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# 실버형 멀티미디어 정보 시스템 설계

## Design of Multimedia Information System for the Aged

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### 요약

본 연구는 점차로 확대되고 있는 실버 관련 전문정보의 체계적인 수집과 관리에 대한 요구를 바탕으로 멀티미디어 DB를 기반으로 한 실버포탈사이트를 구축하고 실버 관련 정보제공을 위한 디지털 콘텐츠 개발을 통하여 실버형 멀티미디어 정보 시스템을 구축하고자 한다. 또한 온-오프라인을 포괄하는 노인전문 온톨로지 기반 정보저장소를 구축하고자 한다. 실버형 정보를 분석하여 각 정보에 대한 의미적 관계를 추출하고 각종 어휘에 대한 계층적 구조를 파악하고 이를 통한 에이전트별 기능을 설계하여 온톨로지 기반 정보저장소를 설계·구축한다. 또한, 다양한 정보 및 디지털 콘텐츠를 개발하여 국내 노인복지시설에 대한 체계적인 멀티미디어 DB망을 구축하고 국내외 각 노인복지 시설에 대한 자동 등록이 가능한 웹 프레임워크를 개발하여, 업체별·시설별 이용현황과 통계 현황을 지원할 수 있도록 설계하였다.

■ 중심어 : 멀티미디어 정보 시스템 | 실버 포탈 | 실버 디지털 콘텐츠 | 온톨로지 | 멀티미디어 DB |

### Abstract

This study aims to construct the aged portal sites based on multimedia DB on the basis of request for systematic collection and management of the aged-related specific information which are spreading and construct Multimedia Information System for the Aged by developing digital contents to offer the aged-related information. It also tries to construct ontology based information repository for the aged that includes on/off-line. It extracts semantic relationship of each information by analysing the aged information, knows the hierarchical structure of each vocabulary, and designs and constructs an ontology based repository by designing function of each agent through that. It has also developed a variety of information and digital contents, constructed a systematic multimedia DB for the aged welfare homes, developed web framework which makes automatic registration of the aged welfare homes possible, and designed in order to support the use state of enterprises/homes and statistics state.

■ keyword : Multimedia Information System | The Aged Portal | The Aged Digital Contents | Ontology | Multimedia DB |

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## 1. Introduction

Today the population of the old, 65-year-old or

over, is 7.1% (3,371,000) of the total population and increasing, but a birth-rate is decreasing as it shown at the population changes of the age of

0~14. Our country is getting into the aging society classified by the UN that means 7% or more of the population is the old[1]. In the nation, the old long-term medical care insurance law has taken effect in 2008, establishments according to this will be increasing and the need of the aged homes and services is getting bigger[2]. These are the main reasons why there should be the business for the aged[3][4]. These factors were the background of development of the business for the aged of advanced welfare nations since in the late of 1970's. It proves that there have been increases of the old in quantity and quality, nuclear families, the old-living-alone family, and families with the old. Increase of the national income and the maturity of welfare service helps economic powers of the old strong and the quality of their lives higher, and the good quality of their lives leads the growth of the business for the aged. As described the business for the aged has a lot of potentials and a certain market. The size of the market in this country is becoming bigger and bigger. Domestic business for the aged should have a lot of possibilities depending on development, quite a few homes for the aged have been built, but shopping malls or the businesses for the aged are only at the stage of the beginning compared to other countries, it seems that there will be a great opportunities to lead the market in the future.

However, established systems in domestic related to the aged are more likely to be homepage and the contents about homes and how to use are composed of texts and pictures. Especially, it is hard to get information related to the aged homes in the country; not only the exact information but the prepared information related to the content. Now for the aged homes, each business constructs its own site and runs it, so there should be an

inclusive and systematic portal site for the aged, management of e-commerce, and information and skills related to the aged welfare. Hence, this study constructs the aged portal site based on multimedia DB, constructs a multimedia information system for the aged by developing digital contents to offer information and use it. It also constructs the aged-specialized ontology based repository which includes on/off-line.

## II. Established Work

The business for the aged is a profit-making business to the aged and it is for private enterprises to supply goods and services based on theory of market competition. The fields of the business are developing into various industries and shows the future business for the aged such as residence, taking good care of the aged, medical care, leisure, etc. as shown [Table 1]. If looking at the trend in domestic, we can see there have been 2 of silver towns open in the national region and some big enterprises like Samsung Insurance and Keangnam Enterprise started joining to develop silver towns. It means that the aged homes will largely affect future business and play a big role to our society. Not only the silver town, but silver goods have appeared on Internet shopping malls and there are silver mart and silver world running the business. There are even silver fashion shops in the department stores[4].

According to consumer analysis, it is not only about the increase of the number of the old, it tells that the old in the modern society have more economic power and are able to spend more money than ones in 20th century. The change of social awareness of taking care of old parents puts the

use of the old homes higher. And also enlargement of women's social activities puts a person or a family to face taking care of old parents at home difficult. The cost of medical care of the aged is increasing largely due to increase of the old with chronic diseases and there are some services to accommodate them but the analysis says that it is not easy for users to get professional information for the patients[3]. Therefore, there should be a variety of portal retrieval for professional information for the silver and digital content skills in order to serve the exact information. A variety of solutions to compose digital content has been appearing, but a solution for the aged content development has not been activated yet.

Hence, in this study I would like to structure silver-welfare-related information into ontology based retrieval agent system based on systematic collection and management of professional information related to silver which is spreading widely and construct a multimedia information system for the aged that produces the aged digital contents from the retrieved information and shows them on the web.

Table 1. Related Field to The Aged Welfare

Field	Contents
Residence Related	Silver towns, Charged nursing homes, 3rd generation houses, Apartments for the aged
Charged Nursing Homes	General homes, Homes for the old with serious illnesses like dementia
Charged Service at Home	Home helper dispatch service, Daytime-care facilities, Short-term facilities, Food Delivery, Housekeeping service
Medical Related	Hospitals for the old, Healthcare facilities for the old; medical equipments/medicine, Doing business for Hospital-related work
Finance Related	Pensions, Insurances, Trust, Asset management, Etc.
Leisure	Sports, Hobbies, Travels, Medium/Long-term travels, Entertainments, Colleges for the old
Job Related	Jog agency services, Vocational courses, Offering job information, Computer education
Life Related	Silver fashion, Health food, Fancy food, Everyday products

### III. System Design

#### 1. System Structure

[Figure 1] is a structure of ontology based multimedia information system for the aged. this system analyzes silver information, extracts semantic relationship between information, and designs a hierarchical structure of each vocabulary. Through this it designs the function of each agent and designs/constructs an ontology based repository[5,6]. This repository a service which retrieves similar information when inquires are input through retrieval engine agent and supports contents by being connected digital contents done in advance. It constructs a multimedia DB with the old homes and services, develops ontology based web retrieval agent system for effective retrieval, and constructs the aged portal site for multimedia DB users[7]. It has also developed various information and digital contents and constructed a systematic multimedia DB net of the aged welfare homes in the country, It has developed web framework that makes automatic registration of the aged welfare homes possible in the country and the support the use state of enterprises/homes and statistics state.

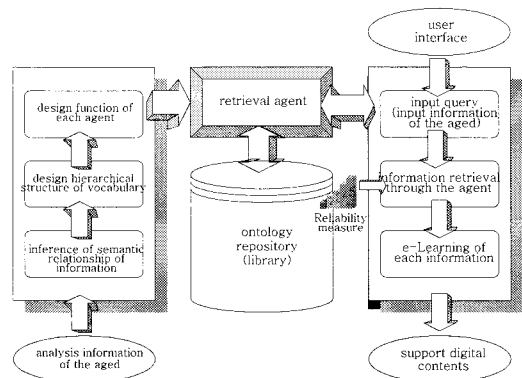


Figure 1. Multimedia Information System for the Aged

## 2. Retrieval Agent

In order to develop ontology based information retrieval system, it defines the aged requirements related to welfare for the aged and considers a lot of things; analysis of specific silver-related information and knowledge, examination into welfare homes, inference management decision, decision of evaluation standard and measurement standard, decision of available range, consideration of data noise, work on established ontologies, and analysis of ontology management tools and procedures. On the basis of this, ontology based retrieval will be used as a method of ontology on the semantic web[7][8]. The structure of web based retrieval system will be divided into retrieval engine and ontology which are subsystems. Retrieval engine is around the ontology repository and this engine is constructed as a subsystem which is linked to inference engine using that users use semantic web, agents, RDF(Resource Description Framework), and ontology subsystem generates ontology on the semantic web, maintains and manages it. Therefore, ontology in the information retrieval system plays a role as a guide that helps retrieval for more results, it can be a kind of solution to queries or meaning in the sentence unsolved in the previous information retrieval system[9]. So, I in this paper designed 3 agents for construction of ontology based DB and retrieval.

### -Ontology DataBase Creation Agent

It is the procedure that converts established Relational Database into Ontology Relational Database based on OWL schema document[10]. It makes ontology database based of OWL document and data that users input and stores. It parses input OWL document, extracts ontology information

and stores into a structured body depending on what kind of information it is. It matches a structured body and data offered and stores it into a new relational ontology database.

### -Query Processor

It is a procedure that puts converted ontology database into DataSet to make ontology inference possible and processes a query. It does not find the result by querying relational database about ontology data directly, but processes by taking the result from DataSet which is memory DB. When there is a query next, it uses detached DB connection which is one of advantages of DataSet and minimizes the load, so it can improve the performance. It finds specific information of contents, matches with query pattern, and retrieves content through OntologyDataSet. Query pattern is made based on basic information of contents.

### -Contents Retrieval Agent

It is a procedure that recommends potential contents corresponded to query and controls weighted values between the actual chosen contents and not chosen contents. Potential contents are shown on the user's screen as each weighted value as the results retrieved by query processor. In the case that user chooses the content, the weighted value will go up, otherwise, the weighted value will go down.

## IV. The Aged Digital Contents

### 1. Multimedia DB

This study structures established text-oriented DB into multimedia DB. It structured facilities for the aged and welfare services into multimedia DB,

developed web-based retrieval agent for effective retrieval, and designed the silver portal site that old people recognize and use easily. Main information offered are about traveling and events for convenience and pleasure of afternoon lives of the aged, and also some information for healthcare, medical facilities, welfare facilities is developed as digital contents and offered. Hopefully, it will play a role as the space that not only helps users, the aged, old people, but also creates stable and reliable market for the silver enterprises and supplies credible products and services. [Figure 2] shows the screens of examples of existing site offered text based and multimedia DB. It is a site only for the aged welfare operated by the Ministry for Health, Welfare and Family Affairs that has constructed a DB related to facilities and served, however, it serves basic items as text-oriented, so it is not easy to get details of facilities[2].

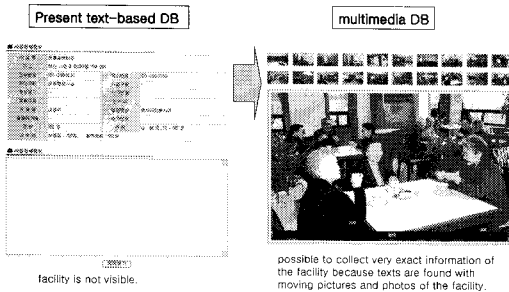


Figure 2. Multimedia DB

Silver content procensure is to select a medium by composing a scenario related to the aged welfare and analyzing circumstance and to compose prototype. Through designing these, storyboard and prototype will be made up and after actual contents are developed, the result has to be ported onto the web and tested. The verification of functions of content and request will be done then

and the reaction between the system and the contents will be evaluated as well. The actual employing environment will also be verified and operated. [Figure 3] shows the procedure of content development.

