



IMPROVING SEMANTIC CONCEPT DETECTION AND RETRIEVAL USING CONTEXTUAL ESTIMATES



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Problem Overview

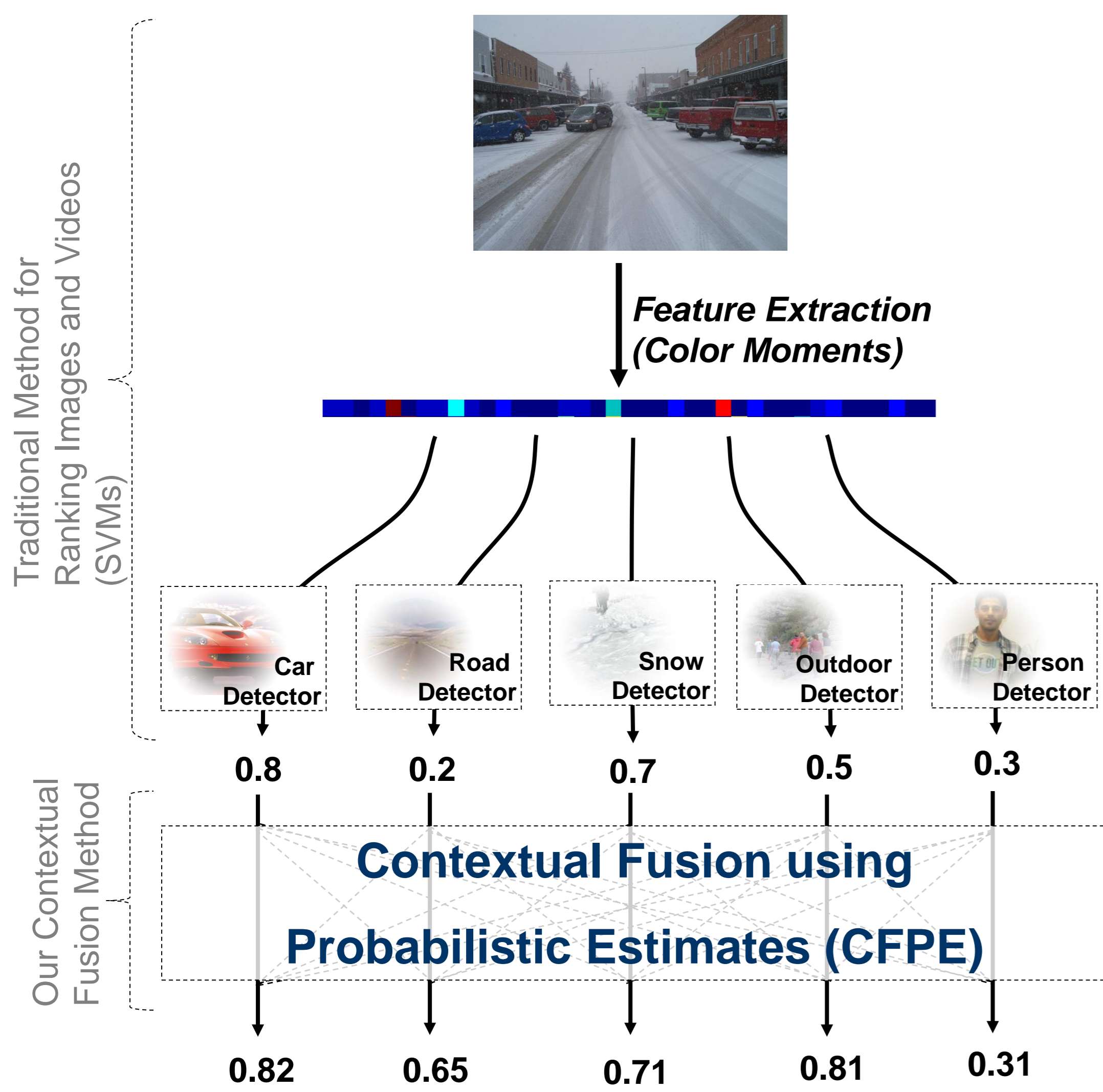
Motivation

The main trend for retrieval of semantic concepts is first training a model (e.g. SVM) for each concept using annotated training images or videos and then using these models for detecting concepts in testing images and videos. However such models generally are built independent of each other, lacking the relationship among semantic concepts.

