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Robust cost function for optimizing chamfer masks

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Abstract

Chamfering, a mask-driven technique, refers to a process of propagating local distances over an image to estimate a reference metric. Performance of the technique depends on the design of chamfer masks using cost functions. To date, most scholars have been using a mean absolute error and a mean squared error to formulate optimization problems for estimating weights in the chamfer masks. However, studies have shown that these optimization functions endure some potential weaknesses, including biasedness and sensitivity to outliers. Motivated by the weaknesses, the present work proposes an alternative difference function, RLog, that is unbiased, symmetrical, and robust. RLog takes the absolute logarithm of the relative accuracy of the estimated distance to compute optimal chamfer weights. Also, we have proposed an algorithm to map entries of the designed real-valued chamfer masks into integers. Analytical and experimental results demonstrate that chamfering based on our weights generate polygons and distance maps with lower errors. Methods and results of our work may be useful in robotics to address the matching problem.

Keywords

Chamfering Euclidean Mean absolute error Optimization

Notes

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no competing interests.

Existence of maximum in RLog