

Digital Movie Guide Service for Approaching Community Coordinated Multimedia

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ABSTRACT: *Community Coordinated Multimedia (CCM) empowers users' experiences through providing services of multimedia aggregation, delivery, sharing, and viewing within a community via the Internet. Annotating and feeding external information on movies really enrich users' viewing experiments through providing digital movie guide services. This paper elaborates Community Coordinated Multimedia focusing on the supporting of multimedia annotation and viewing guide services. We analyze the requirements for developing Digital Movie Guide (DMG) service. With the flowchart design and the annotation file structure design of DMG, we develop the Digital Movie Guide (DMG) service architecture. The DMG service demo version is implemented and evaluated for testing its impacts on enhancing the user's viewing experience. The result is positive and gives encouragement.*

Keywords: Community Coordinated Multimedia, Digital Movie Guide, Electronic Program Guide

Received: 21 September 2010, Revised 28 October 2010, Accepted 3 November 2010

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1. Introduction

Personal experiences emerge from the active participation in events or activities and lead to the accumulation of knowledge, skill and enjoyment. Collaborative use of multimedia and services empowers the user to experience the real world and share it with others. Networked applications have transformed passive consumption of multimedia into a mean of communication between the users. The above emerging technical phenomenon is generalized with a term 'Community Coordinated Multimedia' (briefly, CCM) [1, 2]. The vision of CCM faces a series of challenges with collaborative multimedia applications via heterogeneous infrastructure (e.g., networks, devices, platforms, and software) in multimedia delivery lifecycle (e.g., multimedia representation, creation, indexing, searching, aggregation, distribution, delivery, and viewing).

Enriching user's viewing experience motivates the design and development of DMG service in this paper. Many research and activities have involved in enriching user's multimedia viewing experience in the past decades, e.g., offering program information in electronic program guides (EPGs) such as Guide Plus+ from Gemstar [3] or TV Movie from Heinrich Bauer Verlag [4]. Most of those mainly focus on guiding the consumer to navigate scheduled broadcast television or radio programs, and focus on offering information about the current program and about future programs.

Compared to those systems, our work concentrates on an open digital movie guide service in term of user-generated content. It is created as a downloadable plug-in for Windows Media Player 10 and 11, which gives additional information for the

viewer by showing relevant information about movies. Additional information is arranged in chronological order by using time coding scheme and shown in an extra data view window. By using links information provided by the DMG service, the viewer can retrieve external services, e.g. surfing Internet, going shopping via Internet.

The technical foundations of DMG service are presented in this paper, such as requirement analysis, service design and implementation. The remainder of the paper is organized as follows. Section 2 examines DMG service-enhanced viewing experience. DMG service analysis and design are described in Sections 3. Section 4 presents the implementation and evaluation of DMG service. Finally future work and conclusion are given in Section 5.

2. DMG Service-Enhanced Viewing Experience

Our previous paper [2] depicts an overall scenario on how CCM empowers user's multimedia experience by enhancing multimedia delivery chain. This section highlights DMG service-enhanced movie viewing as follows: (1) User Alice is viewing a movie with Windows Media Player 11. (2) She requests DMG service as a user interface plug-in. (3) Alice presses the pause button while watching a scene clip of the movie, DMG service is triggered and pop-ups a data view window. (4) The data view window presents relevant information about the scene, including actors, song, charming goods, etc. (5) Alice enjoys the extensive information by clicking links. These links are directed to external services, such as Web pages and Web applications. The functional requirements for DMG service are divided into two parts:

1) Functional requirements for using DMG service. There are several possibilities for creating DMG guide files. The user can choose the DMG guide file from his/her own database in the PC/Laptop. How does the user have the DMG guide file? The simplest way is that a film studio includes it to the original DVD with extras of the movie or it is distributed over the Internet by the studio. Other highly useful implementation is a common database in the Internet, where users could add their own information for the movie. And each user could download the DMG guide file to their own PC/Laptops. This solution has great benefit because it could be updated by the users with no limits. Unfortunately there's a weakness in this solution also, because the validity of the information cannot be guaranteed in this option. In the demo version, the user creates DMG guide file in his/her own database in PC/Laptop.

