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Augmented Reality as an ontological tool to access televised audiovisual information: Value for the journalist and for the viewer

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Abstract. A theoretical development is presented of the access to audiovisual content for both journalists and viewers through the Web. This access is possible through virtual platforms using an ontological tool that displays the content through Augmented Reality in such a way that the relationships between and accesses to different ontological levels are carried out using visual elements, determining their value prior to download. Ontological relationships are established between traditional elements indexed in the audiovisual departments of television channels: persons, topics, and places, as well as other elements deriving from them. A brief description is given of the ontologies and their relationship with what is audiovisual, as well as experiences on television with Augmented Reality. The originality of the paper lies in the absence of previously proposed or developed experiences by any of the mass media.
Keywords: Augmented Reality; Ontologies; Commercial exploitation; Television archives; Access to information; Web information; Audiovisual collections.

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Introduction

Television is still the most universal method to access both news and entertainment content. "Homo videns", however, is mutating drastically towards "Homo digitalis", especially among those Prensky (2001) called "digital natives". This evolution is not changing the importance of television for the access to content, but it is changing the habits involved in reading and consuming such information. Despite this, television is still the medium used to receive a constant flow of information that is easily and rapidly consumed deriving from its audiovisual nature.

This reality in the evolution of television regarding the methods of diffusion and consumption has not excessively varied the internal work of television channels. The change from an analogue to a digital paradigm was the great revolution, with important modifications in the habits of making and understanding the work of television channels in such different areas as broadcasting, reception, production, and, of course, documentation.

All major TV channels currently have a documentation department whose purpose is primarily to reduce production costs, and secondarily to have control of the channel's audiovisual collection which is an asset as important as the firm's human resources.

These documentation departments are complex webs that, within the framework of the digital paradigm, have merged even further into the rest of the TV channel's subsystems, becoming incorporated as a key and fundamental element within the overall Media Asset Management (MAM) system. They control the information from the moment that it is collected, analysing the different metadata that each part of the system can incorporate into that information, until it reaches the documentation department to be analysed and kept permanently in the TV channel's archive (Blanco & Póveda, 2015).

The systems of conservation, storage, and content management are in most cases developed by the staff of the TV channel itself, using authentically "ad hoc" tools depending on the requirements of the different agents involved in the collection, storage, production, and dissemination of the content. The systems there-

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fore manage the content prepared by the TV channel's staff to meet their firm's specific requirements.

The requirements identifiable in the various TV channels do not differ greatly between each other. However, there are only a few – and those few are very expensive – different tools on the market with which to control within their information systems the large amount of content audiovisual companies accumulate every day.

Starting therefore from this reality – the homogeneity of the requirements of television channel staff – we understood there to be an important gap in the current production of scientific literature in this area. The number of developments that facilitate the access to information in a more attractive and efficient way, and which use already tested technologies, is especially low. Although the field of documentation has been working for many years with ontologies, they have not been specifically implemented in the documentation departments of TV channels in which they would be of great importance in indexing actions and relationships, although less so concepts. Colon classification, for instance, has always been a valid, although little tested, option, and that ontologies constitute the best approach to retrieving information and its relationships in television has almost been forgotten, as also have their relationship with the semantic Web (Sánchez, 2016).

This access to audiovisual content through ontologies can and should be carried out using methods that are increasingly simple, intuitive, and attractive both for professionals (who are still somewhat illiterate in the work carried out by the documentation departments) and for the TV "cyberviewers" who access both entertainment and information content through the Web. It is in this last point that Augmented Reality (henceforth AR) and its great potential give us a tested, consistent, and validated tool with which to access content in a very attractive way.

Background of the study

Any research project has a series of antecedents behind its development. The authors have professional experience in television as well as in the management of technological projects. From a research point of view, prior to the results presented in this paper we have carried out various projects that led to papers published in different journals. Deriving from the cumulative nature of science, we shall indicate and refer to research we have done previously to serve to help understand and contextualize the present work.

In the field of ontologies, we have worked on this subject previously with a project being developed that resulted in a paper published in El Profesional de la Información (Caldera & Jiménez, 2008) analysing ontologies as methods to control and retrieve information in television, but only for onomastic elements and their existing relationships within television databases.

