Video-based Activity Level monitoring for Assisted Living

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Motivation – Promoting independence and providing long-term care facility to elderly people with a video-based monitoring system.

1. Background

What is assisted living?
A residential long-term care environment within which elderly people can live independently and also avail support to carry out the activities of daily living.

What is video-based monitoring?
Monitoring the activities of daily living (ADLs) of an individual by processing and analysing video data captured by a single or multiple cameras within an assisted living environment.

What are Activity levels?
- Movement pattern of an individual over a period time
- Less intrusive
- Indicates the busyness of an individual.

Advantages of Activity Level -
- Uses simple motion features
- Low computation
- Real time
- Single camera setup

2. Video-based framework

Objective - Detecting the activity patterns in the daily living of individuals using a video-based monitoring framework.

3. Activity Level Recognition

Activity Levels are a good indicator of the amount of activity one has undertaken over a period of time without actually recognizing the activities thereby protecting ones’ privacy along with providing a safe and independent living environment.

4. Conclusions

SADL dataset is available online at http://svc.group.shef.ac.uk/SADL.html

Accuracy for each Activity Level:

\[
\text{Accuracy} = \frac{\text{Total number of positive detection}}{\text{Total number of possible detections}} \times 100
\]

<table>
<thead>
<tr>
<th>Activity Level</th>
<th>Meaning</th>
<th>Example Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>denotes physically moving from one location to another</td>
<td>Walking around</td>
</tr>
<tr>
<td>LOW</td>
<td>denotes minor or no change in ones location but involved in some sort of an activity which involves movement</td>
<td>Using Fridge, Pour water, Using Oven (Plate In and out), Using cupboard, Wash Plate</td>
</tr>
<tr>
<td>NO</td>
<td>denotes extremely low or no movement at all</td>
<td>Watching Television, Reading book, Sitting idle,</td>
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</tbody>
</table>

Confusion Matrix

<table>
<thead>
<tr>
<th></th>
<th>HIGH</th>
<th>LOW</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>100%</td>
<td>6%</td>
<td>0</td>
</tr>
<tr>
<td>LOW</td>
<td>0</td>
<td>88%</td>
<td>0</td>
</tr>
<tr>
<td>NO</td>
<td>0</td>
<td>6%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The overall positive is 85.7%