Title: Route Description by Landmarks

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Finding landmarks for long distance navigation by a mobile robot is explored. In a trial navigation, the robot continuously views and memorizes scenes along the route. When the same route is subsequently pursued again, it locates and orients itself based on the memorized scene. Since the stream of images is highly redundant, it is transformed into an intermediate 2 (1/2) D representation, called Panoramic Representation, with a much less amount of data. Although the Panoramic Representation can be used as guide of the autonomous navigation, it still contains a huge amount of data for a very long route. A human memorizes only very impressive objects along the route such as an old church or a very high tower and uses them as landmarks. Our robot also finds distinctive objects along the route and memorizes their features as well as spatial relationships for the navigation guidance. 3 D objects along the route are segmented each other in the Panoramic Representation by fusing range estimates and color attributes and, then, a structure map representing their arrangement in space is yielded. By examining the spatial relationships, shapes and color attributes of the objects in the structure map, distinctive objects are selected as the landmarks. The route described by selected landmarks is recognized successfully, although the speed of camera motion and the illumination condition change considerably.
図の形で表現する。これは定性的表現で、ロボットの運行速度や照明条件の変化などに影響されにくい。次に物体の属性を調べて、目印として有用なものを少数個選抜し記憶する。記憶した目印と照合を行うことにより経路確認、位置判定が可能なることを実験的に検証した。

以上の結果は、人工知能、ロボット工学に新しい知見を与えたもので、学位の授与に値すると認める。