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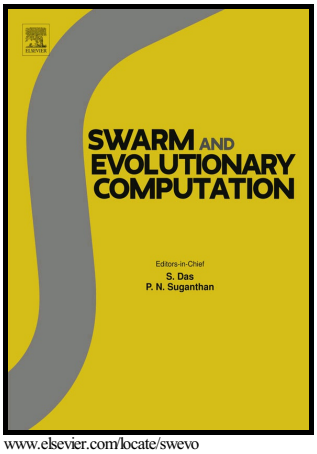

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A novel evolutionary rigid body docking algorithm for medical image registration

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Abstract

One of today's motivating medical image processing problem is registration. Medical images acquired from different modalities give rise to a practical problem in image registration. For many years, mutual information has been utilized as a similarity criterion for registration. Therefore, it is believed to be the state-of-the-art in this field. Nonetheless, it is understood to be non-convex and possess many local maxima. To overcome this problem, we introduce a novel evolutionary rigid body docking (ERBD) algorithm for medical image registration. Here, the ligand is taken as the non-aligned (target) image (to be registered) and protein as the reference image. The alignment of the target image is changed as per the optimal configuration. This paper introduces a firsthand objective (fitness) function for finding optimal configurations. Genetic algorithm (GA) is used to optimize the fitness function. The proposed method is useful for recovery of rotation and translation parameters. Different image data formats like magnetic resonance image (MRI), computed tomography (CT) and positron emission tomography (PET) images from Retrospective Image Registration Evaluation (RIRE) project are used to demonstrate the effectiveness of our proposed method. Experimental results are presented to reveal the fact that our approach seems to be efficient.

Keywords

Evolutionary Algorithm, Rigid Body Docking, Medical Image Registration.

1. Introduction

Image registration is a repeated assessment of an image transformation confirming the maximum similarity between the aligned (output) image and the reference (input) image. It has been one of the sought after areas of research in the field of remote sensing, territory surveillance, environmental protection and so on. It has also gained importance in the area of medical imaging. For successful diagnosis and treatment planning, human body is scanned with different modalities

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