

## Research on Multimedia Ontology based on XMDR+

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**Abstract.** This paper suggested a model of MOXMDR+ (Multimedia Ontology based on XMDR+) for interoperability of multimedia contents. The model was composed according to rules of ontology concept in the structure of metadata schema like as MDS (Multimedia Description Schema) of MPEG-7. Based on the concept of ontology, the association of multimedia contents data was expanded to enable semantic search.

**Keywords:** Multimedia, Content, Ontology, XMDR+, Description Schema

### 1 Introduction

Recently, many studies on multimedia contents search in an effective way and its interoperability were performed. Among the studies, several methods of describing metadata of contents were suggested, and thus semantic search of the contents was enabled [1]. Among standards for metadata expression, the representative standards were suggested such as MPEG-7, TV-Anytime, MPEG-21, Cablelabs1.1, DIG35, and Dublin Core; among the standards, MPEG-7 was applied for semantic expression of the multimedia contents instead of expression of the multimedia [2]. However, as contents based on different standards were increased, the semantic search of users for the contents was merely effective. This study suggested MOXMDR+ model to solve the semantic collision occurred in metadata of the contents. And it suggested rules of the semantic collision to effectively compose associated metadata of the contents. This study was structured as follows: The 2nd chapter introduced the relative researches. The 3rd chapter illustrated the suggested model and the 4th chapter contained conclusion and discussion.

### 2 Related Work

#### 2.1 MPEG Technology

Regarding MPEG, the standards of MPEG-4 were set for processing interoperable contents with various types of multimedia and the standards of MPEG-7 [2] were set for metadata of the contents; and currently elements of e-commerce technologies for digital contents and integration technologies were standardized as MPEG-21,

framework of multimedia. MPEG-7 was related to ‘metadata’, which was expression of the data, instead of data itself [3, 4]. The framework standards of MPEG-21 were created with total 7 elements of technologies for applications to create, transmit, and certify data in e-commerce environment through various networks and devices. This study composed multimedia ontology based on MPEG-7 including the concept of ontology for semantic search of contents, instead of standards of creating multimedia contents among the standards.

## 2.2 XMDR+ Technology

As XMDR+ [5] was a roadmap to solve metadata schema, data structure, and semantic collision through integration of data using XMDR, which was an expanded concept of MDR, the technology saved metadata of relational database to object-oriented database. In other words, it was storage integrating data by combining MDR and ontology to solve collision between schema structures and instances of dispersed data. This study composed the association of metadata of multimedia contents with XMDR+ to support data interoperability service for using the multimedia contents effectively.

## 3 The proposed model

### 3.1 Multimedia Ontology Structure

The structure of multimedia ontology was categorized by contents based on MPEG-7; according to the category, classes were defined to express each object and properties were defined to express the classes. The concepts of the structure were shown in the <Fig. 1>; ellipses were the classes, squares were the properties, straight lines of arrows were sub classes, dotted lines of arrows were domains of the properties, and alternate long and short dash lines were the ranges of properties.



Fig. 1. Multimedia Ontology based on XMDR+ configuration

In the <Fig. 1>, Creation was a class of the ontology of created multimedia data. The class was a sub class categorizing the contents using the data of the contents, and the necessity properties were title, abstract, creator, location, and date. The title and abstract properties contained the instance of rdfs:Literal. The creator property set tools and rules for creating multimedia through the creator class, and the location and data properties showed necessary information for creating ontology through the class. The classes on the creation class inherited one category of the multimedia data, which was categorized by multimedia ontology. Thus, the created ontology was built through a schema before creating each class.

### 3.2 MOXMDR+ (Multimedia Ontology based on XMDR+) Structure

The concept structure of MOXMDR+ according to metadata was composed based on schema after saving association of contents. This model provided associated information of users with reference to MO upon requests of users, and accordingly the users could search dispersed content resources through mapping based on schema according to the selected association. <Fig. 2> summarized workflow of the model's structure and elements of the structure. Arrows in the <Fig. 2> showed interoperation between the elements, and it showed the process of confirmation according to situations of mediator. The functions of each element were as follows:

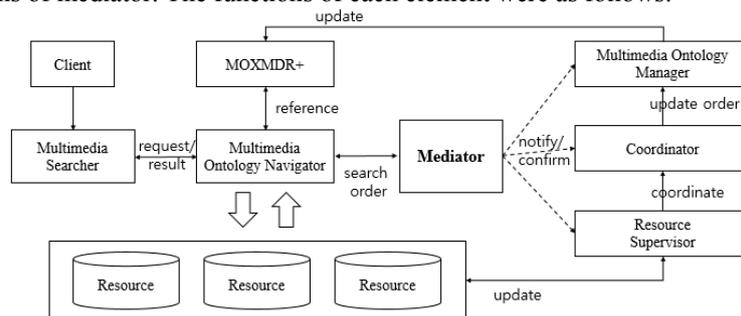


Fig. 2. XMDR + based on multimedia ontology model proposed

- \* **Multimedia Search Interface:** This element notices the start of process to mediator according to inputs of users and conveys the behavior of users.
- \* **Mediator:** It generally operates the system, searches contents data according to conditions of ontology and users, and monitors ontology update.
- \* **MOXMDR+:** In concept structure based on multimedia metadata, it manages association of contents and processes mapping for semantic collision in application of rules.
- \* **MONavigator:** With reference to ontology according to demands of users, it extracts and returns relative information.
- \* **Resource Supervisor:** It checks whether dispersed resources are modified and demands ontology update.
- \* **Coordinator:** It compares ontology of the mediator and updates information of resource supervisor to adjust ontology.
- \* **MOManager:** It updates ontology according to coordinator.

Accordingly, MOXMDR+ was updated for the mediator on regular basis to keep the relationship with contents up to date.

## 4 Conclusion

This study introduced structures of multimedia ontology based on XMDR+ and rules for solving collision for effective search of contents information, and it suggested a system model to search contents accordingly. The model checked a change of data sources and updated ontology on regular basis to develop the ontology. According to the suggestion, a single ontology used relative information of the dispersed contents for search. Recently, studies were performed on integration of the ontology for the dispersed ontology. Accordingly, the integrated ontology would be expanded to use various types of contents; and the suggested rules should be normalized.

## References

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