Interior Pedestrian Tracking by Random Forest Algorithm with a Half-Voting and Weighted Decision Trees

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***Abstract*: The traditional Zero Velocity Updating Algorithm is being used to correct the accumulated errors of the device effectively. However, as the threshold value of the traditional Zero Velocity Updating algorithm is fixed, it is only suitable for a single motion mode. When indoor pedestrian motion includes multiple motion modes, the positioning accuracy will be greatly reduced. In this paper, we propose an adaptive Zero Velocity Updating method for multi-motion mode using half- voting Random Forest. We analysed the selection of Zero Velocity Updating threshold value for stilling, walking, running, going upstairs and downstairs for the interior pedestrian. Then we recognize pedestrian motion by Random Forest with a Half-Voting and Weighted Decision Trees. Finally according to the result of recognition adjust the threshold adaptively to determine the zero velocity intervals accurately. In order to verify the feasibility and effectiveness of the method proposed in this paper, field experiments were carried out with the inertial navigation module developed by our laboratory. The experimental results show that when indoor pedestrians perform multi-mode motion, the positioning error is 0.5m.**

Keywords: Zero Velocity Update; Adaptive Threshold; Random Forest; Pedestrian Navigation System