Abstract

As medical images contain uncertainties, there are difficulties in classification of images into homogeneous regions. Fuzzy sets, rough sets and the combination of fuzzy and rough sets plays a prominent role in formalizing uncertainty, vagueness, and incompleteness in diagnosis. Development of hybrid approaches for the segmentation of the magnetic resonance imaging (MRI) with the ability of combining the merits of individual techniques is constantly increasing. The rough-fuzzy c-means (RFCM) clustering algorithm is a hybrid approach combining the merits of fuzzy set and rough set in the c-means framework and is successfully applied to the MR image segmentation. The focus of this paper is on enhancing the computational capability of the fuzzy set based clustering algorithms and the hybrid variant. In this paper we propose an alternative optimal version of the hybrid variant based on type-2 membership function and rough set. We extend and generalized RFCM algorithm with type-2 membership function and call it rough type-2 fuzzy c-means (RT2FCM) algorithm. The RT2FCM algorithm is a generalization of the RFCM algorithm which extends the membership value of each pattern to the type-2 membership functions and is applied to the segmentation of MR images. Experimentation is done using the brain MR images and the results show better detection of abnormal tissues by RT2FCM in contrast to the FCM, T2FCM (Type-2 FCM) and RFCM clustering algorithms.
A Rough Type-2 Fuzzy Clustering Algorithm for MR Image Segmentation

References


**Index Terms**

Computer Science

Pattern Recognition

**Keywords**

Fuzzy c-means  Rough-fuzzy c-means  MR imaging  image segmentation