

# The Ontology Design of Intangible Cultural Heritage Based on CIDOC CRM

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## Abstract

*Intangible Cultural Heritage is of comparatively high value in culture, economy, science and tourism, which is at its peak of development and utilization. Intangible cultural heritage needs preservation, so the development and utilization of the digital storage of intangible cultural heritage are a subject of theoretical and practical values. Among the various complicated types of intangible cultural heritage, the authors choose Pang Wang Festival of Yao nationality of Guangdong Province of China as an example and apply the CIDOC Conceptual Reference Model to the construction of the entities and properties of the knowledge ontology of the Pang Wang Festival, and the well-constructed knowledge ontology has been stored in the database. This study has provided the solution to the construction of the knowledge ontology of the intangible cultural heritage and benefits the digital storage, preservation and management of intangible cultural heritage, which offers a new way of thinking and is of great significance to the preservation and inheritance of intangible cultural heritage.*

**Keywords:** CIDOC CRM, Intangible Cultural Heritage, Ontology, Data Base, Informationalization

## 1. Introduction

As the dynamic carrier of inheriting traditional and ethical culture, intangible cultural heritage has played the important bonding role in the thousands of years of historical river. With the in-depth development of the economic globalization, the problem of the cultural convergence phenomenon has become more and more serious. The diversity of the world culture and the intangible cultural heritage treasure of the world have been seriously eroded, and the speed of destruction is accelerating year by year. The preservation of intangible cultural heritage is imminent. The most common preservation methods of intangible cultural heritage are the participatory center, monetary protection, policy and regulation protections; the work of the preservation of intangible cultural heritage lacks the digital preservation methods in this information era. There is a huge amount of information resources of intangible cultural heritage. The digital methods can reduce greatly the difficulty in preserving the intangible culture heritage. The use of information technology can effectively promote the efficiency and effectiveness of the management of intangible cultural heritage, which can strengthen the ways and speed of raising the awareness of intangible cultural heritage and can also give a big push to the preservation of intangible culture heritage. Ontology is a tool of modeling, which can describe concepts in information systems on the

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semantic and knowledge levels. It is widely used in knowledge retrieval. Using ontology technology to construct the ontology of the resources of intangible cultural heritage and the ontology database of intangible cultural heritage can provide an effective way for the informationalization of the preservation methods of intangible cultural heritage.

## 2. Research Review

### 2.1. The Research Review of the Informationalization of Intangible Cultural Heritage

As in this heading, they should be Times New Roman 11-point boldface, initially capitalized, flush left, with one blank line before, and one after. In October, 2003, the United Nations Educational, Scientific and Cultural Organization passed the "Convention of Preserving Intangible Cultural Heritage" at the 32<sup>nd</sup> general assembly, which defines the concept of intangible cultural heritage, namely the "various social practices, expression of views, form of expression, knowledge, skills, and related tools, objects, handicrafts, and cultural sites that are considered by any community, group, and sometimes an individual as one component part of their cultural heritage." Intangible cultural heritage is considered the most important entity representing the entire complex of distinctive, spiritual, material, intellectual and emotional features that characterize a society or social group [1].

The digitization of intangible cultural heritage has become a new direction and a natural trend in the protection and development of historical heritage, with more and more people engaging in the study on the subject. The developed countries are state policy oriented utilizing the public fund to construct the digitization of cultural heritage. Tiit Reimo introduced political and practical context for digital preservation of cultural heritage in Estonia [2]. Efthimios Mavrikas *et al.*, presented a semantically consistent framework for the online presence of Cultural Heritage document collections, set upon a participatory center stage and supported by a shared knowledge model, the CIDOC CRM ontology [3]. Carugati Andrea & Hadziliias Elias provided a framework for the design of e-government services on cultural heritage, using observation from concrete applications, knowledge of information system development methodologies, and the IDEF0 modeling method [4]. Élise Meyera *et al.*, presented the development of a Virtual Research Environment dedicated to the exploitation of intra-site Cultural Heritage data [5]. Caroline M. Mendes *et al.*, apply the interactive 3d visualized system in the field of cultural heritage [6]. Dimitrios A. Koutsomitropoulos *et al.* used semantic web technology in cultural heritage and digital library [7]. Anupama Mallik and Santanu Chaudhury constructed a more robust and refined version of the basic ontology by learning from this set of concepts annotated data. We show an application of our ontology-based framework for exploration of multimedia content, in the field of cultural heritage preservation [8]. Shenghui Wang *et al.*, gave a comprehensive overview of the problem of Semantic Interoperability in the Cultural Heritage domain, with a particular focus on solutions centered around extensional, instance-based and ontology matching methods [9].

