## Proposition of a methodology for the detection and identification of craquelure patterns on painted artworks

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Study and management of painted artworks, based on the application of mathematical methodologies, recently arise new potentials evolving the multimedia technologies. The conservation of works of art is nowadays based on the study of the materials and painting techniques as well as their damages recorded by the conservators. The support of the documentation procedure using a computational application for the evaluation of the information can result to a contribution of important significance to the conservation field.

The use of mathematical image processing presents new perspectives in computational applications concerning the qualitative evaluation of the condition, analysis, management, recall, image enhancement and digital restoration of works of art. Consequently, the applications concerning the automatic recall and analysis of information recorded in digital images prove to be a necessary means of documentation in the conservation field.

Such an application is the semi-automatic classification of works of art based on the morphology of the craquelure patterns recorded on various layers of their structure, in the visible, ultraviolet and infrared regions of the spectrum. The specific study of cracks support decisions concerning the authenticity, the materials and painting techniques as well as the environmental impact on them, since different cracks caused on artworks are directly related to the aforementioned factors.

The aim of this project is the proposal of a methodology for the detection and extraction of the craquelure patterns present on the structure layers of works of art, as this is recorded in the visible region of the spectrum, using morphological operators and digital filters.

Moreover, the definition of the specific characteristics of each type of crack's shape is attempted, while mathematic algorithms are applied for the extraction and measurement

of morphological and geometrical parameters in order to obtain an automatic distinction and classification of the different crack's types.

Our ultimate target is the development of the proper mathematical model for the automatic classification of painted artworks based on the morphology of their cracks. The systematic documentation of the craquelure morphology contributes to the development of the appropriate background for the identification and understanding of the causes of the damages on works of art. The automatic identification of the craquelure patterns by the computer using digital image processing constitutes a rather complicated procedure, especially in multiple image shoots, due to different experimental conditions, the background noise, the contrast and the intensity level. The craquelure identification is followed by further elaboration procedure aiming at the determination of specific classification criteria. The morphology of the cracks can reveal information related to the qualitative and quantitative composition of the support, the ground and the painting layers, contributing thus to a better understanding of historical and artistic issues.