With regard to AR, the work we have developed is much more recent, carried out as part of a project integrating AR into MAM. From this came the paper published in 2014 (Caldera-Serrano, 2014) which dealt with how the information generated and distributed through AR should be managed from a documentation point of view. A second paper (Caldera & León, 2016) analysed how AR contributes to the commercial exploitation of audiovisual archives, but did not offer a concrete and tangible possibility such as that which is developed in the present paper.

The paper published in 2010 (Caldera & León) also developed another aspect of the present work – the potential of commercialization and exploitation of audiovisual archives in the context of the new digital paradigm, i.e., the potential of facilitating access to the content, and therefore the TV channels' archives, through the Web.

All the papers have been published in journals indexed in the JCR of the Web of Science, so that the papers themselves are also indexed therein. They are also present in the Scopus database, and the journals are in the ranking conducted by the SCIMAGO research group for the said institution.

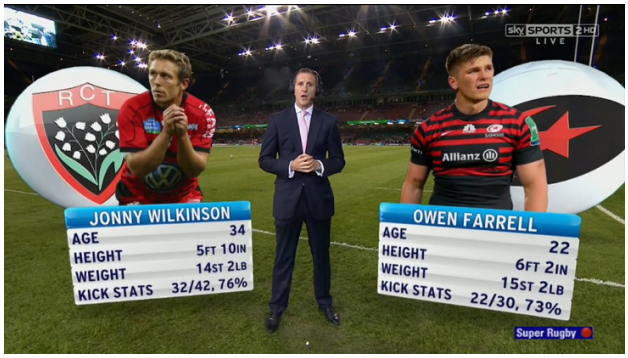
AR and television

Ivan Sutherland (1968) published the first experience with AR, which was basically using a helmet with a screen on which simple information could be seen. After the first AR event, the most important thing differentiating this from other technologies was the fact that it does not supplant reality (like virtual reality does) but rather complements, accompanies, and in some cases improves it by providing value-added information.

Since 1992, when Tom Caudell & David Mizell (1992) coined the term, there have been many AR developments and experiences, standing out being the pioneers Milgran & Kishino (1994) who related AR with HMD (head-mounted display), as well as Azuma (1997) who analysed AR from a technological point of view and Parhizkar (2011) who classified it for us into its different uses.

Since then, AR has been exploited in such various fields as education, medicine, business, industry, and also television, but without doubt where it has been especially strongly developed is in the field of entertainment, specifically in video games.

There have been, however, some experiences of using AR in the field of television (we do not know from the scientific literature or our own experience if they exist for MAM). Indeed, AR is not a strange element in television media because it is widely used in graphics, advertising information, etc., generating changes in production and post-production as it includes computer-generated elements (Galán-Cubillo, 2008).



Source: http://aegraphics.tv/template-7.php?t=2&id=augmentedreality.

In television, AR was used in a first phase associated with the use of chroma keying, especially in scenography. It has also been used to create computer-generated images that overlay the real image. But within the framework of these experiences, those which need an external device to view the contents in AR are really interesting and powerful (and especially useful for this present work). This option is still being developed, and currently is little used, with there having been only a few experiences. In this way, sound, visual, audiovisual, etc., information is offered with the same possibilities as human imagination. Therefore, with this technique, the objectives developed by means of AR technology are not displayed on the television screen, but external equipment will be necessary to facilitate its visualization.

The main hardware for implementing AR consists of:

> *"Head-Mounted Displays: Devices placed on the head or helmet. They obtain information from cameras and are used for virtual reality and mixed reality.*
> *Personal Computers and Laptops. Currently replaced by mobile devices, but they were first used due to their robustness.*
> *Hand-held Screens (Smartphones and tablets): AR is mainly used on these devices because, with the different sensors, they also provide information on the geo-location of the user, thus facilitating the use of the AR application.*
> *Spatial Screens: This technology is in the environment and must be ported by users, attaining ultimately the independence of the ported technical element. These elements include holograms, optical devices, video projectors, etc.*
> *Gesture gloves: By wearing gloves that are connected through sensors, users can manipulate virtual objects.*
> *Device for video games: AR devices were originally created for video games and were implemented by Nintendo Wii, Sony PS3 Move or Microsoft Kinect."* (Caldera & León, 2016)

In the following, we shall present some experiences in television, already described in the base research for this project (Caldera & León, 2016):

