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Monitoring of historical frescoes by timed infrared imaging analysis

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Abstract:

The subflorescence and efflorescence phenomena are widely acknowledged as the major causes of permanent damage to fresco wall paintings. They are related to the occurrence of cycles of dry/wet conditions inside the walls. Therefore, it is essential to identify the presence of water on the decorated surfaces and inside the walls. Nondestructive testing in industrial applications have confirmed that active infrared thermography with continuous timed images acquisition can improve the outcomes of thermal analysis aimed to moisture identification. In spite of that, in cultural heritage investigations these techniques have not been yet used extensively on a regular basis. This paper illustrates an application of these principles in order to evaluate the decay of fresco mural paintings in a medieval chapel located in North–West of Italy. One important feature of this study is the use of a robotic system called aIRview that can be utilized to automatically acquire and process thermal images. Multiple accurate thermal views of the inside walls of the building have been produced in a survey that lasted several days. Signal processing algorithms based on Fast Fourier Transform analysis have been applied to the acquired data in order to formulate trustworthy hypotheses about the deterioration mechanisms.