Abstract

We report our Instance Search system which based on last year BOW framework and a new spatial consistency enforcement method. Our system this year improves 29.9% MAP comparing to last year system. The main contribution is to propose a new point-based and region-based post-processing method: (1) using RANSAC for removing noise shared words, (2) DPM for object localization (3) combining BOW, RANSAC and DPM with an efficient score formula.

Existing methods

• Point-based method such as RANSAC is not effective when working with small and less feature point (< 4 shared words)

• Shape-based object localization such as Deformable Part Models (DPM) works properly with small and highly discriminative shape objects (e.g. logo)

⇒ They are complementary each other

Proposed method

Step 1: Get top K shots (K=10,000) from BOW model with asymmetric dissimilarity
Step 2: Run RANSAC algorithm to remove noise shared words between queries and frame shots
Step 3: Train DPM model for query
Step 4: Run DPM with trained model for each frame shot to get bounding box
Step 5: compute new score based on inlier shared words and bounding box region $S_{new}$

Proposed score for post-processing

$$S_{new} = \left(1 + N_d\right)^2 \left(1 + N_{fg} - N_d\right) \log_2 \left(2 + N_{bg}\right) \left(w_1 S_{BOW} + w_2 S_{DPM}\right)$$

where:

$N_d$ : number of shared words of foreground inside bounding box (green lines)
$N_{fg}$ : number of shared word of foreground (both blue and green lines)
$N_{bg}$ : number of shared word of background (black lines)
$w_1$ : weight of BOW score
$w_2$ : weight of DPM score

Efficiency of the proposed system:

<table>
<thead>
<tr>
<th>Run Name</th>
<th>MAP*</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOW with asymmetric dissimilarity</td>
<td>22.51</td>
</tr>
<tr>
<td>DPM only</td>
<td>19.11</td>
</tr>
<tr>
<td>BOW + RANSAC</td>
<td>25.67</td>
</tr>
<tr>
<td>Proposed method</td>
<td>29.24</td>
</tr>
</tbody>
</table>

(*)this score is computed using ourselves MAP function

Experimental Results

Fig3. Comparison of our system with other teams at TRECVID INS 2014