> *"Great accomplishments are being developed by Japanese companies, such as those advanced by NHK (http://larepublica.pe/blogs/realidad-aumentada/tag/nhk-hybridcast/), which is working on the interaction with television through tablets or smartphones. Hybridcast (or hybrid broadcast) is based on broadcast interconnection with information on the network. There are some visual examples in the operation network of Hybridcast linking access to the network with information, in some cases, related to AR, such as the inclusion of statistical data, information and identification of players in real time sports competitions, etc. Although still in test mode in Japan, this technology will also improve Social Television significantly, and it is being implemented by large technology companies like Sony, Panasonic, Mitsubishi, Toshiba or Sharp. The race toward a real-time interaction with the network is already underway.*
> *Another Japanese company, NTT, is developing a software using AR that allows access to audiovisual content that can only be accessed through a second screen, and that will be displayed synchronously with the traditional television signal. In short, two screens that need to be watched at the same time to understand the television message. The screens required to view this second image will be mobile devices, such as Tablets or Smartphones. Visual SyncAR (http://www.neoteo.com/visual-syncar-realidad-aumentada-sincronizada-con/) also measures the distance and angle of the viewer to the screen in order to determine volumes, perspectives and angles, thus generating emotions and optical illusions."*

Ontologies and television

We shall not be going to analyse the concept of ontology, so well known in the field of Information Science, but we do intend to briefly relate it to the audiovisual field so as to be able to understand how it will subsequently be related to AR. We would also underline the definition we consider to be the most widely accepted by the scientific community (Gruber, 1993) together with Gruber's work that identifies the components of an ontology (Gruber, 1993b). These are:

- Concepts: ideas that one tries to formalize.
- Relationships: representing the interaction between concepts.
- Functions: offering a specific type of relationship, used for the representation of certain objectives of a concept.
- Axioms: theorems that identify the relationships between elements.

The contribution of Guerrero Bote & Lozano (1999) is interesting as they point out that the domain closest to Documentation is that of ontologies constructed from the terminological (knowledge representation) and in-

formative (structure of the information storage in the databases) points of view.

We do not know of the existence of experiences in ontology design and creation in television. A review of the scientific literature provided no results, and neither did direct contact with the documentation departments of different TV channels. In audiovisual companies, there is scarce exchange and diffusion of information. This should not be a surprise as they are corporations with identical ends, competing to attract audiences and advertising revenues.

In previous studies about ontologies, we focused on implementing an ontology that specified the structure of information storage in a database, thus improving the identification of relationships and optimizing the product and final result offered to the user (Barchini, 2006).

One example is the onomastic information about each person appearing on the television grid, indicating to the system both the date and the place of birth (and of death, if deceased). Personal information is also provided, and should be profiled in each documentation department according to the characteristics of the users' queries. The possible relationships with entities are indicated, determining the dates, as well as the responsibility of the person within that entity. One will attempt to include the greatest number of attributes in each record. This does not impede it being impossible in some cases, or that in other cases modifications must be made.

However, for correct management of this information, it is necessary to set up and follow strict authority control, specifying the various forms of denomination and variants in spelling, so that any inquiry involving the various forms will always offer an identical result. We have no wish to enter into any large controversy about this issue, but current authority control norms are too strict for the reality of television. Also, the control in many TV channels is deficient, and therefore it is necessary for them to begin making this effort at standardization.

We would re-emphasize the scarcity of research about ontology in television, which is suggestive of the secrecy of audiovisual companies or the lack of results in the creation of tools in which the MAMs are structured on the basis of ontologies.

Beneficiaries and benefits

The tool used was access through the Web to the audiovisual content of a television channel's collection. The user can access the content by means of a text query (or a speech recognizer) applied by default to the attributes indexed in the database, usually title, date, author, topic, persons viewed, topics visualized, in short, of those metadata that the documentation service has determined as being valid. Once the first battery of potential images has been retrieved, using a peripheral element of AR reading, a sequence of images, text, and sound resources that may be useful for the query are provided. There will therefore be options to interact with the AR element so as to expand the search through the visualization of content that, by means of the ontology, is offered autonomously. Below we shall see the possibilities and potential that can be provided by AR in conjunction with a good ontological tool that determines the relationships between the images.

The direct beneficiaries of the development of the idea embodied in this paper have a triple dimension, directly related to the advantages (benefits) that the idea can contribute to the actors involved.

The first beneficiary would be the TV channel's journalists, the second the different companies and institutions in the field of audiovisual communication, and the third, but not the least important, the cyberviewers who access the content.

