Spatial Conflict Reduction in Building Generalization Process using Optimization Approaches

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SUMMARY

Building generalization represents an essential step in topographic map generalization. This process involves three main steps: Building clustering, building pattern detection and building generalization and spatial conflict reduction. This paper presents a comparative study of two optimization algorithms (particle swarm optimization (PSO) and simulated annealing (SA) algorithms) for spatial conflict reduction in building generalization process. The objective of this study is to analyze the algorithms considering three points. The first one is the reduction in total conflicts; the second one is the total displacement distance and the third one is their accuracy in the building generalization process. A real building dataset at 1:25k dcale is used to evaluate the algorithms in complete building generalization process. The success of the algorithms are evaluated firstly using the ratios between the building area and the free space area, block density and the mean of the first nearest neighbor distances in the block, before and after the generalization and secondly by comparing the generalized results with those produced manually by cartographer. The results demonstrated that both approaches are successful in reducing spatial conflict. In other words, with the increase in the number of iterations, the number of conflicts and total displacement distances are decreased for both algorithm, while the accuracy of the final map increases. However, when compared against each other, the PSO algorithm is superior regarding the fewer number of total conflicts, smaller total displacement distance and higher accuracy in the generalization process. Therefore, it can be concluded that the quality of the result is better when the spatial conflicts problem is solved using PSO algorithm. So, it is beneficial for the building generalization process.