

## Metadata hiding tightly binding information to content

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### Summary

The future dramatic development of telecommunications infrastructures (next generation Internet and wide-band mobile networks) will strongly push forward the diffusion of multimedia communication services. Anyway the real effective development of such services will strongly depend on the availability of a reliable platform for managing all the issues related to the exchange of multimedia items among users through heterogeneous networks and systems. Such a need is also witnessed by the ISO MPEG21 initiative whose goal is to achieve “an environment that is capable of supporting the delivery and use of all content types by different categories of users in multiple application domains”. In particular some important elements which are considered by MPEG-21 still to be addressed for achieving its goal are Digital Items Identification and Description and Intellectual Property Management and Protection. Some calls have been already issued regarding the identification and description schemes: although it seems that metadata (and XML) will have an important role for addressing this issue, anyway it is evident that much work has still to be done. Future coming *watermarking technologies* will have thus to consider this kind of metadata, and how these will influence their behaviour. It is possible, for example, to suppose that some particular type of metadata should be hidden inside the data themselves for security/confidentiality reasons: these metadata would be known only to those who have knowledge of them (any other person neither would notice their pres-

ence) and are authorised to access them. In general this approach would make the embedded metadata independent from the particular format used for storing the image (being this requirement no satisfied if the metadata would have been embedded solely into the image header which is obviously format dependent), and resistant to format changes. In particular metadata embedding is attractive because offer the possibility to make metadata persistent through digital-to-analogue transformations. Of course the need to embed metadata inside the image raises a issue which is beginning to be addressed by watermarking research and regards the technologies to be developed for increasing the watermarking payload given a certain degree of robustness. It is presently emerging with evidence that many of the watermarking techniques developed until now are able to grant payloads that are strongly inferior to what can be theoretical estimated as the capacity limit. These results are encouraging researchers to attempt to design more powerful coding and decoding strategies.

In this paper an application for embedding, inside a digital image, metadata for identifying its IPR status is presented; this insertion has been achieved by means of a digital watermarking technique. This technology has been developed within the IST 21031 Tradex European Project. The metadata have been constructed according to the indications contained in the JPEG standard

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