These three actors have an autonomous, agile, dynamic, and intuitive access to the audiovisual collection, without needing any prior knowledge about documentation, and without having to know anything about the ontological developments behind the computer tool. Therefore, they do not need prior knowledge to be able to access the content on the Web, nor to understand the relationships between the images provided since these will be clearly represented in the AR tool.

It is clear that if we only had one of these beneficiaries the tool itself would still be valid, and its potential would remain maximum. However, when trying to weigh and rationalize its usefulness, we understand that the usefulness for journalists might be relative as the broadcasting of the TV channel's audiovisual collection is guaranteed, therefore they need to access it to be able to create audiovisual products, especially those to do with news. However, a value-added tool is being made available that reduces, if not eliminates, the complexities that many users who are not experts in documentation (most journalists) find when they are confronted with MAMs designed more for documentalists and control of the information than to disseminate the collection.

The fact that the journalists can not only directly access the content requested through their query but also other possible resources makes the tool a way of more fully exploiting the audiovisual archive, and this translates into better and more complete audiovisual products without any increase in production costs.

If information was previously provided through the corporate intranet for the journalists to be able to elaborate their audiovisual content, this information could also be made available to the general public and other companies that may wish to access the resources for marketing and purchasing purposes. Obviously, the content accessible to journalists will always be greater in amount and quality. What limits the resources available to internal users (journalists) and external users (companies in the audiovisual field and cyberviewers) is, however, directly related to the rights of the use and exploitation of images deriving from the corresponding legislation in each country (right to privacy, self-image, freedom of the press, etc.).

Companies in the audiovisual field are also clear beneficiaries as they are able to access this content and choose that which may be useful for purchase and exploitation. Obviously, the material provided on the Web will be provided in low resolution and with "watermarks" and/or the logo of the TV channel for it to be recognized at all times. It is necessary to contact the TV channel's marketing service to purchase high resolution audiovisual resources.

The companies in the audiovisual field are many and varied, ranging from other TV channels to news and graphic agencies, advertising companies, press offices, etc., among many other options.

This use of the tool will be the same as for internal users, although with quite different purposes and utility.

It should be noted that the consumption of audiovisual products is changing fast. The consumption of products from the Web has grown explosively, and this seems to be irreversible. Hence, providing innovative and in some ways spectacular tools for the user will lead to greater dissemination of the content and thus higher advertising revenues, in both conventional and digital media. Cyberviewers have the capacity to visualize not only the desired content but to exploit other value-added content that, in some cases, they did not know existed.

In a way, there have already been advances of the benefits of this development. Undoubtedly there are many advantages, and they could go in three different ways: improving the services offered, improving the brand image, and selling the products.

Apart from the fact that audiovisual archives should be designed to safeguard the TV channel's heritage, and therefore the heritage of the society to which the services are offered, this should be guaranteed through the preservation of the products offered as well as the material attached to them (unedited originals, broadcast recordings, master copies, etc.). The value of these assets also has a two-fold dimension: internal exploitation for the improvement of the audiovisual products, and the direct sale of those products once broadcast (as archival material).

Is it possible for a television channel not to have an audiovisual archive and continue working? No doubt, this is possible. The quality of the products and their validity, however, would be really poor. Hence, if the effort is made to preserve the television channel's archives and make them accessible, this effort must continue to be made so that the archival material can be used in a way that improves the products of the TV channel. Granting journalists access to a wide range of possibilities of images beyond the one originally requested will certainly provide an improvement in the performance of the audiovisual work. The value of commercial exploitation will also be increased by making a large quantity of material available in a clear and intuitive way besides the material directly requested by the user (whether an actual or a legal person).

And of course, having these types of tools which are at present unknown will improve the brand image and will position it in the top places among its competitors, which in the developed countries are really numerous.

AR and ontology for MAMs

In this section, we shall analyse the proposal and development of the idea for the implementation of AR to offer the results of searches on audiovisual collections through ontological relationships.

The above figure shows a general outline of the proposal, a graphic complemented with the one that will be shown below and in which the ontological relationships are analysed.

First, it must be highlighted that all the proposed actions must be integrated into the framework of a MAM, i.e., it is not an isolated algorithm with just tools and applications that help in its purpose, but it must be integrated within a larger system at the service of the integral management of the television channel. In this framework, the Documentation Service is a further, equally necessary, link for the attainment of the objectives of the channel, which usually offers quality services and products to the viewer and to other types of users, such as in the case analysed of cyberviewers. Therefore, it must be understood in this way, and be integrated into the system itself.