Goal

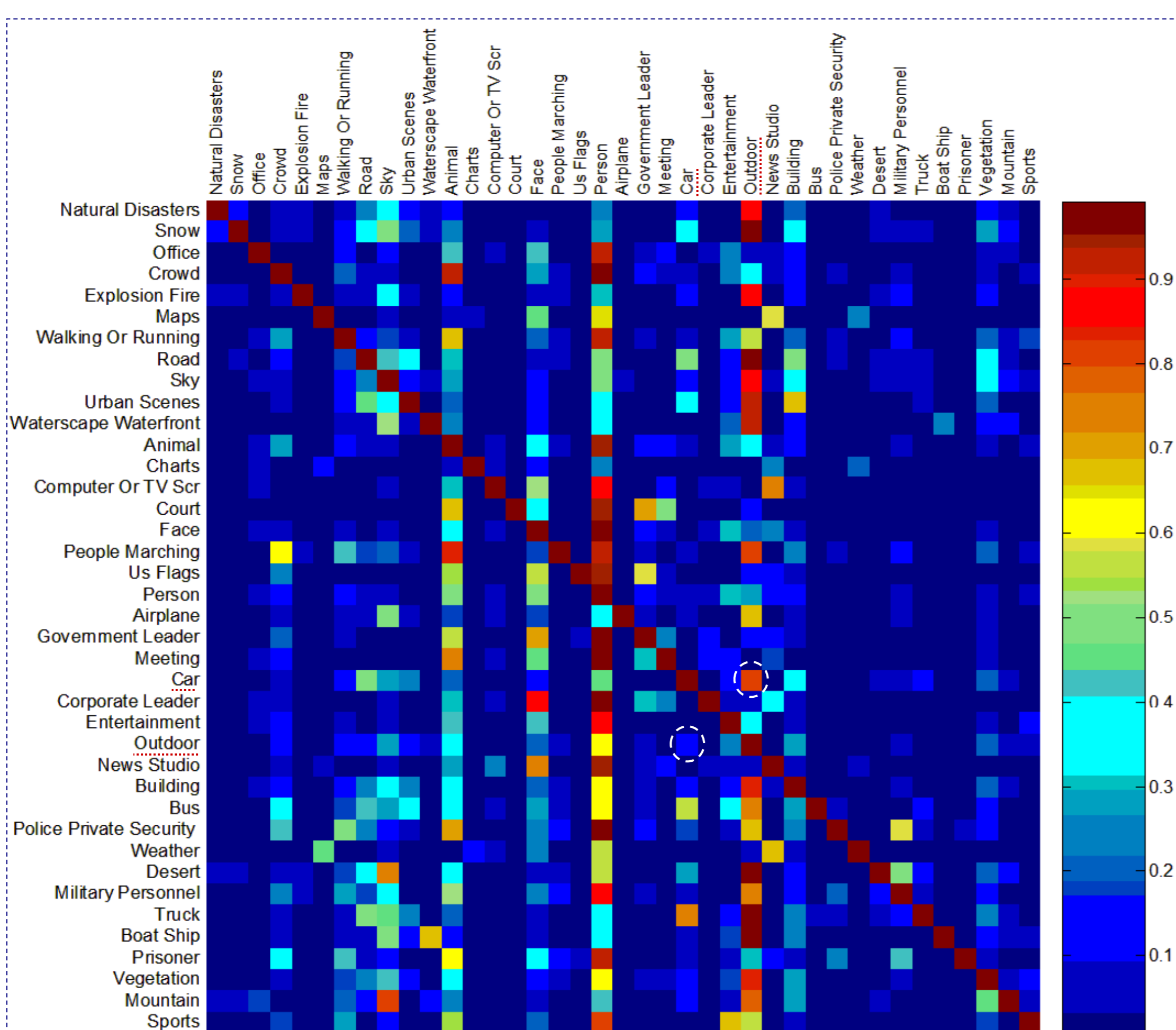
Improving detection scores of semantic concepts in videos and images using the semantic relations between each other.