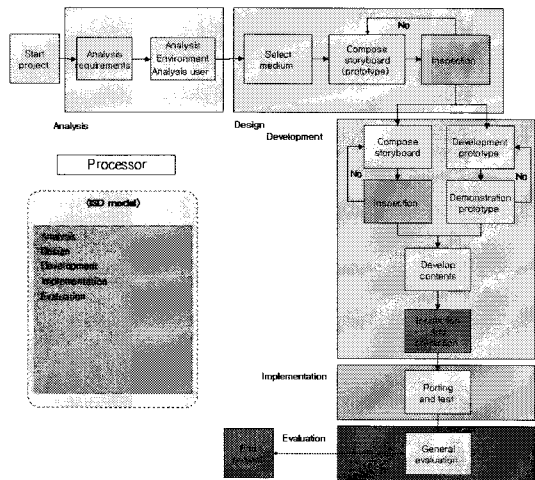


Figure 3. Procedure of Content Development

## 2. The Aged Operation System

The silver information system this study tries to construct offers a variety of digital contents such as information of old age life, traveling, events, shopping malls, and so on. It aims to structure multimedia DB net of nationwide the aged welfare facilities and information, and to offer tailored contents information through linking developing 3-dimension digital contents. The first screen as shown in [Figure 4] is composed of DBs about the aged welfare facilities and other DBs that support them. It develops silver-related digital contents about finance, clinics, homes, and facilities and supports. Also for traveling information, it structures a network which can offer various travel agency service. As an event, it produces every celebration as digital contents, and it could give a

good influence to the aged welfare. Shopping malls develop frameworks that connect products for the aged, use it as an authoring tool, and constructs a tailored system between client and server. It also develops digital contents about welfare facilities in the country and develops contents about information and how to use facilities. Web frameworks should be done to make every the aged facility register automatically and support the statistic function to measure the use state of enterprises/homes and statistic state. In order to structure a retrieval engine, it decides attributes of applications by using ontology with data collection of related established information and data collected, confirms requirements of products for the aged, structures the system by drawing a lot of things: information of specific organization and analysis of knowledge, ownership issue, system examination inside specific organization, inference management decision, decision of evaluation standard and measurement standard, decision of available range, consideration of data noise, ontology managing tools, analysis of management procedure, and so on.

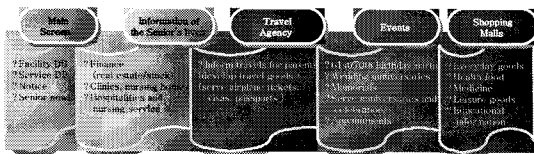


Figure 4. The Aged Portal

Silver information system proposed in this study structured in order to extend into silver operating system. Silver information system as shown in [Figure 5] offers various silver contents by using ontology based retrieval agent and further more it is a chance to offer educations and information to the aged and can be a developed as a silver

operating system that includes client management support about silver-related enterprises and e-learning service of 3-dimension virtual space

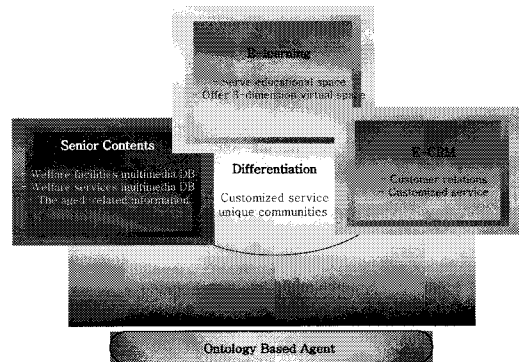


Figure 5. the Aged Operating System

## V. Conclusions

This study tried to structure information of the aged facilities in he country into multimedia DB and to structure the multimedia information system for the aged that offers developed items and contents connected to a variety of on/off lines related to the aged. The procedure of content development is like this; it selects a medium by composing a scenario related to the aged welfare and analyzing environment and composes prototype. Through this design it develops contents, ports the results onto web, and tests. Then the verification of content function and requirement function is done and it evaluates the reaction between the system ann contents. It also verifies the actual operating and operates. Various silver-related content retrieval is done through information retrieval engine constructed. Retrieval was constructed with ontology based better effect than established string-matching method. Information related to the aged welfare is retrieved by using

retrieval agent system of ontology based and information retrieved is produced as silver digital contents in order to be seen on web. Further study of this work is to make e-Learning on 3-dimension virtual space about how to use services for the aged welfare, facilities related to, and information possible.

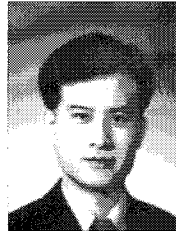
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