As there is already abundant scientific literature about the analysis of MAMs, it seems unnecessary to analyse this issue in detail. It only needs to be pointed out that MAMs comprise different subsystems, which obviously include the dissemination of Web content and journalists' access to the content previously generated by the channel. The elements queried through the Web, whether through an intranet or the Internet, will be connected to the database management system which will provide as results images from the audiovisual collection.

Therefore, once the user (at any of the levels analysed above) has made a query, the potential that the technology associated with the MAM has with which to resolve that query is highly varied. In a traditional way, this metadata retrieval resolves the queries made through text, resulting in audiovisual resources that directly relate to the description the Documentation Service has made of those resources or those that can be assigned automatically in the MAM during the process of capturing the image. Traditionally, although its potential is as broad as the associated metadata, these images can be retrieved by title, author, persons, and even topics and places.

In reality these results could be significantly expanded and the consultation systems even improved, so that the a priori most relevant results could be extended using biometric techniques in the case of queries concerning persons, and capable of being retrieved by means of speech recognizers (voice of the protagonists) as well as by the coincident nodal points of biometric algorithms to identify and retrieve faces. Hence, there is another potential for queries – not only with the use of text but also using a query in the

form of an audio archive and a photograph (uploading a file), with retrieval being possible by way of these elements.

Nevertheless, the potential for query and retrieval through non-textual elements does not end here, as there could be a search for similarities of images, whether of persons, places, or things. With this, we want to point out that it is absolutely feasible to provide images related to the base image for the query by colour, contour, etc., giving as response alternative images similar to those queried directly.

When later we analyse ontological relationships, this issue will be returned to, as it will be another element to be retrieved and offered to the user.

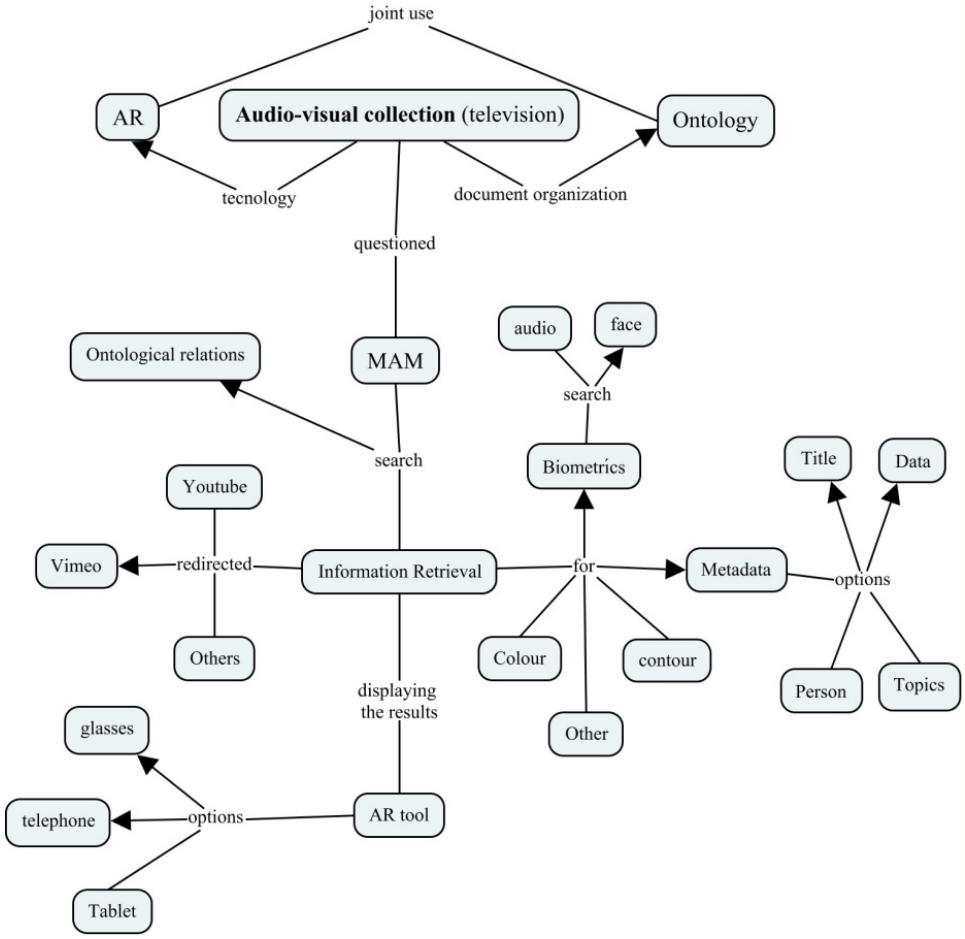


Figure 1. Concept map. Use of AR and ontology for information retrieval.

