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Abstract
Rheumatoid arthritis is a form of autoimmune disease characterized by synovitis that can ultimately cause joint deformities and impaired functioning. The cartilage destruction is one of the most important indicators for diagnosis and treatment of Rheumatoid arthritis, and it is radiographically manifested as joint space narrowing. In this study, we propose a joint location detection method and a sub-pixel accurate method for quantifying joint space narrowing progression with a joint angle correction. The proposed joint location detection method can detect the location of 14 joints from a given hand radiographic image, the error of 89.13% joints is less than 3 pixels (spatial resolution: 0.175 mm/pixel). In our previous works, we measured joint space narrowing progression between a baseline and its follow-up finger joint images by using partial image phase only correlation. We found that the inconsistency of joint angles may lead to characteristic mismatch and thus affect the accuracy of joint space narrowing quantification. In this work, we introduce rotation invariant phase only correlation in joint space narrowing quantification for joint angle correction. In our experiment, the improved quantification method can effectively manage the mismatch due to the inconsistency of joint angles