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International Telecommunication Union
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Recommendation

ITU-T F.740.3 (09/2023)

SERIES F: Non-telephone telecommunication services

Multimedia services

Metadata for digital representation of cultural relics/artworks using augmented reality

ITU-T F-SERIES RECOMMENDATIONS

Non-telephone telecommunication services

TELEGRAPH SERVICE	F.1-F.109
Operating methods for the international public telegram service	F.1-F.19
The gentex network	F.20-F.29
Message switching	F.30-F.39
The international telemessage service	F.40-F.58
The international telex service	F.59-F.89
Statistics and publications on international telegraph services	F.90-F.99
Scheduled and leased communication services	F.100-F.104
Phototelegraph service	F.105-F.109
MOBILE SERVICE	F.110-F.159
Mobile services and multidestination satellite services	F.110-F.159
TELEMATIC SERVICES	F.160-F.399
Public facsimile service	F.160-F.199
Teletex service	F.200-F.299
Videotex service	F.300-F.349
General provisions for telematic services	F.350-F.399
MESSAGE HANDLING SERVICES	F.400-F.499
DIRECTORY SERVICES	F.500-F.549
DOCUMENT COMMUNICATION	F.550-F.599
Document communication	F.550-F.579
Programming communication interfaces	F.580-F.599
DATA TRANSMISSION SERVICES	F.600-F.699
MULTIMEDIA SERVICES	**F.700-F.799**
ISDN SERVICES	F.800-F.849
UNIVERSAL PERSONAL TELECOMMUNICATION	F.850-F.899
ACCESSIBILITY AND HUMAN FACTORS	F.900-F.999

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T F.740.3

Metadata for digital representation of cultural relics/artworks using augmented reality

Summary

The augmented reality cultural service system (ARCSS) is a kind of digital interpretation system based on augmented reality (AR). ARCSS is able to present a story or history behind cultural relics/artworks in a dynamic and actual fusion way.

Recommendation ITU-T F.740.3 describes the information flows of augmented reality cultural service, including AR content creation information flow and AR content display information flow. Based on the information flows, this Recommendation specifies the metadata for digital representation of cultural relics/artworks using augmented reality.

History *

Edition	Recommendation	Approval	Study Group	Unique ID
1.0	ITU-T F.740.3	2023-09-13	16	11.1002/1000/15613

Keywords

Artworks, augmented reality, cultural relics, metadata.

* To access the Recommendation, type the URL https://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Table of Contents

		Page
1	Scope	1
2	References	1
3	Definitions	1
	3.1 Terms defined elsewhere	1
	3.2 Terms defined in this Recommendation	1
4	Abbreviations and acronyms	1
5	Conventions	2
6	Overview	2
7	Information flows of augmented reality cultural service	2
	7.1 Workflow of augmented reality cultural services	2
	7.2 AR content creation information flow	2
	7.3 AR content display information flow	3
8	Metadata for ARCSS	3
	8.1 AR content creation metadata	3
	8.2 AR content display metadata	5
Bibliography		7

Recommendation ITU-T F.740.3

Metadata for digital representation of cultural relics/artworks using augmented reality

1 Scope

This Recommendation describes the metadata for digital representation of cultural relics/artworks using augmented reality.

The scope of this Recommendation includes:

1) Information flows of augmented reality cultural service system;

2) Metadata of augmented reality cultural service system.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T F.740.2] Recommendation ITU-T F.740.2 (2021), *Requirements and reference framework for digital representation of cultural relics and artworks using augmented reality*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

3.1.1 augmented reality [b-ITU-T J.301]: A type of mixed reality where graphical elements are integrated into the real world in order to enhance user experience and enrich information.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AR Augmented Reality

ARCC Augmented Reality Content Creator

ARCSS Augmented Reality Cultural Service System

ARCU Augmented Reality Content User

ARM Augmented Reality Manager

RAM Random Access Memory

ROM Read-Only Memory

5 Conventions

None.

6 Overview

Augmented reality cultural service system (ARCSS) is a kind of digital interpretation system based on augmented reality (AR), it can use AR technology with rich media forms, such as video, audio, and other media forms to present the story behind cultural relics/artworks in a dynamic and actual fusion way. ARCSS can increase the interest of visits to cultural venues and deepen understanding of cultural relics/artworks for the audience.

There are three roles in an ARCSS, namely AR content creator (ARCC), AR manager (ARM) and AR content user (ARCU). ARCC is responsible for AR content creation and processing of artworks in cultural venues, while ARCUs use AR terminals to enjoy AR content in cultural venues. The ARM is responsible for the unified management of AR content and terminals via the ARCSS.