China lags behind in the research of this field. In 1998, Dunhuang Research Institute and the American "Mellon Foundation" signed a contract to be corporate to establish "Digital Virtual Caves". In 2000, the Palace Museum and the Japanese Publishing and Printing Co. Ltd also signed a contract to be corporate to do "Digital Application Research of the Palace Museum Cultural Heritage". Bachir & Dong used the hardware, the software, the data, the user, and the use methods of GIS technology as content to introduce the basic principles of the technology and its application in urban planning taking the historic site of Xijin Ferry of Zhenjiang as an example to analyze the concrete preserving methods used by this technology [10]. Dongmei Peng *et al.*, used as reference the techniques of digital preservation of tangible and intangible cultural heritage abroad, taking the digitization of such an intangible cultural

heritage as folk art as an example to explore the significance and urgency of the digital preservation of intangible cultural heritage [11]. Dai & Tan discussed the special character and information processing technology of intangible cultural heritage, classified the intangible cultural heritage based on its character and the category theory of knowledge, and designed and constructed a knowledge modeling framework for intangible cultural heritage based on this classification [12]. Lai & Zhang studied in depth the knowledge relation and development in intangible cultural heritage digital management information system [13].

## 2.2. The Research Review of the Ontology Technology

Ontology originates in philosophy. With the development of computer technology, theories related to ontology have extended to other fields of science. In the artificial intelligence field, Neches et al. were the first group to define ontology [14]. They hold that ontology "defines the basic terminology and the relationship of the glossary of related domain, and the provisions formed by these terms and relations are made use of to set rules to define the denotation of these words." Gruber defines ontology as "the explicit specification of the conceptual model", which is a widely accepted definition of ontology in the field of computer science [15]. Based on this, Borst further states that "ontology is the formal specification of the shared conceptual model" [16]. After further in-depth research, Studer *et al.*, had extended ontology to be the formal specification standard on the shared-oriented conceptual model, including four layers of meaning: conceptual model, explicit specification, formal, and shared [17]. One ontology defines the public glossary of a domain, which can in turn be used to share information and knowledge. John McCarthy was inspired and proposed that the intelligence system base on the logic concepts must "list all the things that exist and construct an ontology to describe the actual world" [18]. Sowa also proposed to construct a possible "ontology of the world" including as many as possible all the things in the world, their links and their ways of interacting [19]. Since 1990s, the research field of computer abroad has focused on the ontology technology. As the semantic basis, ontology has been widely applied to such fields as information retrieval, artificial intelligence, semantic network, and software project, a natural language processing, e-commerce, and knowledge management. The research program CYC of MCC (Microelectronics and Computer Technology Corporation) of Austin, Texas, USA provides the common deducing basis through developing extensively the application of ontology based on specific domains [20]. The enterprise integration lab of Toronto University developed TOVE (Toronto Virtual Enterprise) which is used specifically for the construction of enterprise ontology [21]. The artificial intelligence library of the Polytechnic school of Madrid University adopts the Methontology method to manage, develop, and maintain the library. The artificial intelligence research institute of Edinburgh University and its corporate partners: IBM, Lloyds, Register, Logical UK Limited, and Unilever jointly undertake the skeletal methodology program and offer guidelines for the development of ontologies.

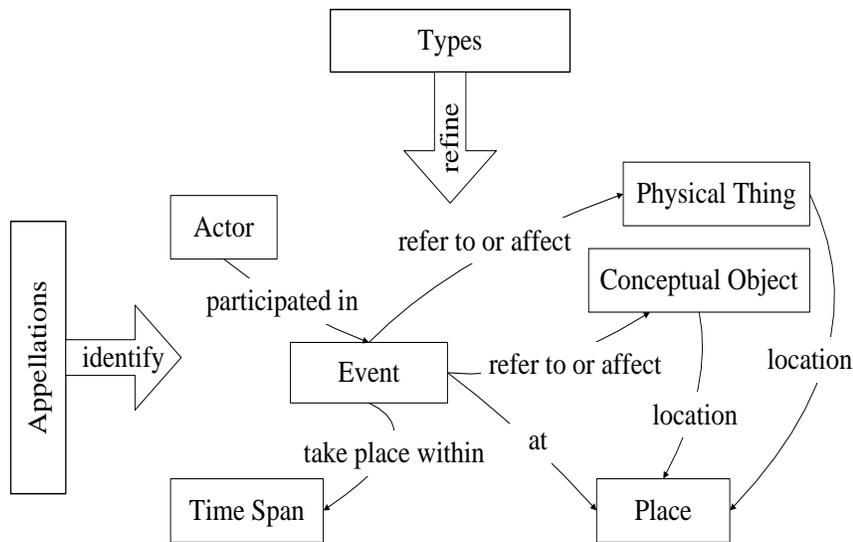
At present, countries with the relatively advanced ontological technology, mostly use it in such fields as information retrieval, artificial intelligence, software project, e-commerce, and knowledge management, which are, however, little applied to the intangible cultural heritage field. China mostly deals with taking samples from the massive amounts of information, setting up the knowledge base, etc. In recent years, there have been gradually more and more Chinese scholars doing the researches on ontological base and the construction of ontologies. Such scholars as Rujiang Bai, Li Chen did some researches in the perfection, comparison at home and abroad, and the functions of the ontology base [22, 23]. Such scholars as Mangling Li has constructed the ontology for the resource base of the quality courses [24], and Yu Zhang et al. has applied comprehensively the knowledge engineering and the subject indexing

method to guide the domain ontological development [25].

