

Adaptive Motion Compensated Spatial Temporal Filter of Colonoscopy Video

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Abstract : Colonoscopy procedure is widely used in the world to detect an abnormality. Early diagnosis can help to heal many patients. Because of the unavoidable artifacts that exist in colon images, doctors cannot detect a colon surface precisely. The purpose of this work is to improve the visual quality of colonoscopy videos to provide better information for physicians by removing some artifacts. This work complements a series of work consisting of three previously published papers. In this paper, Optic flow is used for motion compensation, and then consecutive images are aligned/registered to integrate some information to create a new image that has or reveals more information than the original one. Colon images have been classified into informative and noninformative images by using a deep neural network. Then, two different strategies were used to treat informative and noninformative images. Informative images were treated by using Lucas Kanade (LK) with an adaptive temporal mean/median filter, whereas noninformative images are treated by using Lucas Kanade with a derivative of Gaussian (LKDOG) with adaptive temporal median images. A comparison result showed that this work achieved better results than that results in the state- of- the- art strategies for the same degraded colon images data set, which consists of 1000 images. The new proposed algorithm reduced the error alignment by about a factor of 0.3 with a 100% successfully image alignment ratio. In conclusion, this algorithm achieved better results than the state-of-the-art approaches in case of enhancing the informative images as shown in the results section; also, it succeeded to convert the non-informative images that have very few details/no details because of the blurriness/out of focus or because of the specular highlight dominate significant amount of an image to informative images.

Keywords : optic flow, colonoscopy, artifacts, spatial temporal filter

Conference Title : ICMLMI 2020 : International Conference on Machine Learning in Medical Imaging

Conference Location : London, United Kingdom

Conference Dates : December 10-11, 2020