Abstract

Nodes along the boundaries of a Wireless Sensor Network (WSN) play some other important roles in addition to their routine tasks. A prior knowledge of the WSN boundaries can effectively be utilized in numerous WSN aspects pertaining to mobile events, mobile nodes, geographic routing, shape and coverage maintenance, barrier coverage etc. In this paper, we present a localized method based on actual connectivity graph and nodes’ locations to detect the
boundaries of a WSN. The proposed scheme does not make any idealistic assumption like Unit Disk Graph (UDG) model, uniform node deployment, or specific node degrees. The method is based on the idea of alpha-shapes – geometric structures used to capture the shapes formed by a set of points in space. With an appropriate value of alpha, alpha-shapes capture the meaningful boundaries of a point cloud. The value for the parameter alpha is computed locally by each node as \( \frac{\pi}{2}/d \) where \( d \) is the distance between the node and its farthest neighbor. The analytical and simulated results show the robustness of the proposed scheme under dynamic network conditions.

References

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**Index Terms**

Computer Science

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**Keywords**

Wireless Sensor Network  Alpha-shape  Boundary Detection