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## ACCEPTED MANUSCRIPT

## Local Contextual Information and Gaussian Function Induced Fuzzy Clustering Algorithm for Brain MR Image Segmentation and Intensity Inhomogeneity Estimation

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#### Highlights

- A fuzzy clustering algorithm by integrating local contextual information and a Gaussian function in the objective function to estimate bias field and segmentation of brain MR images simultaneously is presented.
- The algorithm works directly on the MR signal model without transforming it into a log-transformed domain.
- We have used the Gaussian surface to compensate the effect of bias field and the local contextual information to influence the final labeling of image pixels.
- We have introduced global and local membership functions for each pixel to define its belongingness into a tissue region.
- Simulation results on a number of real-patient and simulated brain MR images demonstrate its effectiveness and superiority over other similar methods.

*Abstract*—This paper presents a fuzzy clustering algorithm, where local contextual information and a Gaussian function are incorporated into the objective function, for simultaneous brain MR image segmentation and intensity inhomogeneity estimation. In doing so, for each pixel, we define a local contextual information, which actually defines its association among the other neighboring pixels based on intensity distribution. In particular, this information defines the possibility of the pixel to belong into a specific tissue type. Whereas, for each tissue region, a Gaussian surface is defined to estimate the intensity inhomogeneity (IIH) using the local image gradients, which are believed to be caused by the IIH. We use this Gaussian surface to Download English Version:

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