### 3. Intangible Cultural Heritage Preservation and the Application of CIDOC CRM

CIDOC Conceptual Reference Model (CIDOC CRM) is the object-oriented conceptual reference model developed by the International Committee for Documentation. CIDOC CRM provides definitions and formal descriptions for the implicit and explicit concepts, and their relationship involved in the work of the documentation information of cultural heritage, which reaches a common understanding of the information of cultural heritage through a general, extendable semantic framework so that the information communicated and the established information systems share a common language. The new version was issued in January, 2010, in which 90 entities and 148 properties are defined in the domain of cultural heritage, and whose contents cover such information as the historical facts, humanities arts, time, place, and person related to cultural heritage.

In CIDOC CRM, the entity and the class, all have their own properties, and the relationship between the entities is shown through the properties. The entity, on the other hand, makes up a hierarchical structure, whose top layer composed of knowledge concepts are projected to such an entity as Event, Actor, Place, Time-Span, Physical Thing, and Conceptual Object. CIDOC CRM describes entity and the method of the property relationship. The relationship between the entity and appellations involves a part of the historical reality described by an ontology, so the relation between the two is to identify; Event is participated in by Actor, so the relation between the two is to be participated in; similarly, the relationship between Event and Time-Span is to take place within, and the like. Figure 1 shows the structure of the property relations centered around Event.



**Figure 1. The Property Relations of the Entity of CIDOC CRM Event**

The study reuses the knowledge ontology established by CIDOC CRM, which can establish the interlinks among the various entities with no direct relation or involving one event. Therefore, only the proper entity and property chosen according to the characteristics of intangible cultural heritage are suitable to construct completely knowledge ontologies of intangible cultural heritage.

## **4. The Construction Method of the Ontology of Intangible Cultural Heritage**

### **4.1. The Construction Method of Ontology**

The construction method of ontology is mainly guiding the work of the construction of ontology. In the construction of domain ontology, the skeleton method, METHONTOLOGY method, and the seven-step method are often used, while the flow of the seven-step method is comparatively perfect after a contrastive analysis based on Gruber's principle of modeling [26]. The main idea of the seven-step method is to abstract the main terms of ontology into categories, and then to define the properties of the categories and construct actual examples. The demand analysis, concept classification, and the construction of ontology of the domain ontology are done through the seven steps. Knowledge of intangible cultural heritage involves such aspects as people, object, event, time, place, whose huge, complicated amount of information changes quickly as time passes. So due to its particularity, the method of manual construction has to be used to construct the ontology of intangible cultural heritage. In the light of the analysis above, the domain ontology of the tourist resources of intangible cultural heritage is constructed based on CIDOC CRM model with reference to seven-step method.

### **4.2. The Main Thought and Method of Constructing the Ontology of Intangible Cultural Heritage**

According to the characteristics of the resources of intangible cultural heritage being extensive, large in data quantity, rich in the connotations of knowledge, and quick to dynamic change, the study has realized the transfer from tree-shape structure to net-shape structure through the restructure of knowledge. And also the transfer from simple description to in-depth description of the process of the storing and preserving the intangible cultural heritage, so as to further reveal deeply the semantic relations and content features of the knowledge of intangible cultural heritage, as a result of which preserving properly different types of knowledge of intangible cultural heritage and inherited knowledge can be done in different appropriate systems. On the basis of this, the main thought and method of phrased construction of ontology are proposed: taking one category of intangible cultural heritage as an example to try to construct its kernel ontology and then introduce the related concepts and relations in this domain one by one, step by step to the kernel ontology to extend the already existing ontology. This thought may make the construction plan of the ontology construction of intangible cultural heritage stronger in control, extension, and feasibility.

The study sets goals to work in different stages, and finally forms the technical route of constructing the ontology of intangible cultural heritage with the preparation stage, construction stage, and storage stage. Among which, the client demand analysis is done in the preparation stage to determine the aims and scopes of the ontology application. Based on knowing the client's demand; the corpus will be collected in combination with related information inquiries in the network, and field visit. In the construction stage, the corpus is analyzed quantitatively to determine the concepts, definitions, categories, classes, properties, and relations of the ontology construction. In the last stage of the semantic storage of intangible cultural heritage, the already constructed domain ontology of intangible cultural heritage is input into the database so that the goal of realizing the goal of digital storage and preservation of the data of the ontology of intangible cultural heritage is achieved.

