SCALE-INvariant SiAMEsNE Network FOR PERSON RE-IDENTIFICATION

Yunzhou Zhang, Weidong Shi, Shuangwei Liu, Jining Bao, Ying Wei

College of Information Science and Engineering, Northeastern University, Shenyang 110819, China.

ABSTRACT

Most existing methods for person re-identification (ReID) almost match people at a single scale and ignore that people are often distinguishable at the right spatial locations and scales. Unlike previous works designing complex convolutional neural network (CNN) architecture or concatenating multi-scale specific features, we aim to design a simple network to make scale-invariant features. Consistently, we first propose a shared two-branch framework with two-scale images from the same identity as inputs, which is beneficial for ReID network to focus on common features in different-scale images. Furthermore, we introduce a novel attention loss to enforce discriminative regions between two branches more consistent in the visual level. Finally, we conduct extensive evaluations on three large-scale datasets and report competitive performance.

METHOD

As shown in Fig.2, we propose a scale-invariant siamese network (SiSNet) and introduce an attention loss called discriminative region consistency (DRC) for person ReID, which aims to improve the generalization of the model on scale.

RESULTS

Table 1. Comparison with state-of-the-art methods. (Boldface denotes the best result; - not available, R1: Rank-1/mAP).

<table>
<thead>
<tr>
<th>Method</th>
<th>Publication</th>
<th>Backbone</th>
<th>Market-1501 R1 mAP</th>
<th>DukeMTMC-ReID R1 mAP</th>
<th>MSMT17 R1 mAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ours</td>
<td></td>
<td></td>
<td>92.5</td>
<td>89.0</td>
<td>78.5</td>
</tr>
<tr>
<td>SiSNet</td>
<td></td>
<td></td>
<td>94.8</td>
<td>84.7</td>
<td>87.5</td>
</tr>
<tr>
<td>SiSNet+DRC</td>
<td></td>
<td></td>
<td>93.9</td>
<td>83.6</td>
<td>85.2</td>
</tr>
</tbody>
</table>

We compare the proposed method with some state-of-the-art methods which are trained on local features [2, 5, 6] (top), attention mechanism [4, 5, 6] (middle) and multi-scale features [9, 11, 12] (bottom) in Table 1. The results show that the proposed approach has a clearly overwhelming performance on the three datasets.

CONCLUSION

We present a novel Scale-invariant Siamese Network (SiSNet) by aiming to discover scale-invariant information for the cross-scale matches in person ReID. In contrast to most existing approaches that employ single-scale features alone or multi-scale fusion features together, the proposed SiSNet is capable of capturing discriminative and abundant scale-invariant features of cross-scale images. Moreover, the proposed Discriminative Region Consistency (DRC) loss further promotes the capability of SiSNet learning diversity and consistency of features, which also make it possible to exploit either-scale features in the matching procedure. Extensive experiments on three large-scale datasets demonstrate the effectiveness of the proposed framework.

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