of 80,000 pages in length. We compiled bibliographical data, text files and image files of the plays, as well as images from playbills and some multimedia data (audio, video). These will be used in the drama hypermedia model system.

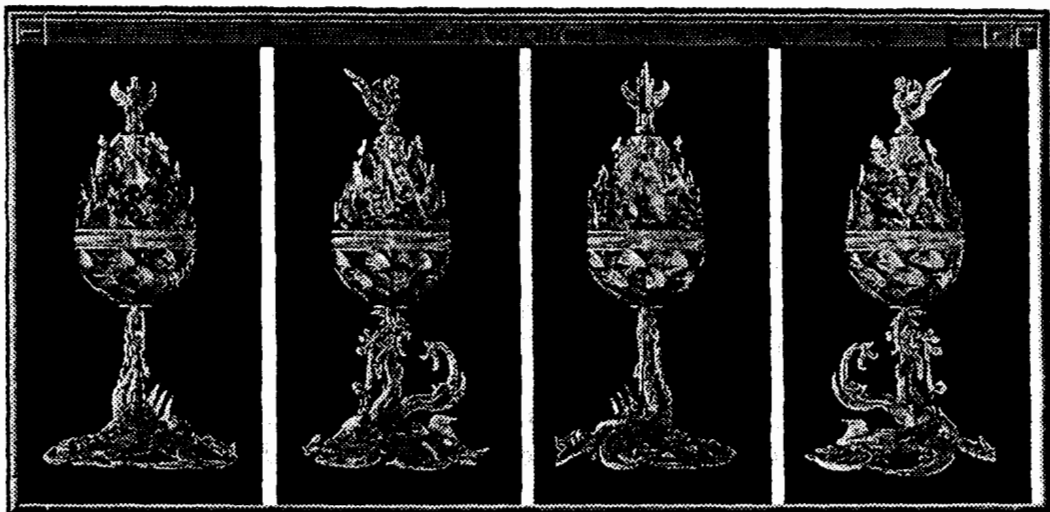




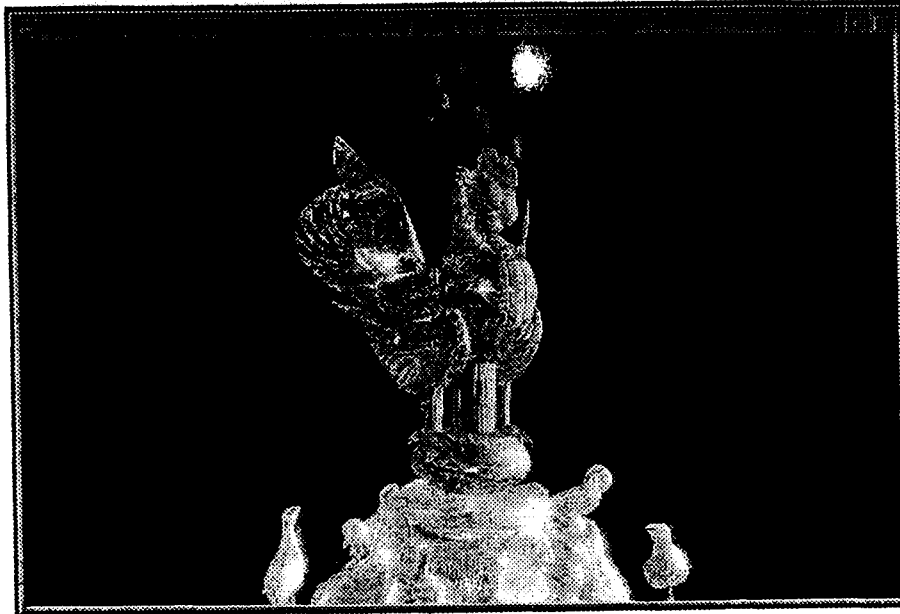
*Figure 12: Part of Musicians*



*Figure 13: Wire frame*



*Figure 14: Texture & Rendering*



*Figure 15: Phoenix*

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## Conclusion

The final purpose of KCAIN is the development of a system to satisfy the desire for “real life” cultural-artistic information. To this end, we have devised a system which preserves cultural assets while highlighting the incremental gains derived from the process of upgrading that system.

