

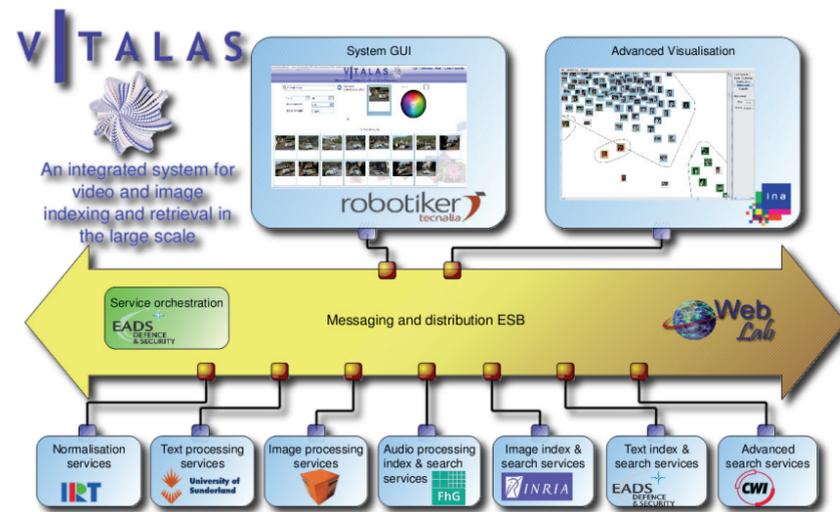
# The search goes on for more efficient retrieval methods

Over the past ten years clever search engine technologies have revolutionised the way we store, access and retrieve information. **Nozha Boujemaa**, scientific coordinator of the VITALAS project, outlines how her initiative's work to enable cross-media retrieval will enhance them even further

Although a relatively young technology, search engines have grown rapidly in commercial importance over recent years. Today, millions of people across the world routinely use tools like Google and Yahoo! to gain instant access to information, all with an ease which would have been inconceivable to earlier generations. To the layman the technology seems dauntingly sophisticated, nevertheless Nozha Boujemaa of the VITALAS project (Video & image Indexing and reTrieval in the Large Scale) says her initiative can improve it still further. "VITALAS is an integrated project addressing the issue of digital archiving," she says. "The main strategic objective is to enable cross-media indexing and retrieval, as well as to design and develop new methods that will allow for content aggregation through the automatic annotation of content. Another topic that is very important to VITALAS, and which we are addressing in-depth, is scalability – the ability of such engines to cope with large amounts of multi-media content. We are also looking at the question of how to present search results to the user, how to provide interactive and economical search interfaces, and also how to develop interactive search mechanisms."

## Cross media

With such interactive searches requiring advanced personalisation mechanisms, it is clear that VITALAS' objectives are not only technically complex, but will also require broad-based collaboration. The project, which includes some 12 partners from across Europe, is well aware of this need for a wide range of expertise, and is thus ideally positioned to address the question of cross-media indexing, an area which Boujemaa says



VITALAS system

VITALAS is keen to focus on. "The cross-media aspect is very important for us," she stresses. "This means addressing the question of how best to approach using and creating content from different media outlets. Textual access is a well-established way in which users make queries about the content – but we would also like to enable audio queries and visual queries, as well as to analyse the non-textual content in such a manner that we can automatically predict and generate textual annotation from audio and visual content analysis."

Incorporating such a wide range of media inputs within one overall approach has proved a technically demanding task. However, with the in-depth knowledge possessed by those within the VITALAS consortium, the project has been able to pursue the kind of holistic approach which is well-suited to addressing such issues. "In terms of the visualisation issue our work is not only about human interaction, nor is it

only about interface design – it's also about how to build the similarity maps between the documents so that we can see the relevant factors in a wide perspective, and in a better way," explains Boujemaa. "When we are capable of identifying visual objects, speakers, and background sounds in scenes we will be able to identify and hence generate labels, thematic labels and content. In this case we will be able to see and make queries in a textual way. The query is still traditional, but the query formulation has to be looked at from the search engine point of view – it will interpret the query, and the engine will not only look after the manual annotation, but will also match the automatically generated textual annotation."

## Practical focus

Of course it is important to stress that this kind of work, in addition to being technically innovative, brings real benefits on the practical level. While the

average search engine user may well not be familiar with the underlying technologies on which information retrieval depends, VITALAS' work is nevertheless crucial to their ongoing development. "If we are to improve the efficiency of search engines, and to enhance their retrieval performance, then we need to make data more searchable than before," says Boujemaa. "That means we need to be able to enrich the data, and there are different ways in which we can do that. We can compute signatures that describe the multimedia data in a way that makes it accessible for a machine for example. The second way is cross-media indexing, which will still allow us to make queries in a textual form, but in addition we may use other modalities to express a query, such as an image or audio fragment. In any event we will really need to explore further beyond the manual annotation."

These are attributes which are enormously important in the commercial context, and which go a long way to ensuring the market relevance of VITALAS' work. This has not happened by chance; indeed the project took account of the likely needs of end-users from the very earliest stages of the development process. "We spent six months looking into, in a very precise manner, the specifications and requirements in terms of time, in terms of size, in terms of what kind of queries, that our system should be able to answer and what kinds of documents and scenarios we should take into account," outlines Boujemaa. "Belga, INA, IRT, as partners and content owners, have been very closely involved in the development of the project. We are keen to further expand their involvement and to hear from content owners about the scenarios and use cases so that we can develop very

The main strategic objective is to make large audio visual archives searchable through cross-media indexing and retrieval, as well as to design and develop new methods that will allow for automatic annotation of content

Such an approach indicates that the work of the VITALAS project should be viewed in a context wider than that merely of search engine development. While the enrichment of search engine results is one of the most challenging areas the research community currently faces, VITALAS' work to address it demands that they take the wider perspective very much into account, work which gives some measure of their determination to develop a user-focused method. "VITALAS is not only a search engine, it is also an annotator, it is an engine capable of generating new kinds of meta-data," points out Boujemaa. "One of VITALAS' most important attributes is that, with the inclusion of the annotation capacity, we can provide a post-editing capability. VITALAS is capable of annotating without any prior information; it annotates the whole content without subjective preferences about what should be annotated or what shouldn't."

clear specifications for the ongoing development of the methods." These words give some insight into the relentless nature of development in the technology sector. This, with concern about issues like security and accessibility growing, is particularly true of search engines, and while VITALAS has achieved much already, Boujemaa is in no doubt that there is room for further development. "In VITALAS we have put the emphasis on cross-media enrichment and indexing, route-figure mechanisms and scalability. So, we have been pursuing quite innovative research directions already," she says. "Within VITALAS we can still work on personalisation mechanisms and interactive retrieval – through feedback and log analysis. However, the issue which is really important at the moment – not only for professionals and businesses but also for the wider public – is privacy. We are keen to play a part in developing a privacy capability for a given search engine."

## At a glance

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