

Best clustering results are achieved when v_{pc} is maximum or v_{pe} is minimum. Disadvantage of v_{pc} and v_{pe} are that they measure only the fuzzy partition and do not specify featuring property.

4. Conclusion

Digital images generally contain unknown noise and consider able uncertainty. Traditionally, FCM is a popular segmentation method for digital images. However, it is an intensity-based clustering algorithm which is not robust against noisy images. In this paper, we have compared

Fuzzy C-Means (FCM), Intuitionistic Fuzzy C-Means(IFCM), Possibilistic C-Means(PCM), and Credibilistic Fuzzy C-Means(CFCM) methods under different environments. We observed the results of these four algorithms on two different types of images – Hestain.png which is a synthetic image, and Westconcordaerial.png which is a SAR image. We compared the experimental results of PCM, CFCM, FCM, IFCM on both the images. Quantitative and qualitative analysis of the results showed that the algorithm is more efficient compared to two others.

Table: Comparison of Fuzzy Algorithms on basis of Execution Time, and Validity Functions.

IMAGE	METHOD	Clusters	Execution Time	Vpc	Vpe
SAR	FCM	2	1.913961	1.0935e +05	-5.7167e +04
		3	3.629229	9.3171e + 04	-9.1313e + 04
		4	5.462073	8.1837 e + 04	-1.1828 e + 05
	PCM	2	1.86979	8.4912 e + 04	-8.0601 e + 04
		3	3.82852	1.0724 e + 05	-1.21182 e + 05
		4	7.28608	1.3083 e + 05	-1.6171e+05
	CFCM	2	3.733267	8.03e+04	-5.71e+04-
		3	3.772235	6.40e+04	-9.13e+04
		4	6.05966	5.54e+04	-1.18e+04
	IFCM	2	4.029621	1.0133e +05	-6.7873 e + 04
		3	8.135913	7.8841 e +04	-1.1373 e + 05
		4	10.926989	6.6688	-1.4593
HESTAIN	FCM	2	2.267298	5.3906 e+ 04	-2.4286 e+ 04
		3	1.928546	4.9789 e+ 04	-3.4080 e+ 04
		4	4.332554	4.5713 e+ 04	-4.3928 e+ 04
	PCM	2	0.1317	5.0280 e+ 04	-3.6214 e+ 04
		3	0.28401	5.3461 e+ 04	-5.6029 e+ 04
		4	0.42549	5.9751 e+ 04	-7.4691 e+ 04
	CFCM	2	1.046882	3.33e+04	-2.43e+04-
		3	3.435347	2.85e+04	-3.40e+04
		4	5.637113	2.37e+04	-4.40e+04
	IFCM	2	2.604906	4.5779 e+ 04	-3.4807 e+ 04
		3	3.984573	4.1051 e+ 04	-4.8399 e+ 04
		4	5.187209	3.2734 e+ 04	-6.6425 e+ 04

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