Detection of cracks in concrete walls using image processing algorithms and extraction of features related to its restoration operation

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Each type of construction in the present age is in a growing number of countries and this means increasing the consumption of construction materials, in the world, and at the top of their high-value materials, such as concrete. Concrete is one of the materials that offers high compressive strength, It is among the cheapest materials, and this is due to the high cost of using it in construction. But these engineering materials also have high sensitivities, which in some cases provide limitations for its use. Among the disadvantages of concrete materials, the possibility of cracking on its surface is under many factors, the deposition of cracks on concrete in situ can reduce the useful life of concrete, but with timely repair it can be overcome. But it is always the first step in detecting the cracks in order to prevent this phenomenon as undesirable as possible by improving existing methods. In this research, a smart crack detection method based on fuzzy digital image processing at various levels of concrete materials has been presented. In this regard, based on the morphology operation, the brightness of the concrete surface, which is usually due to exposure to relatively modest environmental conditions, is identical. Then, using the fuzzy threshold detection, the crack form is extracted. The proposed method can be used for concrete surfaces under different environmental conditions. Using the program written in the MATLAB software environment, the accuracy of this method is examined and the results compared with the existing methods indicate a higher accuracy and less calculation time.

Keywords : concrete aggregates, cracks, image processing, morphology, fuzzy logic