## 5. The Construction of the Ontology of Intangible Cultural Heritage Face to Actual Cases

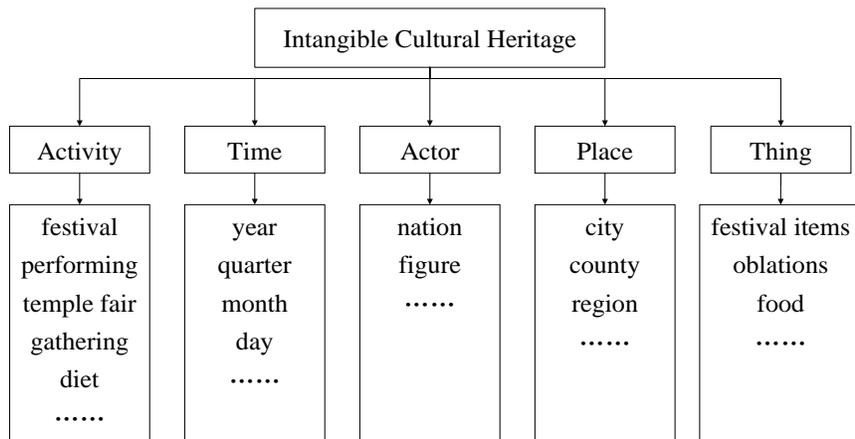
### 5.1. Choice of Domain Construction—Pan Wang Festival of Tao Nationality

Intangible cultural heritage is of great variety and quantity, multifarious in knowledge, so it is difficult to construct directly the whole ontology of the complete knowledge of intangible cultural heritage. As one of the most important representatives of intangible cultural heritage, folk custom is classified as worshipping and celebration ritual activities, temple fair, weddings of nationalities, traditional etiquette, traditional festival and apparel, etc. In the various folk customs, the folk festival celebration involves various aspects of things as etiquette, performing, activities, food, *etc.* It is quite representative of choosing festival celebration to probe into the tentative construction of the domain ontology.

In the first group of the directory of intangible cultural heritage issued by the State Council, Guangdong province recommended to the State Council the Pan Wang Festival for Yao People, which passed and has become a national intangible cultural heritage of China. Pan Wang Festival is an important festival of the Yao nationality worshipping their ancestor, Pan Wang, which is considered very important by Yao nationality at home and abroad as the worshipping of their nationality. Pan Wang Festival has a long history and is a festival and celebration activity widely celebrated by the people, which integrates all the best of the culture of Yao nationality and promotes the centripetal force of the nationality linking all nationalities together with this humanistic grand ceremony. Today Pan Wang Festival has developed into not only the social gathering of celebrating good harvests and opportunity for the young girl and boys to find their partners, but also fairs for interflow of commodities, product exhibition and various sports, performing and competition activities with many audiences and visitors, which is an exceptional grand festival. Therefore, this object of study is proper in quantity, rich in the connotation of knowledge, and appropriate for the construction of the ontology.

### 5.2. Demand Analysis

Before the construction of ontology, to determine the application aim of the domain ontology is very important (see Figure 2).