Approach

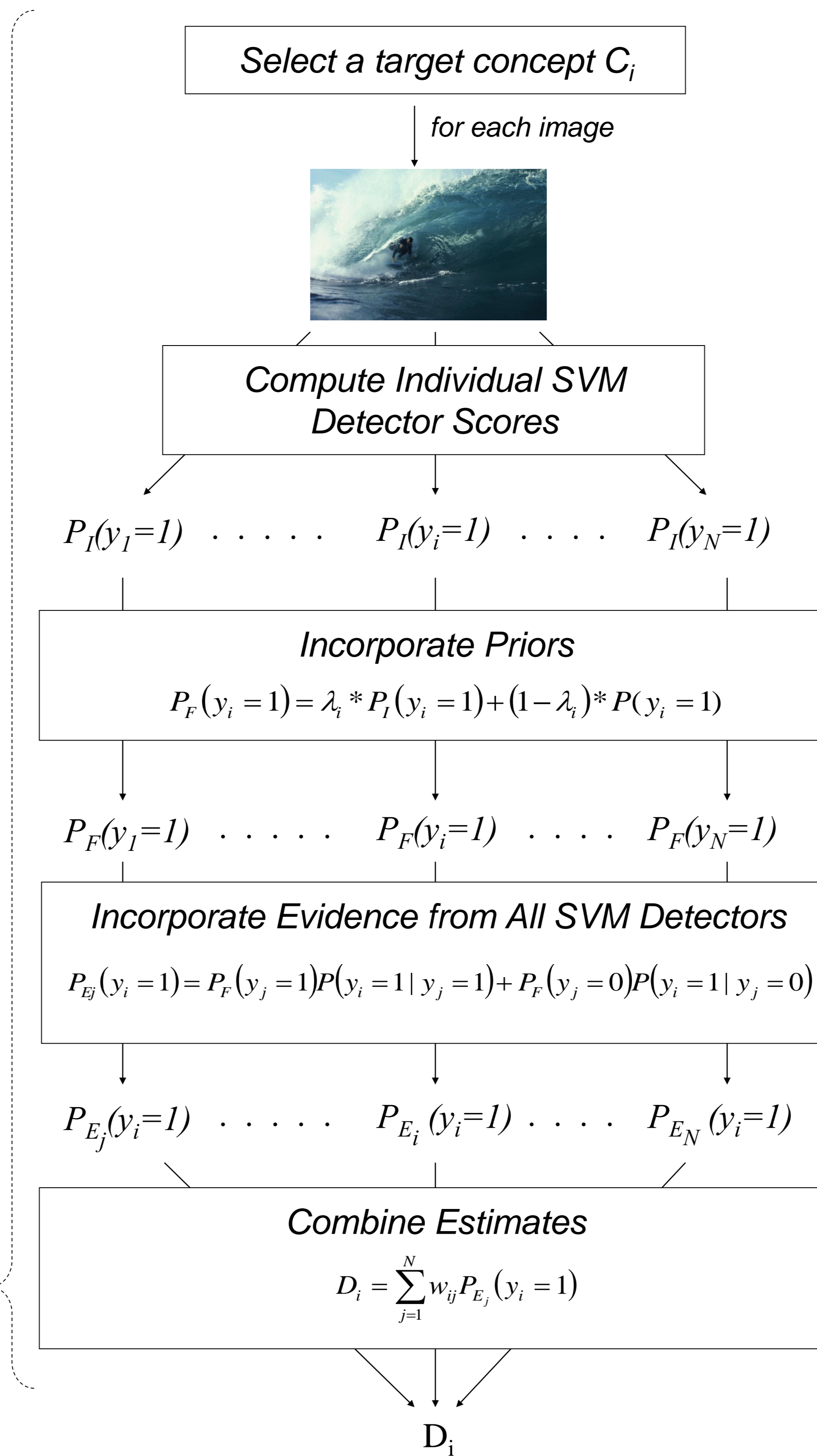


Concept Relations

- Directed models represent relationships better than undirected co-occurrence models.
 - When *car* concept exists, we are very likely to see an *outdoor* concept.
 - When *outdoor* concept exists, we are less likely to see a *car* concept.