A further value-added service associated with this retrieval is interrogation of other video collections, of which, by way of example and because of their importance, we would highlight Youtube and Vimeo. This allows the possibility of interrogating not only our own tool but also those that we are able to link to freely and carry out the query in parallel, so that a redirection would be given back to the results obtained through the said image collections. We recognize that the Web is an inexhaustible source of information of audiovisual resources, and in many cases better than the TV channel's own collections. However, great care must be taken in the use and exploitation of such material, as it may be subject to copyright or contractual agreements.

Once this material has been retrieved, we will have the option of viewing it directly on the computer screen. This is where AR comes into play because, through such peripherals as glasses, tablets, and phones, not only can the valid results be visualized but also images associated through their ontological relationships.

Source: https://gamesalfresco.com/tag/futuristic-visions/

The ontological relationships must be created previously, in an automatic way in some cases and in others through the database relationships added by the Documentation Service of the television channel. All these ontological relationships must be opaque to the user.

The ontological relationships can also be summarized in the following concept map:

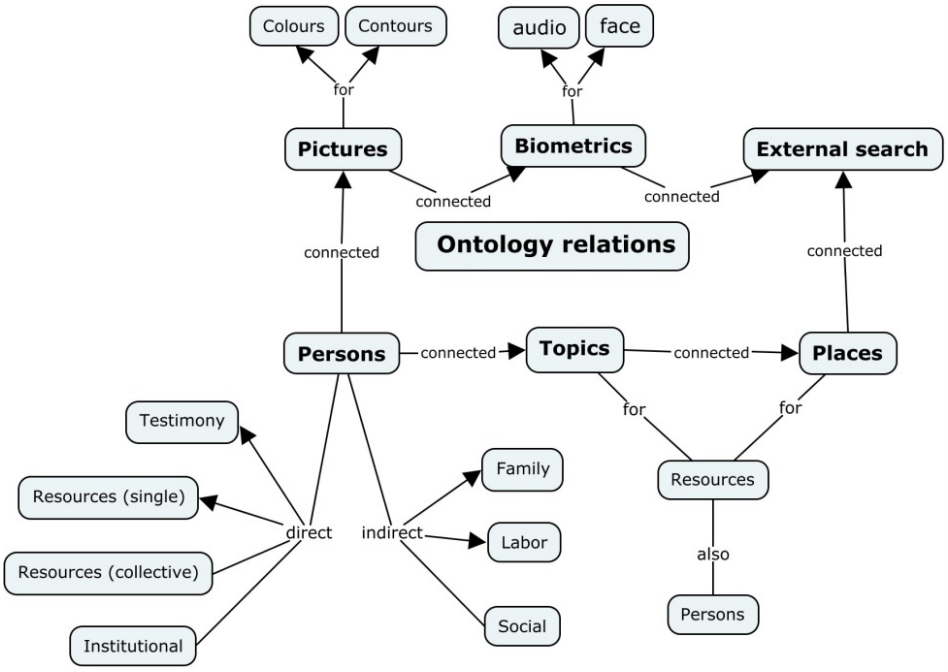


Figure 2. Concept map. Ontological relationships of internal and external images

As can be seen in Figure 2, the ontological relationships are generated from six key elements interconnected in a star-shaped distribution: persons, topics, and places as the more relevant and directly accessible elements since these are currently conformed in the databases, plus the less standardized image, biometric study, and external search elements. However, these latter are really easy to implement in most cases, so an ontological relationship is offered with both internal information (five of the six elements) and information based on other external searches which can be as easy as just linking to other external search engines. It is clear that, in the ontological relationship shown, all the nodes are interconnected, so a query about a person, for example, will not only give as a result the person directly consulted but their relationships, as well as topics, places, images, biometric elements, and associated external searches. The system response is the basic response itself plus all the relationships in the different nodes. It can be displayed by means of peripheral elements with AR technology, so that really value is being added through AR when compared to the traditional retrieval of these elements.