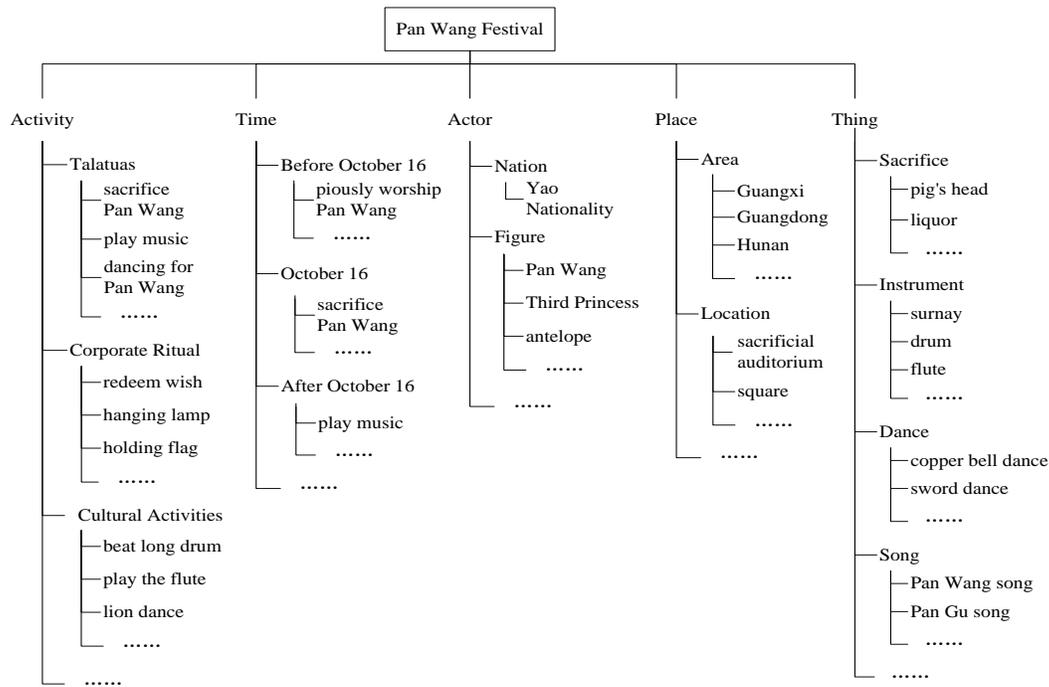


**Figure 2. The Chart of Demand Analysis of the Information of Intangible Cultural Heritage**

Demand analysis is of great significance to limit the scope of the construction of the domain ontology, and strengthen the focus of the domain ontology, so as to further reduce the complication in the process of construction, shorten the period of the ontology construction, and reduce the cost of the ontology construction. The goal of the study is to construct such 5-dimension ontology of intangible cultural heritage as actionable information, time information, actor information, place information, and thing information, making the resources of intangible cultural heritage be recorded and describe wholly by data, and laying the common foundation for later all-round construction of the ontology of intangible cultural heritage.

### 5.3. The Construction of Domain Knowledge Hierarchy System

According to the features and the hierarchy of the knowledge of intangible cultural heritage, the author analyzes Pan Wang Festival in details from such five aspects as activity, time, actor, place, and thing with every category, including several subcategories, and every category and its subcategories forming a tree-shape hierarchical structure (see Figure 3).



**Figure 3. The Chart of the Knowledge Hierarchy system of Pan Wang Festival**

(1) Activity. Pan Wang Festival originates the legend of Pan Wang’s creation of the world, expressing Yao people’s gratitude to their ancestor and celebration of their wonderful life. The custom of the festival is centered mainly around Talatuas activity, among which sacrifice to Pan Wang is the biggest ritual, besides playing music, dancing for Pan Wang are also included. In order to sacrifice to Pan Wang, Yao people spontaneously organize such Corporate Rituals as redeeming wishes, hanging lamps, holding flags. The Cultural Activities mainly refer to some of the activities of folk customs related to the traditional literature and art done by the people gathering together in the Pan Wang Festival, such as beating long drums, playing the flute, lion dance, etc.

(2) Time. Pan Wang Festival originates the legend of Pan Wang's creation of the world, which says that 16, October of Lunar Year is Pan Wang's birthday. So on the 16th, October of every lunar year; Yao people hold the grand pageant, celebrating Yao people's new life and Pan Wang's birthday filled with hope for the wonderful and stable life. The festival usually lasts three days and two nights, sometimes as long as seven days and seven nights. Several days before October 16 Yao people begin to piously worship Pan Wang, and sacrifice to Pan Wang on the 16, October. After October 16, such ritual and activities as playing music will be done.

(3) Actor. Pan Wang Festival is the Yao people's traditional festival, whose main participants are Yao people. The creation, development and inheritance of the Pan Wang Festival have always related closely to its actor. The most important part related to the creation of the Pan Wang Festival is such figures as Pan Wang, Third Princess, and Antelope.

(4) Place. There exists Pan Wang Festival, where there are Yao people living. The Pan Wang festival originated in Guangxi, Guangdong, and Hunan provinces, and has now become the grandest festival of the Yao people of the nation. The activities of Pan Wang festival are usually held in the sacrificial auditorium, and big-scale recreational activities are held in the square.

(5) Thing. Things related to the Pan Wang Festival are very rich, involving the offerings for sacrifice, popular musical instruments, and festival-specific dancing and singing, etc.

#### 5.4. The Definition of Kernel Concepts

The definition of the kernel concepts must be determined first before defining the entities in the construction of the ontology of intangible cultural heritage according to CIDOC CRM model. The author chooses the kernel concepts needed to construct the ontology and listed the relevant definitions concerning the definition of CIDOC CRM model of the International Documentation Committee. (see Table 1)

**Table 1. Definition of Kernel Concepts**

| <b>Terminology</b> | <b>Definition</b>   |
|--------------------|---|
| Class              | A class is a category of items that share one or more common traits serving as criteria to identify the items belonging to the class. |
| Property           | A property serves to define a relationship of a specific kind between two classes.  |
| Domain             | The domain is the class for which a property is formally defined. A property must have exactly one domain.                            |
| Range              | The range is the class that comprises all potential values of a property.   |
| Instance           | An instance of a class is a real world item that fulfils the criteria of the intension of the class.                                  |

