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# Fusion-based shape descriptor for weld defect radiographic image retrieval

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**Abstract:** Content-based image retrieval with relevance feedback plays nowadays an important role in several machine vision applications. In this paper, such a system is proposed for weld radiograms in radiographic testing, with the aim of searching from the overall image database, interactively with the radiograph expert, discontinuities similar to some common weld defect types such as crack, lack of penetration, porosity, and solid inclusion. Therefore, shape features characterizing efficiently these defect indications are required. Two shape descriptors are proposed: a shape geometric descriptor (SGD) consisting of a set of invariant shape geometric measures chosen on the basis of their relationships with the weld defect classes and a generic Fourier descriptor (GFD) known for its discrimination powerfulness for planar filled objects. To improve the weld defect retrieval results, we propose a new fusion-based shape descriptor. The idea of the fusion strategy is to examine the compactness and the rectangularity measures in SGD and derive a criterion permitting the design of a new descriptor f(GFD,SGD) able to better discriminate, particularly, between the problematic defect classes of crack and lack of penetration. Experiments conducted on weld defect image database show the strength of the proposed hybrid descriptor compared to GFD and SGD, simply or hierarchically concatenated or used separately.

**Keywords :** Radiographic testing, weld defect, CBIR, SGD, GFD, f(GFD, SGD)