In order to make these proposals possible, it is necessary to have good documentation management in place relative to the creation of such relationships, although this work is opaque for the user, whether journalist or cyberviewer.

In short, without the peripheral vision afforded by AR there would only be access to the content that was directly consulted, but with the AR devices both realities can be accessed. This will be a spur for queries by cyberviewers and an improvement in the potential of valid results for audiovisual professionals, both internal and external users. Obviously the information system visualized with AR will only facilitate the information in the cases in which such relationships exist. There may be many possibilities of having resources available about a person, topic, place, etc. Depending on their importance, potential, and on the audiovisual collection, the ontological relationships will be more or less complex.

Searches on PERSONS. Queries through onomastic elements undoubtedly constitute the commonest form of query in documentation services, especially in news services. The retrieval of a resource (images for display that are associated directly with a person) or a "total" (the person's statements) is, together with topics, the commonest form of request for material because these are usually the requirements of the journalist-users. Therefore, the MAMs control this information and its access by implementing an authority control procedure for the capacity to access information about these persons through the different denominations.

A first consultation will provide us directly with the person's image, also yielding individual and collective resources, totals, and institutional images.

Individual resources will provide the person performing an action as the protagonist, when possible alone, with waving, walking, getting into a car, etc. being some of the possibilities that the system can return. The collective resources are those in which the person queried for appears but with other people around, although trying to make the main person in the image be the one queried for. The totals are images in which the sound has the main value, i.e., what is said is the really important part. An example of this would be statements at a press conference, in the street surrounded by journalists, interview material, etc. The images denominated "institutional" are related to the person carrying out actions in his or her own institutional field. There may be resources of the person in an assembly, in meetings surrounded by collaborators, images from the course of their job activity (business, politics, sports, etc.).

As indirect results, and this is where ontology becomes much more important, the MAM will provide elements where the person queried for is not displayed in any way, but other people appear. The system will

provide resources and totals of the close family and other people in their social environment as well as those corresponding to their working environment.

Although queries and retrieval are more effective for physical persons, they can also be carried out for legal persons and entities. Nevertheless, depending on the institution, the relationships can result in an important amount of documentation noise.

Searches on TOPICS and PLACES. These two elements have been grouped together in the ontological relationships because of their similarity. Topic searches are, together with person searches, the commonest queries on television channel databases. This is not so for place searches because it is not very usual to seek a resource for its individual value but rather it is often associated with specific people. However, it is still important to have this present because of its frequency in queries.

It must be mentioned that, a priori, only topic searches can be carried out on the elements of a controlled language previously indicated by the documentalists. This is because all television channels are heading towards hybrid models in which, together with query through controlled language, it will also be possible to retrieve information using free text extracted from news headlines or titles of programs, as well as step outlines, scripts, and image analyses provided by the documentalists, none of which are carried out in a controlled language. We also support a hybrid method, deriving from the user and cyberviewer not knowing documentation languages, so that there must therefore be files of redirections of free text queries to accepted descriptors.

Topic searching always raises the question of what is the best documentation tool for a television channel, an issue that far from being resolved seems to be increasingly useless for the reasons noted above. Therefore, when there is a topic query, the system will give as a result the associated images as well as those related to topics, places, and persons, through the star-like relationship that has all the retrieval elements linked by means of their ontological interaction.

Place searching is much simpler given that the queried elements have to be part of a geographic thesaurus, currently very solidly developed. Television channels delve even more deeply into these thesauri, down to the level of neighbourhoods, zones, geographic locations, etc. Monuments, mountain ranges, neighbourhoods, even emblematic buildings can be part of the thesaurus, or at least they may be present in the description of the images, which is essential for the retrieval of information in television channels because of the impossibility of standardizing everything.

These places are related with people who have been in them, and especially with topics of all kinds that have developed in those said places. Moreover, all the proposed relationships are still given as results in our ontology.

Searches on IMAGES. There are technological developments that facilitate the automatic detection of images according to such varied parameters as colour, pattern, texture, contour, etc. Examples are the image search tools in the major search engines. This reality is not only valid for static images but there are also possibilities for moving images. Derived from the technology for the detection of shots based on visual characteristics, we will not only be able to make a division by significant key frames (using some of the aforementioned parameters) but also retrieval of images by similarities if (i) the query itself is made by means of an image, or (ii) significant relevant images are retrieved in response to a text query. This is how we relate the information requested to similar images by means of our ontology. We associate images by similarities in accordance with those directly retrieved as valid.