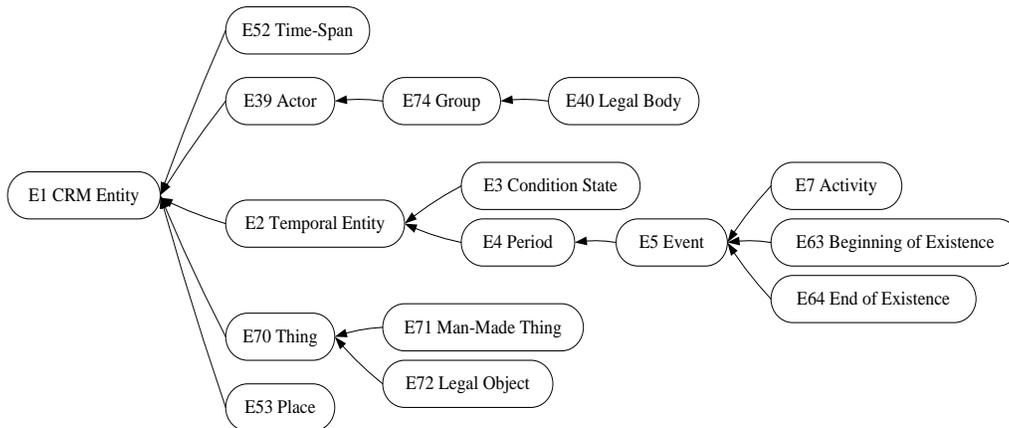
#### 5.5. Defining Entities and Property Relations

The entity is something distinguishable and independent in itself, namely class in CIDOC CRM. CIDOC CRM defines the domain of cultural heritage in 90 entities. Since the hierarchical structures of different entities are different, the main entities need to be defined first before defining the suitable the entities of the domain of intangible cultural heritage, and then to extend other entities according to the main entities.

**Table 2. Main Entities and the Scope Note**

| Entity             | Scope Note   |
|--------------------|--|
| E2-Temporal Entity | This class comprises all phenomena. In some contexts, these are also called perdurants   |
| E39-Actor          | This class comprises people, either individually or in groups, who have the potential to perform intentional actions for which they can be held responsible.                                       |
| E52-Time-Span      | This class comprises abstract temporal extents, having a beginning, an end and a duration. Time Span has no other semantic connotations.   |
| E53-Place          | This class comprises extents in space, independent from temporal phenomena and matter. A Place can be determined by combining a frame of reference and a location with respect to this frame.      |
| E70-Thing          | This general class comprises usable discrete, identifiable, instances of E77 Persistent. They can be either intellectual products or physical things, and are characterized by relative stability. |

Knowledge of intangible cultural heritage can be classified into five big categories: Activity, Temporal, Place, Actor, and Thing. According to the specification of the CIDOC CRM, the knowledge concepts on the top layer can be mapped correspondingly to such entities as Event, Time-Span, Place, Actor, Physical Thing, and Conceptual Object. Based on the definition rules of the CIDOC CRM, the entities of the Pan Wang Festival domain are mainly centered around activities and events, which can be classified as five categories as E2 Temporal Entity, E52 Time-Span, E53 Place, E39 Actor and E70 Thing. Table 2 shows the main entities and the annotations of the scope. The entity is marked with a number headed by E and is named after the noun phrases or nominal groups with the first letter in its title case. Take the knowledge of the Pan Wang Festival, for example; some of the entities and actual cases are E1 CRM Entity-Pan Wang Festival, E7 Activity-play music, etc. After the main entities of the construction of the ontology, the subclasses are then defined one layer by one layer according to the semantic analysis of the domain knowledge of intangible cultural heritage. Figure 4 shows, some of the entities and the hierarchy structure.



