Urban Pedestrian Behaviour Modelling using Natural Vision and Potential Fields

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Why do we need this?

Increasing situational awareness on an urban street – getting to level 3
Natural Vision?

- Natural Vision – “...human behaviour in wanting to move in a direction that interests them the most in their field of view …” [3]
- Pedestrian behaviour is a function of the built environment made up of positive and negative attractors
- Points of Interest (POI) – “…Monuments, places of public interest, public transportation…stores, restaurants, etc…” [3]
How do we model this?

**Potential fields [4]**

- In a structured urban environment, for legal crossings to occur, certain assumptions are made:
  - The edges of the road repel pedestrians.
  - A cross-walk acts as a conduit between the two sides of the street.
  - The road acts as a barrier for crossing, repelling pedestrians towards the side-walks.
  - Static and Dynamic obstacles in the scene are repulsive in nature.
  - Side-walks offer no resistance to pedestrian movement.
  - Points of Interest are a reason for pedestrians to cross.
Activity modeling and abnormality detection dataset [6]

- Contains Points of Interest at (1), (2), (3) and (4)
- Dynamic obstacles in the form of cars and bicycles
- Captures pedestrian movement
Results

TABLE I: Quantitative analysis of trajectories within predicted regions

<table>
<thead>
<tr>
<th>Case</th>
<th>Nb Trajectories</th>
<th>A* Predicted zone</th>
<th></th>
<th>Extended zone (40 cms)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Inside zone (%)</td>
<td>Outside zone (%)</td>
<td>Inside zone (%)</td>
<td>Outside zone (%)</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>84.11</td>
<td>15.88</td>
<td>96.88</td>
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<td>2</td>
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<td>69.92</td>
<td>88.17</td>
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<tr>
<td>3</td>
<td>1</td>
<td>29.10</td>
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<td>4</td>
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<td>64.67</td>
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</tr>
</tbody>
</table>
Problems it will help solve

- Recognizing danger areas in the observed scene
- Better prediction of pedestrian behaviour
- Illegal pedestrian crossings
For more information…

Come see my poster 😊

References: