Feature Mining for Localised Crowd Counting

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1. Introduction

Crowd counting for public space safety and management; Applications include crowd control, public space design, pedestrian behaviour profiling.

2. Methodology

- Multivariate Ridge Regression for multi-hop regression learning (MORR):
  - Given the concatenated intermediate feature vector xi and the concatenated localised labelled ground truth y, Multivariate Ridge Regression is presented as
    \[
    \min \frac{1}{2} \left( W \mathbf{y} - \mathbf{b} \right)^T \mathbf{W} \left( W \mathbf{y} - \mathbf{b} \right)
    \]
  - where \( \mathbf{W} \in \mathbb{R}^{d \times K} \) and \( \mathbf{b} \in \mathbb{R}^{K} \) denote a weight matrix and a bias vector.

3. Experiments

- Table 2. Performance comparison between different methods and our multi-output ridge regression (MORR) model on global crowd counting.

4. Conclusion

- Future work will focus on exploring dynamic and temporal segmentation of crowd structure.


Table 1. Dataset properties:

<table>
<thead>
<tr>
<th>Data</th>
<th>( N_f )</th>
<th>( R )</th>
<th>FPS</th>
<th>D</th>
<th>Tp</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCSD</td>
<td>2000</td>
<td>238 x 158</td>
<td>10</td>
<td>11–46</td>
<td>49885</td>
</tr>
<tr>
<td>Mall</td>
<td>2000</td>
<td>320 x 240</td>
<td>&lt;2</td>
<td>13–53</td>
<td>62325</td>
</tr>
</tbody>
</table>

Table 2. Performance comparison between different methods and our multi-output ridge regression (MORR) model on global crowd counting.

- Figure 5. Localised counting performance on two busy localised regions in the Mall dataset. Region 1 consists of Cells 11, 12, 19, and 23, while Region 2 includes Cells 43, 44, 51, and 55. Time-tr and Time-te denote the training time and testing time respectively.