**Figure 4. Some Entities of the Construction of Ontology and the Hierarchy Structure**

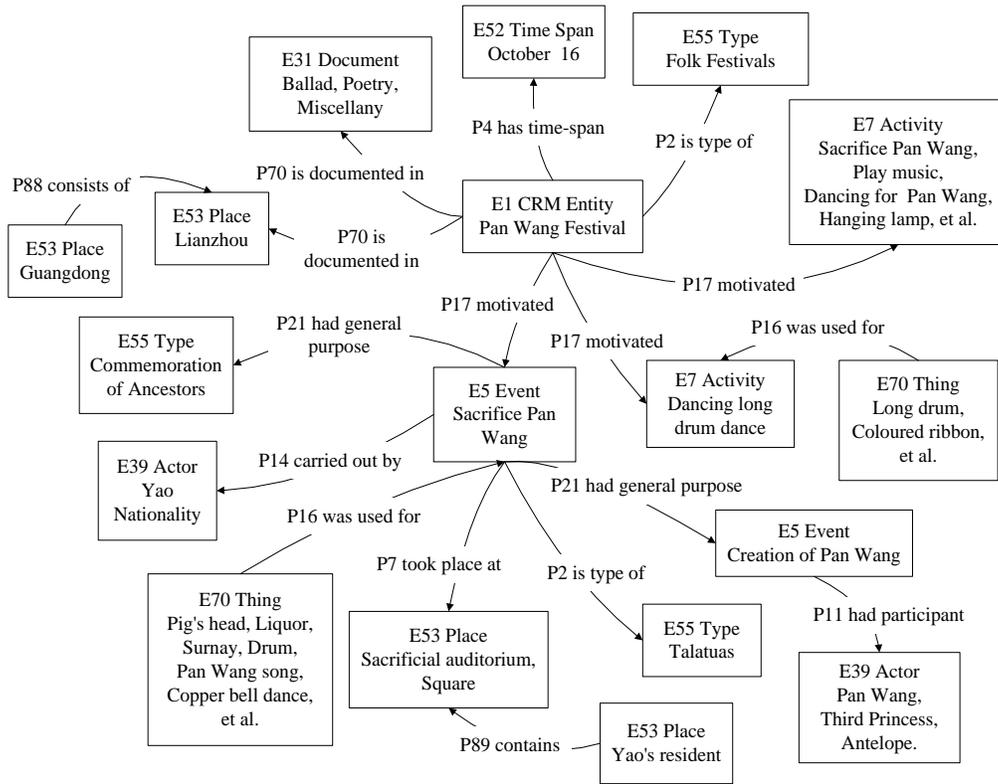
The entity construction system cannot fully provide all the needed information of the reply system, so after these entities and hierarchies are defined; their properties need describing. CIDOC CRM has defined 148 property relations of the entities of the domain of intangible cultural heritage, linking the people related to the event, entities of tangible and intangible cultural heritage according to their property relations. Property is marked with a number headed by P, is of double-track naming. The properties between the different entities in CRM are definite. The property relations between the entities can be established after the entities are extracted and defined concerning the property relation table of CRM, for example, E5 Event is participated in by E39 Actor, so the property between the two is that P11 had participant; similarly, the property between E39 Actor and E53 Place is that P74 has current or former residence. According to the extraction of knowledge of the Pan Wang Festival and the construction of the hierarchy system, the study of defining the entities and the property relations of the Pan Wang Festival is done based on the CIDOC CRM as shown in Table 3.

**Table 3. Some Entities of Pan Wang Festival and the Definition of the Properties**

| Property ID | Property Name                              | Entity-Domain            |                                | Entity-Range     |                                    |
|-------------|--|--------------------------|--------------------------------|------------------|------------------------------------|
| P2          | has type<br>(is type of)                   | E1 CRM<br>Entity         | Pan Wang<br>Festival           | E55 Type         | Folk Festival                      |
| P17         | was motivated by<br>(motivated)            | E7<br>Activity           | ssacrifice<br>Pan Wang         | E1 CRM<br>Entity | Pan Wang<br>Festival               |
| P21         | had general<br>purpose<br>(was purpose of) | E7<br>Activity           | ssacrifice<br>Pan Wang         | E55 Type         | Commemo-<br>ration of<br>Ancestors |
| P14         | carried out by<br>(performed)              | E7<br>Activity           | ssacrifice<br>Pan Wang         | E39 Actor        | Yao<br>Nationality                 |
| P16         | used specific object<br>(was used for)     | E7<br>Activity           | ssacrifice<br>Pan Wang         | E70 Thing        | Liquor                             |
| P4          | has time-span<br>(is time-span of)         | E2<br>Temporal<br>Entity | piously<br>worship Pan<br>Wang | E52 Time<br>Span | Before<br>October 16               |
| .....       | .....                                      | .....                    | .....                          | .....            | .....                              |

CIDOC CRM is applied to constructing the ontology of the interrelationship of then entities of the Pan Wang Festival concerning the entities and properties in Table 3. Different entities and properties describe the relevant knowledge of people, events, history, *etc.* For example, Pan Wang Festival (E1 CRM Entity) is a type of (P2 is type of) a Folk Festival (E55 Type), in various Ballads, Poetry, Miscellany (E31 Document) there are related records (P67 is documented in) ,prevailing in Guangdong province’s (E53 Place) Lianzhou (P88 consists of) (E53 Place), and so on, people (P4 has time-span) every October 16 lunar year (E52 Time Span) hold (P17 motivated) a series of activities (E7 Activity), such as Sacrifice Pan Wang, Play music, Dancing for Pan Wang, Hanging lamp, *etc*; Sacrifice Pan Wang (E7 Activity) is a type of (P2 is type of) sacrificing ritual, Talatuas (E55 Type) , is to celebrate (P21 had general purpose) the Creation of Pan Wang (E5 Event) done (P14 carried out by) by Pan Wang (E21 Person), every year in Pan Wang Festival, Yao Nationality (E39 Actor) gather together (P7 took place at) in Yao residents’ (E53 Place)(P89 contains) Sacrificial auditorium (E53 Place)

or Square (E53 Place) to do the worshipping and recreational activities (see figure 5).