CFPE Algorithm



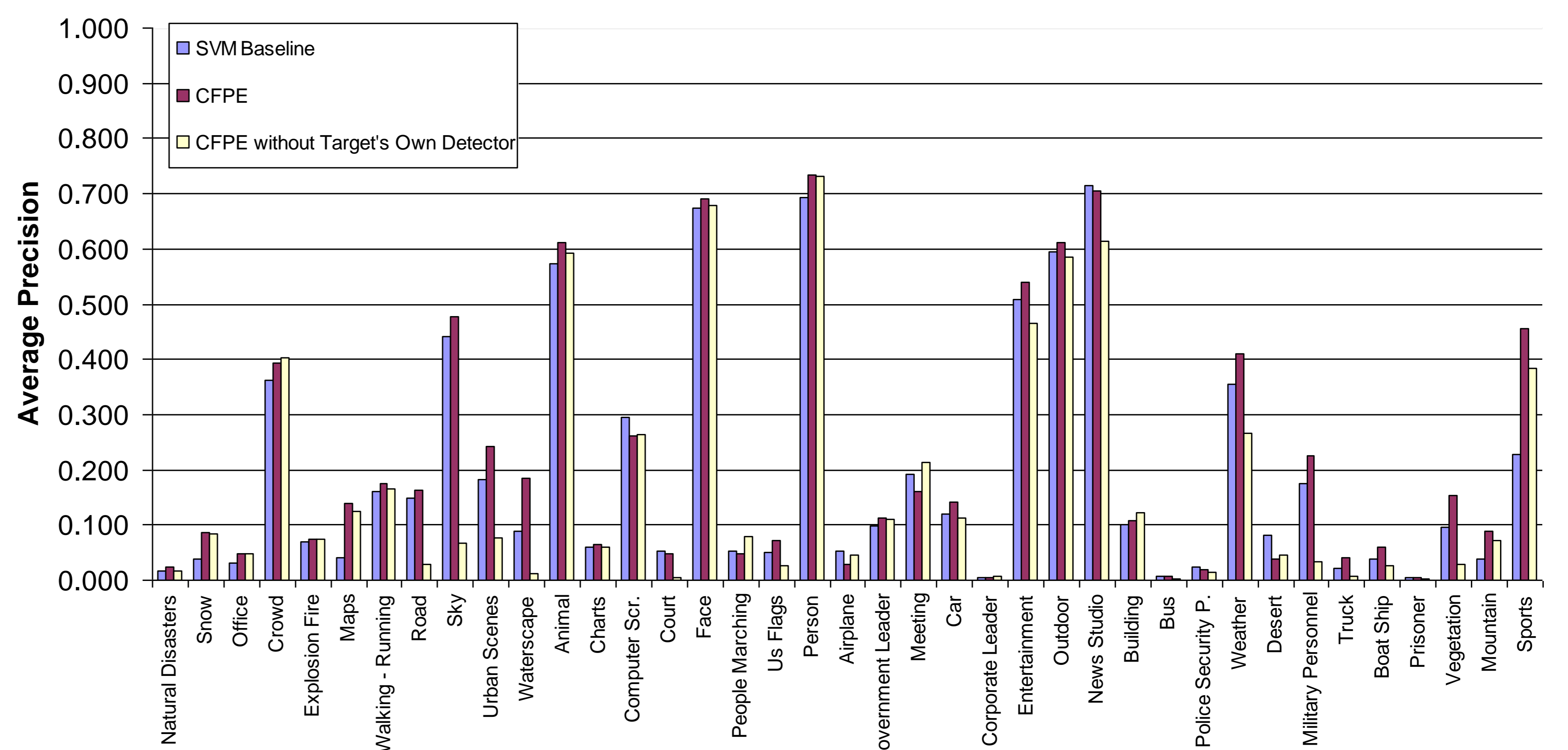
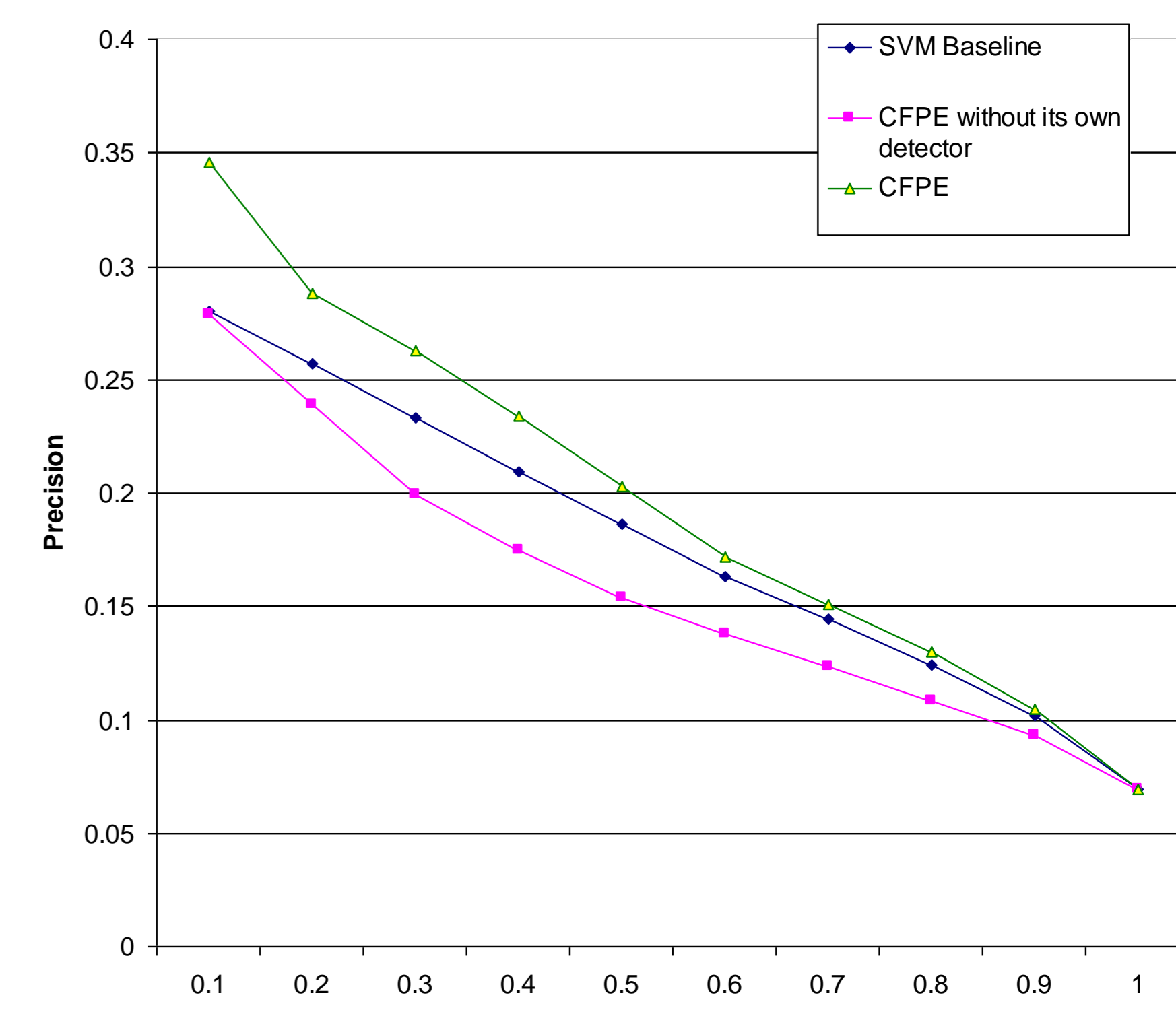
Results

Test Data

- TRECVID 2005
- LSCOM-Lite annotation of 39 concepts.
- 74523 video shots
 - 50% training
 - 25% validation
 - 25% testing

Performance

- +3.9% improvements in 29 out of 39
- 1.6 degradation in 10 out of 39
- +2.5% increase over all concepts
- Over +5% increase in
 - Maps, Urban Scenes, Waterscape
 - Waterfront, Weather, Military
 - Personnel, Vegetation



Average Precision Plots of All 39 Concepts for Baseline and Our Two Experimental Results

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