Information Technologies for Presentation of Bulgarian-Indian Cooperation in a Virtual Museum

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Abstract. We investigate digitalization and security of the Bulgarian and Indian cultural artifacts in multimedia archive. In the paper we describe project implementation and methods for intellectual property protection that are result of bilateral cultural and scientific cooperation between research-workers in India and Bulgaria.

Keywords: Digitalization, Security of data, Digital archives.

1. Project presentation

The inter-disciplinary project for a virtual museum of the Bulgarian-Indian cultural cooperation, which is unique and without any analog in India or Bulgaria, is a result of the efforts of mathematicians and scholars from the Bulgarian Academy of Sciences. According to the project, the information about the history, as well as the present of the Bulgarian-Indian relations in the field of culture will be systematized and presented in way, allowing easy access and updating. This would make it possible to visualize and save the materials giving information about the development of the Bulgarian-Indian cultural cooperation. What is more, it will be an innovative form of this cooperation, which will help its development, as well as drawing young people's interest to these relations. This will also give the opportunity to both governmental institutions and non-governmental organizations to have access to database in order to find new prospects for development of the bilateral relations. Most of the materials have not been digitalized yet in any of the two countries.

Diverse and mainly classical forms of international cultural relations were used: translations of fiction in Bulgarian and Indian; exhibitions; participation in festivals; visits of dance groups and singers; exchange of experts and authors in the field of literature and art; photographic exhibitions; organizing weeks of the Bulgarian film in India and vice versa; publishing of popular science and travel books; official exchange of scientific books. A course in Bulgarian started in Delhi, and a course in Hindi began at Sofia University. In addition, courses in Bulgarian folk dances were run in India and vice versa. In 1972 an agreement for cooperation was signed between the Committee for Radio and Television under the Council of Ministers and the

Indian Radio and Television , which broadcast folklore, classical music and theatre productions of Bulgaria and India.

There is a lot of and diverse written and material evidence about the Bulgarian-Indian cooperation. Documents from the Bulgarian archives concerning the mutual relations between the two countries in the field of culture, photos of posters from exhibitions and film festivals, meetings between representatives of Bulgaria and India, title-pages or covers of books about the two countries, as well as translated books etc., will be included in the virtual displays. Audio and video materials from the radio and television stock could be used in order to extend the cooperation.

The bilateral cultural cooperation is a theme elaborated scientifically by research-workers in India and Bulgaria. In addition, they help to carry out the planned cultural events. On behalf of Bulgaria, experts in India bound up in Bulgarian-Indian cultural cooperation will take part.

Such a project would be of interest for the public, which could obtain more information about the other country, as well as gain access to materials about its culture and history. What is more, it could help students and experts interested in the history and development of the Bulgarian-Indian relations.

The project is being developed on the basis of materials from the Diplomatic archive of the Ministry of Foreign Affairs, "St Cyril and St Methodius" National Library, the Central Library, as well as a number of publications, related to the topic.

2. Project implementation

We create an archive that contains different types of cultural and historical artefacts [1-3], [5], [8-11], [13-17]. To implement this archive we use FotoStation program that allows an archive to a multitude of primary and sub directories. The program has built in powerful file editor providing all functions needed for working with files located on a computer system.

Some of artefacts in archive are:

- Indian books
  - Photos of the cover of the page of the Indian book, granted by the "India Book Hause Ltd." in a request of the House of humour and satire, Gabrovo (1976)
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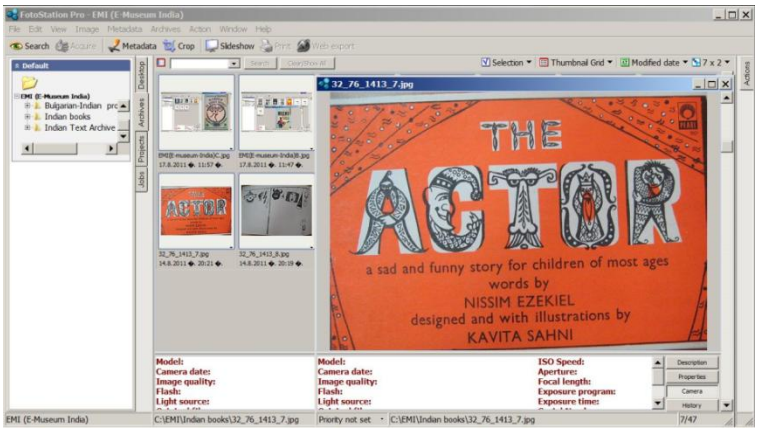

Fig. 1. Photos of the cover of the Indian book, granted by the "India Book Hause Ltd." in a request of the House of humour and satire, Gabrovo (1976)

- Bulgarian-Indian documents

A project between the Committee for television and radio at the Committee of Culture of the Republic of Bulgaria and the Indian radio and television for 1977-1978