**Figure 5. Illustration of some of the Ontology of Pan Wang Festival**

### 5.6. The Storage of Database

The purpose of the study of establishing database is to manage the already constructed domain ontology data, and to structure storing the knowledge of domain ontology. The newly established form defines the fields in the data form bases on CIDOC CRM. Every form of the database each has a preservation number (ID), Property ID, Property Name, Entity-Domain, and their CRM entities and Entity-Range, and the information fields of CRM, and every field in the form is shown in a row. The ID field is used to store the quantity of the data of the property relations in the form. The Property ID stores the codes of the property relations in CIDOC CRM. The Property Name field stores the description of the relations between the entities. The Entity-Domain (Entity-Range) field stores the type entity of the property relations of the Entity-Domain. The Domain-CRM Entity (Range-CRM Entity) field stores the entities of corresponding relations. For example, the first piece of data storage of CRM entity is the property relation of "E1 CRM Entity Pan Wang Festival" and type entity "E55 Type Folk Festival" matches the P2 has type (is type of) in CIDOC CRM, in which way all the data will be input in the corresponding field. All the entities and property relations of constructing the ontology will be stored in the corresponding entity form by the method above. 540 pieces of the ontology data of the Pan Wang Festival are recorded in the established data form in this paper (see Figure 6).

| ID    | Property ID | Property Name         | Entity-Domain  | Domain-CRM Entity        | Entity-Range  | Range-CRM Entity           |
|-------|-------------|-----------------------|----------------|--------------------------|---------------|----------------------------|
| 1     | P2          | has type (is type of) | E1 CRM Entity  | Pan Wang Festival        | E55 Type      | Folk Festival              |
| 2     | P2          | has type (is type of) | E1 CRM Entity  | piously worship Pan Wang | E55 Type      | Talatuas                   |
| 3     | P2          | has type (is type of) | E1 CRM Entity  | ancestor worship         | E55 Type      | Talatuas                   |
| 4     | P2          | has type (is type of) | E1 CRM Entity  | sacrifice Pan Wang       | E55 Type      | Talatuas                   |
| 5     | P2          | has type (is type of) | E1 CRM Entity  | play music               | E55 Type      | Talatuas                   |
| 6     | P2          | has type (is type of) | E1 CRM Entity  | dancing for Pan Wang     | E55 Type      | Talatuas                   |
| ..... |             |                       |                |                          |               |                            |
| 538   | P139        | has alternative form  | E41 Appellatio | worship of ancestors     | E41 Appellati | Commemoration of Ancestors |
| 539   | P139        | has alternative form  | E41 Appellatio | Yao Nationality          | E41 Appellati | The Yao people             |
| 540   | P139        | has alternative form  | E41 Appellatio | Yao Nationality          | E41 Appellati | Yao                        |

**Figure 6. The Data Table of Pan Wang Festival**

## 6. Conclusion and Future Study

The variations of the world culture and every country’s treasure of intangible cultural heritage are being eroded seriously, and the speed of disappearing is increasing every year. The preservation of the resources of intangible cultural heritage is pressing. However, in this information developed modern world, the preservation of intangible cultural heritage lacks of means of digital preservation. The author has done the research of constructing knowledge ontology of intangible cultural heritage based on CIDOC CRM model. And has proven the research result through actual cases, the purpose of which is to do some tentative research into the construction of the knowledge ontology base of intangible cultural heritage. To do some fundamental work for providing preservation means for the informationalization of the knowledge of intangible cultural heritage.

The resources of intangible cultural heritage are everywhere. Due to the fact that the intangible cultural heritage is huge in quantity and jumble in its knowledge, it is difficult to construct the whole knowledge ontology of intangible cultural heritage. The author takes the Pan Wang festival of the Yao nationality rich in knowledge as an actual case to construct the knowledge ontology, and designs and constructs the domain ontology of the Pan Wang Festival of intangible cultural heritage, but the Pan Wang Festival is only a small part of the intangible cultural heritage field. So there is still a long way to go to construct the ontology of intangible cultural heritage gradually later on.

The research has proven empirically, constructing successfully the domain ontology of the Pan Wang Festival, which is stored and preserved accordingly and provides an open technical method, thought and foundation for the construction of the knowledge ontology of intangible cultural heritage. The research is of some significance to the preservation and inheritance of intangible cultural heritage. If it can construct the knowledge ontology database for all intangible cultural heritages in the future through a series of tools based on the database so as to reach the goal of providing an effective way for the informationalization of the means of preservation and management of intangible cultural heritage, it will contribute a lot to the development of the informationalization of intangible cultural heritage.

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