"Gheorghe Asachi" Technical University of Iasi, Romania

OPTIMAL LOCATION ANALYSIS OF LARGE-SCALE DIGITAL TELEVISION STATIONS BASED ON THE VORONOI DIAGRAM FOR ENVIRONMENTAL MONITORING

Jiping Liu, Weisong Zhang, Rongshuang Fan, Shenghua Xu[∗]

Chinese Academy of Surveying and Mapping, 28 Lianhuachi West Road, Haidian District, Beijing 100830, China

Abstract

Optimal location selection for digital television stations is the most significant task in terrestrial broadcasting-TV covering net planning as well as in environmental monitoring. Based on the summary of mathematical model of digital television location, a method of optimal station location analysis based on Voronoi diagram is proposed in the paper. Firstly, the preprocessing is performed to create the forth buffer's boundary of polygon convex hull for achieving aided points of boundary interpolation with the 1:250000 terrain Database and digital elevation model with a resolution of 10m×10m. Then the initial positions are fixed with the location method of the largest hollow circular of Voronoi diagram. Furthermore, the location of stations is optimized with local reconstruction and Laplacian smoothing technology and evaluated by the quality assessment methods of triangulation and application. At last, the location of the new stations is readjusted based on the evaluated results and the factor of terrain and population. The method has effectively solved the overall planning problem of large-scale digital broadcasting location with the advantage of speediness, automatism and rationality.

Key words: digital television station, Laplacian smoothing, location method, partial reconstruction, Voronoi diagram

Received: February, 2012; Revised final: June, 2013; Accepted: July, 2013

[∗] Author to whom all correspondence should be addressed: e-mail: xushenghua@gmail.com