Proposed Approach

- **Traditional Bag-of-Words**
- **Vector Sets as GMMs**

**Evaluation**

- classification performance on PASCAL VOC 2006/2007 using Kernel Logistic Regression (KLR)
- comparison of MAP estimation over MLE
- impact of similarity measure choice
- robustness to variations in common universal GMM, through cross-database experiments
- computational cost analysis

**References**

- [VHM04] N. Vasconcelos, P. Ho and P. Moreno
- [Va04] N. Vasconcelos
- [Lo04] D. Lowe
- [JK03] T. Jebara and R. Kondor
- [GGG03] J. Goldberger, S. Gordon and H. Greenspan
- [CD04] G. Csurka, C. Dance, L. Fan, J. Willamowski and C. Bray

**Experimental Results**

<table>
<thead>
<tr>
<th>Model Estimation</th>
<th>IDW</th>
<th>Imp-GMM</th>
<th>Proposed</th>
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<tbody>
<tr>
<td>robust to low number of samples</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>low computational cost</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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**Similarity Measure**

| high precision | no | no | proposed |
| low computational cost | yes | yes | yes |
| class-independent representation | no | no | yes |

**Supervised Classification**

| high precision | no | no | yes |
| low computational cost | yes | yes | yes |