2) Functional requirements for developing DMG. It should be easy to use DMG service. Enabling and disabling DMG service should be done through Media Player, without the need to access operating system functions. The user must be able to choose the DMG guide file for relevant information of a movie. DMG service must parse the DMG guide file in order to find out any possible errors and the correctness of the file. Otherwise, the program would most likely function unexpectedly. As for the usability of DMG service, there are four things to consider. First, a time buffer must be implemented. If the user would be expected to react and pause the movie in time to view information about an event, for example, she/he would often be forced to rewind the movie. This is not exactly a user friendly case. To avoid this, a buffer must be implemented to take into account information entries in close temporal proximity. Secondly, the entries must be shown in a Graphical User Interface (GUI), in the order they appear in DMG guide file. This will ensure a measure of coherency in the order the entries are shown to the user. Section 3.3 will present the detail on the structure of a DMG guide file. Third, in addition to the dynamically generated lists of entries, there must be a number of static ones, shown to the user throughout the movie. These entries include the synopsis, the director and other such facts, relevant for the whole period of a movie. Lastly, the quality of the GUI must be considered. This includes resizing the data view window and changing the theme (e.g. colors, etc).

3. Service Analysis and Design

The section presents DMG service analysis and design by applying sequence diagrams and flow charts. They illustrate how different parts are interacting with each other and what kind of logic is underlying the design.

3.1 DMG Service Sequence Diagram

Figure 1 depicts the sequence diagram for DMG service-enhanced user's viewing experience, which consists of seven interacting components.

The DMG service starts when the user (component 1) views a movie and requests DMG service (component 2). DMG service opens a DMG guide file (component 3). As the file is opened, the DMG service parses the DMG guide file, and read time-based movie relevant information. The time-based information is only read once from the DMG guide file during DMG

service. The broken lines refer to the one-time actions. After the DMG service initialization, the control is given back to the user. After the user pauses the movie whenever she/he likes, a message is sent to Media Player (component 4) to pause the movie and retrieve the time-based relevant information. The DMG service will then instruct the operating system (component 5) to draw a new window (i.e. data view window (component 6)) to show the relevant information. The relevant information includes links to Web pages, such as homepage of an actor, etc. The user can interact with the Web browser (component 7). The user can continue to watch the movie after Web browsing.

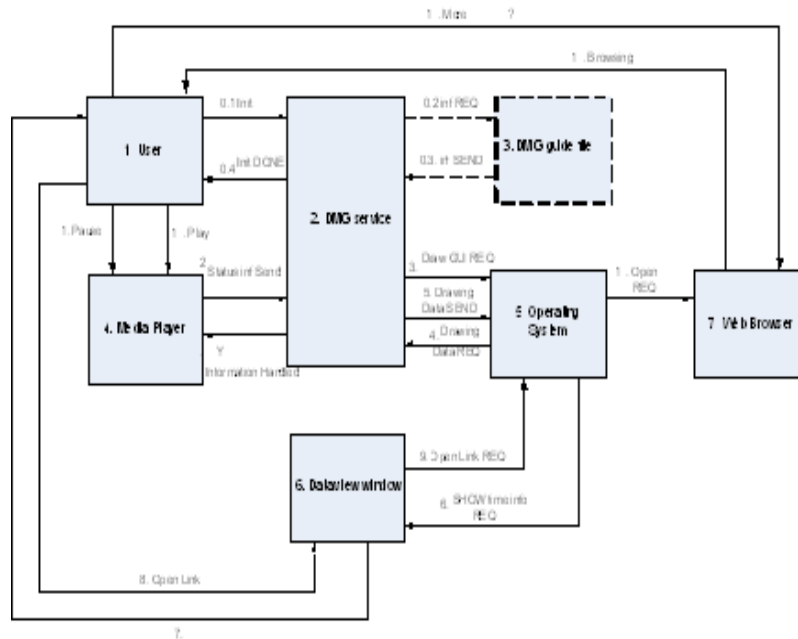


Figure 1. The sequence diagram of the DMG service

3.1. Flow Chart

Figure 2 presents the flow chart of DMG service, focusing on the logical behavior of the DMG service.

