

Optimal Canny's Parameters Regressions for Coastal Line Detection in Satellite-Based SAR Images

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Abstract— Canny's algorithm is a very well-known and widely implemented multistage edge detector. The extraction of coastal lines in space-borne-based synthetic aperture radar (SAR) images using this algorithm is particularly complicated because of the multiplicative speckle noise present in them and can only be used if Canny's parameters (CaPP) are chosen appropriately. This letter introduces a methodology for computing functional forms for the CaPP, using functions of the image characteristics through a system that combines artificial neural networks (ANN) with statistical regression. A set of CaPP functional forms is obtained by applying this method on synthetic SAR images. Pratt's figure of merit (PFoM) is used to measure the performance of them, obtaining more than 0.75, on average, in the 14 400 synthetic SAR images analyzed. Finally, this set of formulas has been tested for extracting coastal edges from real polynyas SAR images, acquired from Sentinel-1.

Index Terms— Artificial neural networks (ANNs), edge detection, statistical analysis, synthetic aperture radar (SAR) images.

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