MEASUREMENT ACCURACY OF CENTER LOCATION OF A CIRCLE BY CENTROID METHOD

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Working Groups I/2, III/1, III/4, III/5

KEY WORDS: analysis, measurement, accuracy, circle, center, digitization

ABSTRACT:

This paper reports an investigation of the effect of digitization on the measurement accuracy of the center location of a circle by a centroid method. Although general expressions representing the measurement accuracy of the center location of a circle by the centroid method are unable to be obtained analytically, we have succeeded in obtaining the variances V of measurement errors for 39 quantization bits n ranging from one to infinity by numerical integration. We have succeeded in obtaining the effective approximation formulae of V as a function of the diameter d of the circle for any n as well. The results show that V would oscillate on an approximate one-pixel cycle in d for any n and decrease as n increases. The differences of V among the different n would be negligible when $n \geq 6$. Some behaviors of V with an increase in n are demonstrated.

This contribution was selected in a double blind review process to be published within the ***Lecture Notes in Computer Science*** series (Springer-Verlag, Heidelberg).

Photogrammetric Image Analysis

Volume Editors: Stilla U, Rottensteiner F, Mayer H, Jutzi B, Butenuth M
LNCS Volume: 6952
Series Editors: Hutchison D, Kanade T, Kittler J, Kleinberg JM, Kobsa A, Mattern F, Mitchell JC, Naor M, Nierstrasz O, Pandu Rangan C, Steffen B, Sudan M, Terzopoulos D, Tygar D, Weikum G
ISSN: 0302-9743

The article is accessible online through www.springerlink.com.