The starting point is for the user to open Media Player. It can be said that Media Player is the idle mode. If the user decides to use DMG service, she/he can open the DMG guide file from PC/Laptop that contains the movie guide information. If the user does not choose the file, he/she can watch the movie without DMG service. After the user selects the DMG guide file, DMG service retrieves relevant information by parsing the DMG guide file. If the user pauses the movie, the relevant information is viewed based on time-coding scheme. The user can browse Internet to get more information by selecting interesting links. The Internet Web page is viewed in a separate window. The user can select more other links before continuing the movie. When the movie is finished the system state is back to the starting point.

3.2 DMG File Structure

Movie guide information is stored in the DMG guide file, which consists of many information entries. Each entry has the following structure based on time-coding scheme:

Entry structure = starting time:ending time:type:value:link

Entry object = 00001:00007:Car:Aston Martin:<http://www.astonmartin.com>, where,

- 1) 5 digits are for the starting time.
- 2) The colon is to separate the beginning time from the next 5 digits.
- 3) The next 5 digits are for the ending time.
- 4) The next is type information which can be for example car, actor, etc. The links that has the same type will be grouped under the title *type*.
- 5) The value of a type starts after colon.

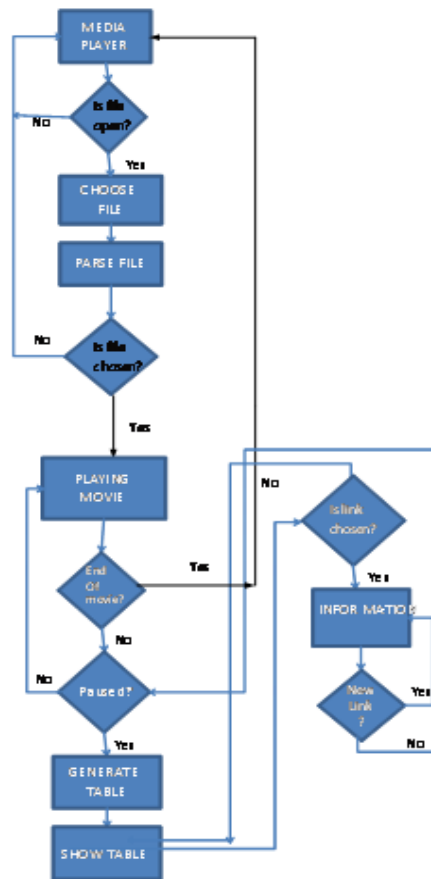


Figure 2. The flow chart of DMG service

6) The value is one of a type, which can be for example a model of a car like Aston Martin, a name of an actor, etc.

7) The link information starts after a colon.

8) An entry definition ends up the link information, which is passed to Web browser.

DMG service guides the user to view a movie through reading and parsing the DMG file. The parsing algorithm is given in a pseudo code form as follows:

```

* READING LINES TO A BUFFER
* *****/
open the file;
if (opening failed)
    return -1;
else{
    read the line to a tableBuffer;
}
when(all the lines read)
    replace null pointer '\0' in the end of the line;

/*****
* TRANSFERING THE TIME INFO FROM tableBuffer TO timetable
*****/

```

```

start from the first line;
1.  if(first 5 digits are numbers){
        change the 5 digits to a number with atoi-command;
        place the number to a start time in timeTable;
    } else {
        place a negative number to timeTable for start and end time;
        start from the first 5 digits in the next line;
    }
2.  if (the 6th character in infofile line j is not : ){
        place a neagative number to timeTable for start and end time;
        start over from the first 5 digits in the next line;
    }
    repeat the steps 1-2 to the next 5 digits that corresponds to end time;
/*****
*  TRANSFERING THE TIME INFO FROM tableBuffer TO entryTable
*****/
3.  Until (the character in tableBuffer is :)
        transfer the category info to entryTable;
4.  if(category info too long) {
        place a negative number to timeTable for start and end time.
        start over from the first 5 digits in the next line;
    }
    repeat the steps 3-4 to entry and link-info.
    start over with the next line in information file.

```

4. Implementation and Evaluation

4.1 Implementation Techniques

The DMG service is implemented as a plug-in for Windows Media Player 10/11. It can work in Windows XP or Vista. The DMG service applied Windows plug-ins packets. Microsoft offers starting packets for different kind of self made plug-ins in Web pages [1]. The Visual Studio 2008 (referred to as Visual Studio in the sequel) is the recommended programming environment for creating DMG service. Windows Software Development Kit (SDK) offers the necessary libraries and tools for coding work in Visual Studio. Visual Studio supports many coding languages. Visual C++ is selected as programming language. Active Template Library (ATL) template based C++ classes are used to support programming. Web links are shown by using Windows Media Player core interface. C++ programming is also used in parsing DMG files. The DMG service runs on Windows XP/Vista operating system.

