X-ray Image Segmentation by using Fuzzy Index measure combined with Principle Component Analysis

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Abstract

The main research of computer based image segmentation using Fuzzy Index measure combined with Principle Component Analysis to isolate/ distinguish/subdivide a digital image into its constituent parts or objects. Image segmentation is often used as an initial transformation for general image analysis and understanding. It is useful in visualization of the different objects present in the image, for example separation of the soft bonny tissues and background on the lateral skull x-ray an important role in producing cephalometric tracing and hence producing accurate cephalometric evaluation used in orthodontics practice is necessary. The objective of this project is to segment the gray level image by splitting the image into three crisp subsets. One is background (black), second one is skin subset (gray), and third one is bones subset (white) using the measure of fuzzy entropy as defined. The fuzzy subsets are associated with the normalized image histogram intervals. The main modules of the system are following:

- Iterative Threshold calculation
- Sigma Calculation
- Meu Calculation
- Slope Calculation
- Fuzzy Index measure calculation
- Segmentation Section

The initial threshold values for each subset are decided based on the iterative approach. Then the sigma values are calculated. Then Meu values are calculated. Based on that slope data is calculated. Then the fuzzy index measure is done by using the particular parameters. After calculating the index values, they are compared with the three sets and maximum values are stored in three different sets. The fuzzy index is a measure of the amount of confusion between pixels in an image. The final result of this system is the segmented output of the Xray Image into Bone, Background and Skin area. By Adding Principle component analysis (PCA) the internal level bones are also accurately identified.