This project is important for its contribution to national cultural awareness and a broader understanding of the performing arts, and is not considered a for-profit venture.

We believe that the finished product will contribute to Korean cultural production. Ultimately, KCAIN will contribute not only to a wider enjoyment of cultural-artistic information by the general public, but also to overcoming cultural dependency on other nations, and consequently to a more equitable distribution of the nation’s cultural prosperity amongst varied locations. We also hope that it will imbue new generations with a sense of Korean national identity. Furthermore, this project will provide us with many opportunities to share our cultural heritage internationally, and help promote mutual understanding on a global scale.

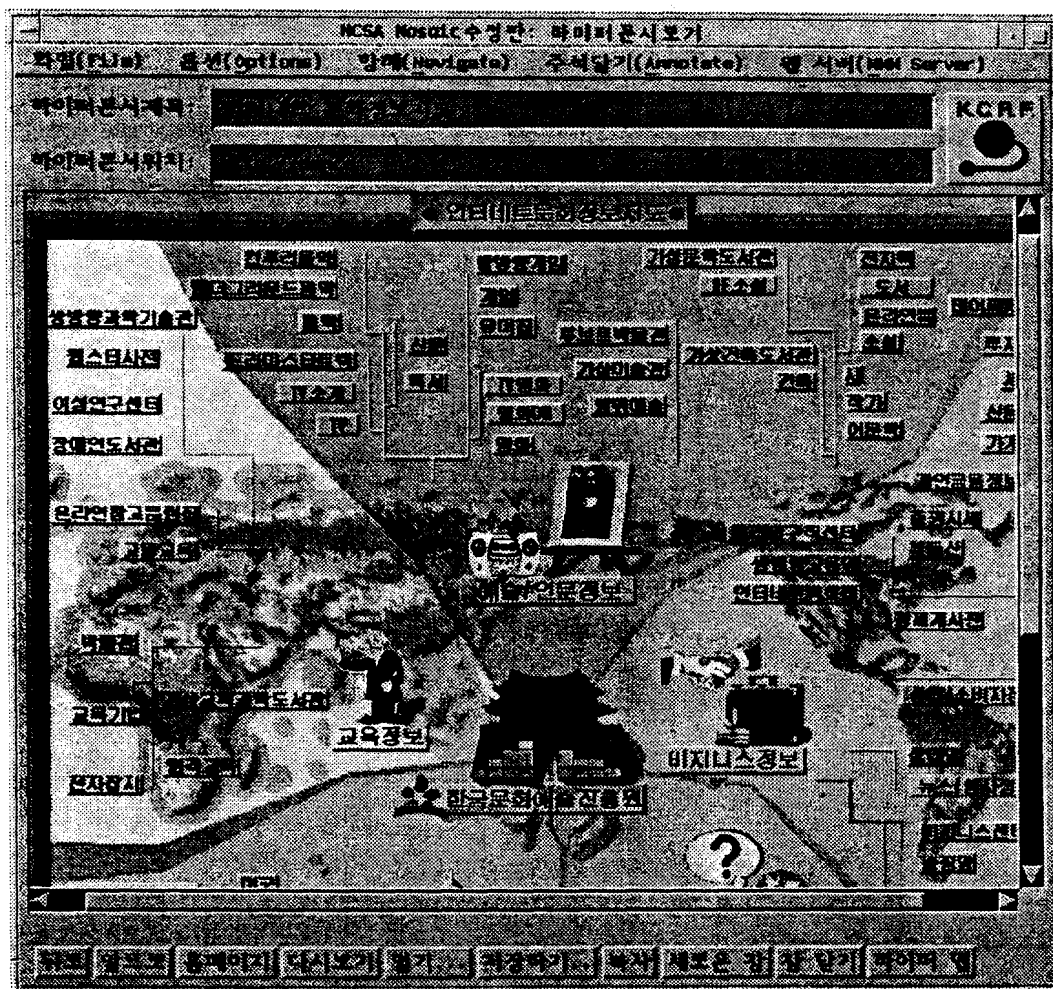


Figure 16: Information of Culture and Arts Map