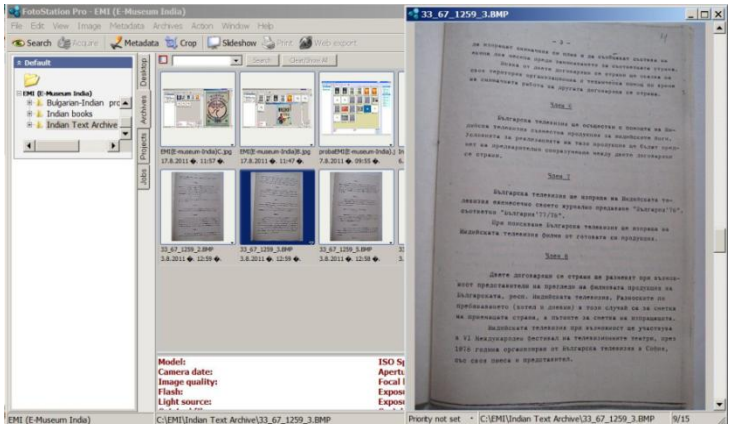

Fig. 2. Bulgarian-Indian documents. A project between the Committee for television and radio at the Committee of Culture of the Republic of Bulgaria and the Indian radio and television for 1977-1978

- Book Covers for India by the Bulgarian writers
  - A cover of the popular book "India" by the Bulgarian writer Ana Kamenova, 1962
  - A cover of the travel book "The Dance of Shiva" by the Bulgarian writer Anastas Styanov, 1970
  - A cover of the travel book "Blue lotus for India" by the Bulgarian writer Nadya Mihaylova, 1983

- A cover of the popular book “India. Reality and Aspirations” by the Bulgarian journalist Veselin Seykov, 1981
- A cover of the travel book “The Land of Living Eternity. Indian Diary” by prof. Aleksander Shurbanov, 1990

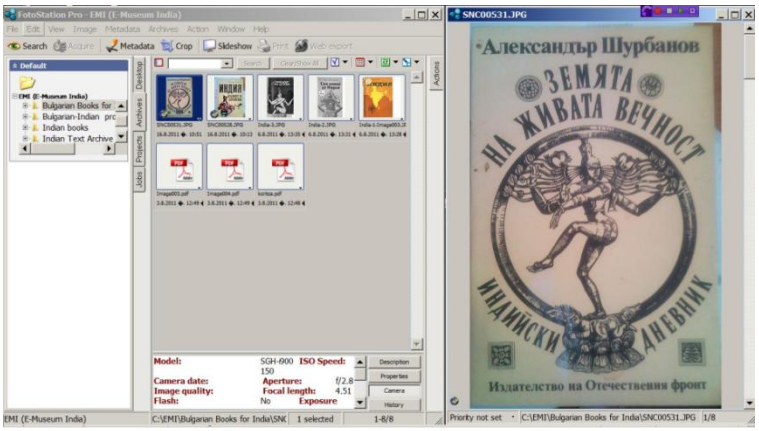

Fig. 3. Book Covers for India by the Bulgarian writers

3. Modern techniques for intellectual property protection

The introduction of more restrictive measures by some governments on the encrypted services motivates the search for methods by which to hide information in the original data. Research in this area is considered in several aspects. One of the most important of these is steganography. Steganography literally translated from Greek means "secret writing". Like steganography, watermark protection, aims carry hidden information. However, there are significant differences between the two techniques. Watermark protection has more resistance against attempts to remove the embedded information. Digital watermark is visible or preferably invisible to the identification code that is permanently embedded into digital data and maintained a presence in them after extracting it [7]. All methods of protection with watermarks have the same basic component blocks: a system for embedding a watermark and a system for extracting a watermark.

3.1 Methods for image watermarking in the spatial region

In these methods data are incorporated directly into the original image. The main advantage is that they is not necessary to do any preconditions transformations. The watermark is embedded by changing the illumination or color components. The main disadvantage is the low resistance. An example of this method is the method of Kutter [12].To derive the integrated lifestyle should be suggested for the original value of the pixel containing the information. This assumption is based on a linear combination of pixels around embedded position. To derive the value of the embedded bit is

calculated assumed difference between value and actual value of the pixels. The sign of the difference determines the value of the embedded bit. Extracting bits is done without the knowledge of the original message. The accuracy of the assumption may not always be ensured, so the functions of incorporation and extraction are not mutually reversible. Moreover, sustainability can be improved with the use of a code error correction. The method is robust to filtering, JPEG compression and geometric transformations.

3.2 Methods for spread spectrum image watermarking

Based on different transformations of the image in which watermark is embedded, for example Discrete Cosine Transformations (DCT). This allows for greater stability of the watermark to different types of transformations. This watermark is highly resistant to most signal processing and geometric transformations. Example of such method is given by Cox [7].

3.3 Encoding text by row

This is a method in which lines of text are displaced vertically so that the document can be uniquely encoded [6]. In most cases, the decoding can be performed without the use of the original document, if it is known that the primary document is the same distance between rows. The method is easily noticeable, but resistant to noise. As an improvement to these watermarking methods we use error-correcting codes. Because of the specificity of protection with watermark, this problem remains open. Its solution requires the use of code that is as compact and resistant to different types of attacks. We improve performance of the codes described in [18] by using our own coding method [4]. This encoding makes embedded watermarks more resistible to attempts to remove the embedded information.

4. Conclusion

We present an inter-disciplinary project for a virtual museum of the Bulgarian-Indian cultural cooperation. The project is still in progress. At the current stage a preliminary design of the archive structure and its software realization is done. Also the project participant created effective methodology for object digitalization, representation, image and text watermarking. Finally, samples of digitized objects, expositions and metadata collections are prepared. All these completed tasks will be used as fundament of the future work on this project.

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