7 Information flows of augmented reality cultural service

7.1 Workflow of augmented reality cultural services

ARM is the core of ARCSS. The ARCC provides the ARM with AR content for the project, and the ARM stores and manages the AR content, and pushes the AR content to the ARCU according to the actual situation. The specific workflow of an augmented reality cultural service is shown in the Figure 1.

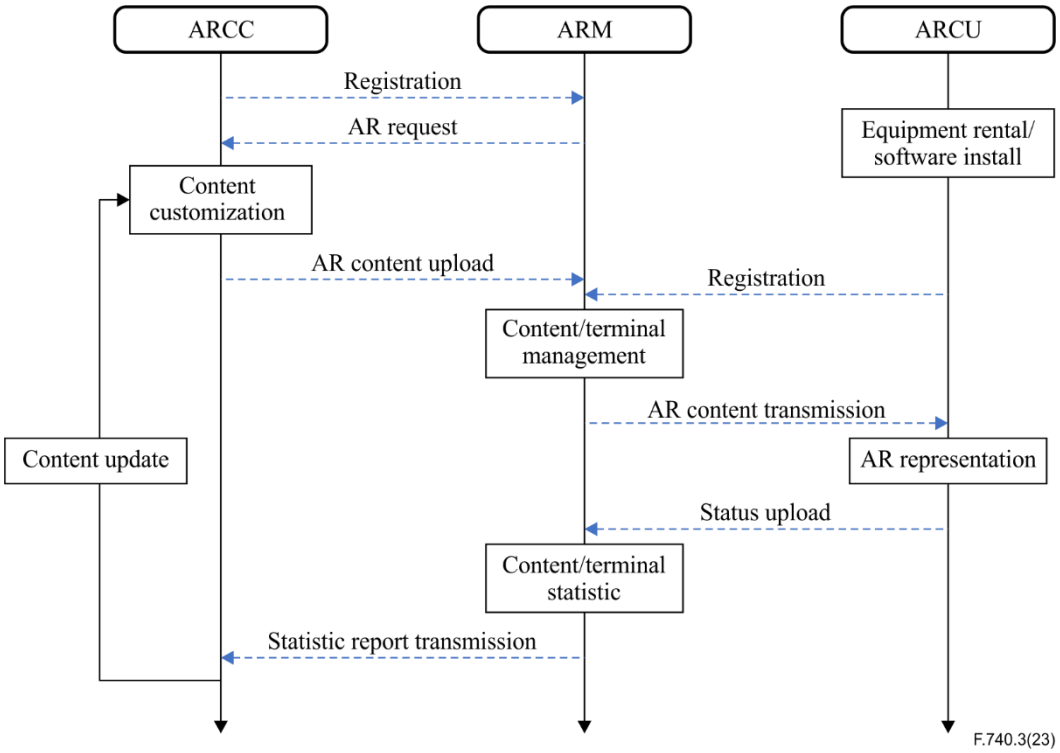

Figure 1 – Workflow of augmented reality cultural service

7.2 AR content creation information flow

The AR content creation procedure and detailed steps between ARCC and the ARM via an AR cloud creation platform and AR cloud management platform have been described in [ITU-T F.740.2]. Before using ARCSS, the ARCC needs to register with the ARM and submit basic information of the creators. The ARCC uploads AR content to the ARM, including project

information data, identification information data and AR present data; ARM provides statistical data to the ARCC to show the usage of AR content. Figure 2 shows the AR content creation information flow.

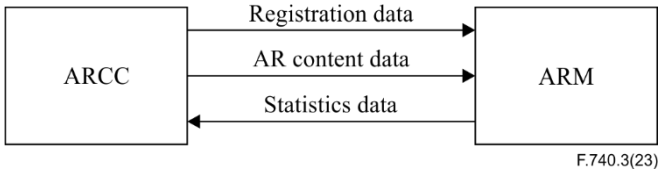

Figure 2 – AR content creation information flow

7.3 AR content display information flow

AR content display procedure and detailed steps between the ARCU and ARM via an AR cloud management platform and mobile device have been described in [ITU-T F.740.2]. ARCU (terminals) need to register with the ARM and submit the basic information of terminals before accessing ARCSS. The AR terminals regularly upload the terminal status and usage to the ARM; and the ARM pushes the AR content data to the AR terminals. Figure 3 shows the AR content display information flow.

