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VIRTUAL RESTORING BY MULTISPECTRAL IMAGING

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ABSTRACT

The Isyreadet project, funded by the European Commission under the 5th Framework Programme of RTD, aimed at developing an user-friendly software prototype for the virtual restoring of damaged documents in order to enhance their readability and aimed at testing innovative devices for the multispectral acquisition.
The project starts from the consideration that the European Cultural Heritage consists for the most part of paper documents that for their nature are particularly subject to deterioration. The new technologies in this sense allow not only the scanning and the archiving of the texts as simple digital images, but above all allow to resort to specific interventions of virtual restoring for enhancing the texts readability.

EXAMPLES OF DEGRADED DOCUMENTS

ACQUISITIONS

METHODOLOGY

Phase 1: Analysis and classification of different kind of paper damages. The attention has been particularly focussed on the damages that show themselves as patterns superposition that interfere with the main foreground text, restricting or, in many cases, preventing the readability.
Phase 2: Digitisation of the test-documents using a multispectral camera. The images have been taken in the three bands of the visible (red, green and blue) and in the near infrared.
Phase 3: Selection of suitable algorithms of image enhancement (such as the Indipendent Component Analysis, decorrelation methods, anisotropic filters, mathematic morphology) and subsequent application of them, in order to reduce the interferences caused by the presence of superimposed text or spots.
Phase 4: Definition of the user-friendly graphic interface: the algorithms, developed by the CNR-ISTI and by the ENST, have been implemented in the PREOCR software.

RESULTS

The tests carried out on the PREOCR software, that does not require specific expertise or mathematical skills to be managed, have raised the following considerations:
A) The images have not all the same quality and that the objective elements (e.g. the light conditions) and the subjective elements (e.g. the damages on the text the quality of the paper) may change from one acquisition to another.
B) The software is particularly effective for the spots removal: the spots, in fact, have generally a different colour from the main foreground text and this allows the algorithms to work in an optimal way.
C) The same happens for the bleed through and show through phenomena: when the difference of colour with the main text is clear, also these interference phenomena can be effectively erased and the readability enhanced.

GRAPHIC INTERFACE

CONSORTIUM

The consortium holder of the project is formed by 5 SMEs (T.E.A. s.a.s. - Italy, Art Conservation BV and Art Innovation BV - The Netherlands, Atelier Quillet – France, Transmedia Technology – United Kingdom) and 3 research institutes (CNR-Istituto dei Processi Chimico-Fisici and CNR–Istituto di Scienza e Tecnologie dell'Informazione – Italy; École Nazionale Supérieure des Télécommunications – France).