The commonest forms of segmentation, and therefore of detection of similar images will be colour, contour, texture, background, and in general by measures of similarity.

Searches on BIOMETRY. Without going into a detailed analysis of biometric technology, an issue dealt with in other publications specialized in computing, it is worth noting that its versatility and transversality facilitate and empower some documentation tasks. Of the many possibilities that biometrics has, we are only going to consider voice recognition and image (especially face) recognition.

Speech recognition helps to put statements into text which may subsequently be indexed automatically. However, what is important for our ontology is to be able to retrieve audiovisual resources based on the resemblance to the voice of the main person retrieved by the users' query. We relate the people about whom the query was made to the section of persons.

Equally important is biometric face recognition. This recognition, carried out by computational algorithms, measures the distance between different nodal points of the face. Through these measurements, the computer provides as the response images of that person in different sequences, giving a certain percentage of possibility of error (in accordance with the calculated similarity). The results are sorted in descending order of the percentage of similarity found.

Biometric elements, together with the elements we have denominated images, enhance the query on the database not only through interrogation with textual language but also through still images and even moving images.

Searches on EXTERNAL ELEMENTS. This last element of the ontological relationship corresponds to the consultation of other external and accessible online sources that provide results which can be relevant and interesting for our user's query. The connection with not only general search engines but also open or semi-open image databases is especially important.

Vimeo and Youtube, as main distribution platforms for audiovisual content, can provide valid results to which we do not have the usage rights but which might be useful to buy and subsequently use. Therefore we provide clear value-added retrieval for both journalists and the organization's external users, especially cyberviewers (not so valid for companies). In this way, we give our tool the value of unifying queries made of the main sources, which of course will be those of the TV channel itself as well as the open image databases.

What is the best app for AR?

Currently any smart mobile device (smartphone or tablet) has the capacity to use AR applications without any large computational cost.

First it should be determined in which environment the app is going to be used and what peripheral is chosen to interact with the TV channel's image database by means of AR. At the present moment, because of its standardization and popularity, we would say that it is best to use the Android operating system, while tablets and smartphones are the best options for interaction. Starting from this premise, valid for both internal and external users, it seems appropriate to note that there are a large number of applications using this kind of interaction on the market, many of them available free of charge.

Currently existing applications with different uses of AR are: Google Goggles, Augment 3D, Wikitude, Layar, Sky Map, Tweeps Around, Yelp Monocle, Junaio Augmented Reality, Ingres, Droid Shooting (http://comofuncionaque.com/realidad-aumentada-android). Another listing is that provided in +Digital El Periódico in its article "19 augmented reality applications", highlighting the following (plus some of those already proposed): LearnAR, WordLens, TAT Augmented ID, Point & Find, ARToolKit NFT, Lookator, Yelp Monocle, Car Finder, 3D AR Compas, Acrossair, Aurasma, ExtraBold, Playar, Google Sky Map, among others.

Currently there are many companies that are adapting to their users' specific requirements by adapting technologies to make use of AR. A quick search will put us on the trail of a major number of firms with quite affordable prices, especially firms in the audiovisual sector.

Conclusions

The ideas proposed have not yet been tested in any communications medium. However, the proposed innovation comes from the union of two well-tested elements. One is that ontologies have been used with greater or lesser success in information and documentation services for years. The other is that AR is a proven technology both in television and in other areas (especially in the field of video games). The intention with the union of the two is to make audiovisual information accessible to journalists and viewers in a much more dynamic and attractive way.

The ontological relationship created by documentation managers facilitates the presentation of such relationships through resources that can be explored by the user using peripheral elements (preferably glasses, phones, or tablets) and will provide the option of accessing resources related to their initial query.

As has been seen, the potentials are many: the retrieval of relationships of physical and legal persons in the original search, of topics linked to the query, of similar places, of shots different from that retrieved but potentially useful, of images with similarities in colour or relief.

This potentiates the re-use and sale of images, since it provides the user with not only what they required in their query but also audiovisual resources that could be equally as useful as those explicitly searched for.

It seems that it may be especially appealing to users who access such content through the Web (cyberviewers). We believe, however, that it would be equally attractive and valid for journalists since, using a simple external device (a tablet), they could access the content much faster and more intuitively, facilitating the exploitation of resources and thus improving the consumption of goods from the television channel's archive and improving the quality of the audiovisual product.

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