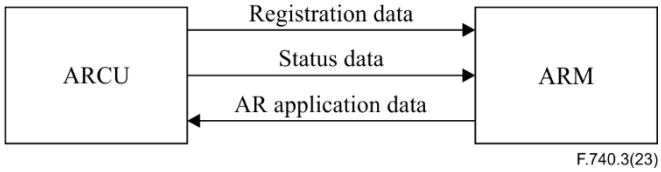

Figure 3 – AR content display information flow

8 Metadata for ARCSS

8.1 AR content creation metadata

According to the AR content creation information flow, ARCSS content creation metadata should promote data interaction between AR content creation and AR management, specification registered AR content, information query and statistics. The metadata can be divided into AR registration metadata, project metadata, identification information metadata, present metadata, and statistical information metadata. Tables 1 to 5 shows the detailed metadata of AR content creation.

Table 1 – AR content registration metadata

Element/attribute	Description	Type
Creator_ID	AR content creator ID	integer
Creator_Name	Name of AR content creator	String
Creator_Org	Organization of AR content creator	String
Reg_Time	Time of registration	time
Other_metaInfo	Other metadata information of AR content creator that are saved as key-value, e.g., {"URL": "http://www.xxx.com"}	Map<String, String>

Table 2 – AR project metadata

Element/attribute	Description	Type
Project_ID	AR project ID	integer
Project_Name	Name of AR project	String
Project_Location	Location of cultural venues where AR project is running	String
Project_Version	Version of AR project	String
Other_metaInfo	Other metadata information of AR project that are saved as key-value, e.g., {"URL": "http://www.xxx.com"}	Map<String, String>

Table 3 – AR identification information metadata

Element/attribute	Description	Type
Identification_ID	AR identification ID	integer
Identification_Name	Name of AR identification	String
Identification_Image	Image file of AR identification	file
Project_ID	AR project ID which the identification belongs to	integer
Creator_ID	AR content creator ID which the identification is made by	integer
Identification_Object	Cultural relics/artworks as AR identification object	object
name	Cultural relics/artworks name	String
type	Cultural relics/artworks type, 2D or 3D	String
location	Location of Cultural relics/artworks in cultural venues	String
Other_metaInfo	Other metadata information of AR identification that are saved as key-value, e.g., {"URL": "http://www.xxx.com"}	Map<String, String>

Table 4 – AR present metadata

Element/attribute	Description	Type
Present_ID	AR present ID	integer
Present_Name	Name of AR present	String
Identification_ID	AR Identification ID which the AR present is corresponding to	integer
Project_ID	AR project ID which the AR present belongs to	integer
Present_file	AR present file including 3D model, video, audio and so on	file

Table 5 – AR statistical information metadata

Element/attribute	Description	Type
Present_ID	AR present ID	integer
Installed_Num	Number of devices in which this AR present installed	integer
Use_Num	Number of uses of the AR present in all the devices in the project	integer
Period	Period of this statistic	[time, time]

8.2 AR content display metadata

According to the AR content display information flow, ARCSS metadata promotes the data interaction between AR terminals and AR management, and regulates the registration, status detection and application distribution of AR terminals, which are specifically divided into AR device metadata, device status metadata and AR application metadata. Tables 6 to 8 show the detailed metadata for AR content display.

Table 6 – AR device metadata

Element/attribute	Description	Type
Device_ID	AR device ID	integer
Device_Info	Information of AR device	object
OS	Operating system of device, 'IOS' or 'Android'	String
Version	Version of AR device	String
Resolution	Screen resolution of AR device	[integer, integer]
ROM	ROM of AR device	integer
RAM	RAM of AR device	integer
Other_metaInfo	Other metadata information of AR device that are saved as key-value, e.g., {"URL": "http://www.xxx.com"}	Map<String, String>

Table 7 – AR device status metadata

Element/attribute	Description	Type
Device_ID	AR device ID	integer
Present_ID	AR present ID to identify the media package	integer
Status_time	Time of status latest update	time
Status_value	Status value which 1 represents this device is online, 0 represents this device is offline, −1 represents this device is out of order	integer

Table 8 – AR application metadata

Element/attribute	Description	Type
App_ID	AR application ID	integer
Project_ID	AR project ID which the AR application belongs to	integer
App_Version	Version of AR application	String
App_package	AR application package	file
Present_List	List of AR present ID which is include in AR application	[integer]

Bibliography

[b-ITU-T G.1036] Recommendation ITU-T G.1036 (2022), *Quality of experience influencing factors for augmented reality services*.

[b-ITU-T J.301] Recommendation ITU-T J.301 (2014), *Requirements for augmented reality smart television systems*.

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Published in Switzerland
Geneva, 2023