Using Hybrid Heuristic Methods to Search an Indoor Area

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Project Objective
To develop a heuristic search algorithm to efficiently explore an unknown area using a robot with a panning camera to optimize target acquisition and tracking.

Project Approach
• Test many heuristic search methods in different environments to determine which performed best in all environments.
• Movement patterns used were random walk, wall following, wavelike motion, zigzags and spirals.
• Change search method based on encountered environmental features.
• Equip robot with a panning camera to increase viewable area.

Environment Maps

Benefits/Impact
• No localization and therefore not sensitive to odometry errors
• Adapts to existing environmental features
• Multiple robots can be used
• No communications requirements so no bandwidth limitations
• No knowledge of environment necessary

Key Results

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight Randomwalk</td>
<td>49%</td>
</tr>
<tr>
<td>Circular Randomwalk</td>
<td>40%</td>
</tr>
<tr>
<td>Waves and Straight Random walk</td>
<td>54%</td>
</tr>
<tr>
<td>Combo with Circular</td>
<td>56%</td>
</tr>
<tr>
<td>Combo with Straight</td>
<td>67%</td>
</tr>
</tbody>
</table>

• The combination of waves, wall-following, and straight random walk searched the most area on average for each of the environments.

Significant Citations

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