The DMG service demo version has the following constraints. The DMG service is only compatible with Windows Media Player 11 and Windows XP/Vista operating system at the writing moment.

4.2 Evaluation

Fig. 3 illustrates the Graphical User Interface of the DMG service demo version in Windows Vista operating system. The window on the left is the Windows Media Player 11's main window and next to it, on the right side, is the DMG data view window. In the data view window, the time coded entries are listed as link buttons in a chronological order. The first link button refers to the entry which has come first on screen; in this case it is actress Uma Thurman. As a default, the links will direct into some informative Web pages. If there is a word "(Buy)" after the entry name, the link is directed into an electronic shop, where you can purchase that specific item. The DMG service demo is deployed and tested for home entertainment. For example, using DMG the user can quickly locate what they are interested and retrieve external content by browsing Internet.

5. Conclusion and Future Work

Community Coordinated Multimedia promises extending and enriching people experience through enhancing multimedia delivery chain, such as multimedia aggregating, distributing, sharing, and viewing processes. This paper focuses on enhancing the user's viewing experience. It proposes DMG service to approach CCM paradigm a step. The requirements for develop-

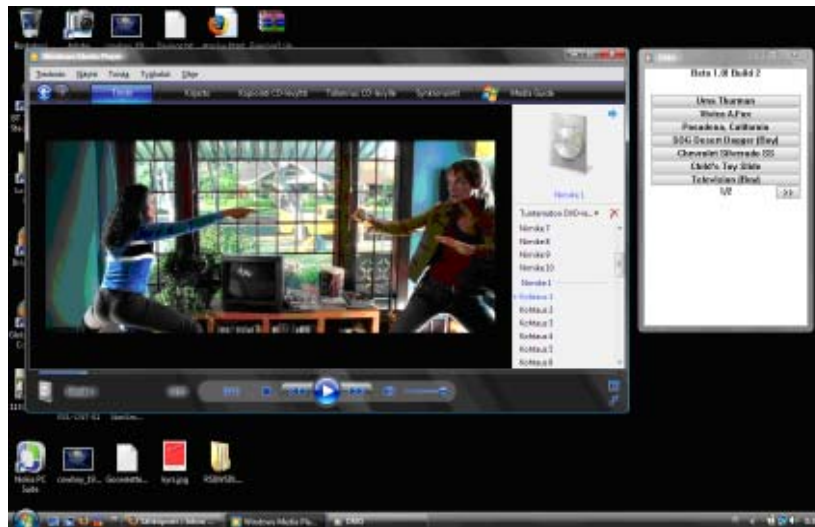


Figure 3. The graphical user interface of DMG

ing DMG service are analyzed first. The sequence diagram and flow chart are detailed for DMG service design. The structure of DMG files is designed. Finally DMG service demo version is implemented and evaluated for testing its impacts on enhancing the user's viewing experience. The result is positive and gives encouragement. Two major tasks are identified for future DMG service development as follows:

- Service-oriented DMG development. Service-orientation system design and technology exhibits strong potentials in leveraging DMG development in discoverability, composibility, flexibility of multimedia viewing via diversity executing environments. Service-oriented DMG development will take a leap for approaching service-oriented CCM [5].
- Application-specific DMG service development. This direction goes toward enhancing the user's viewing experience with specific purposes, e.g. training children in emotion intelligence. There exist various video annotation tools, e.g. Anvil [6-8], YouTube video annotation [9]. Most of them support annotation file generation.

Currently, DMG service doesn't support DMG file generation. How to integrate existing video annotation tools with DMG service will be another challenge.

6. Acknowledgement

This work was carried out in the ITEA2-CAM4Home project funded by the Finnish Funding Agency for Technology and Innovation (Tekes). Many thanks to Ms. Minna Kaukasalo, Mr. Tuomas Paso, Mr. Matti Ojala, Mr. Jaakko Moisanen, for implementing and refining DMG service.

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