Con-Text : Text Detection Using Background Connectivity for Fine-Grained Object Classification

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OVERVIEW

Goal

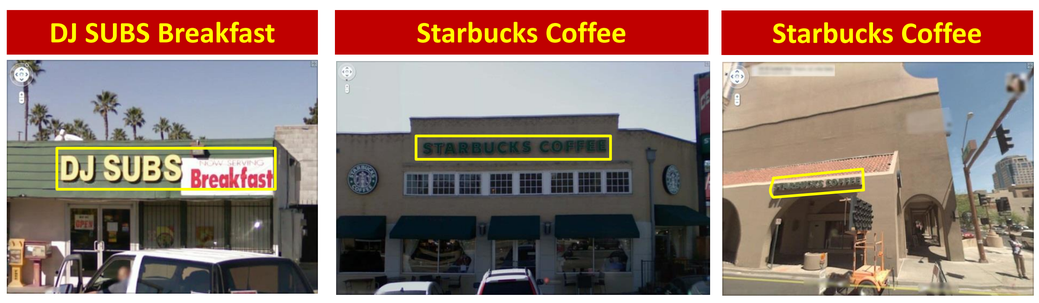
Exploit hidden details by text in the scene to improve visual classification of very similar instances.

Approach

- A novel text detection algorithm using background connectivity.
- Additional semantics using the scene text.

Key Idea

- When text is present in natural scenes, it is typically there to give semantic meaning beyond what is obvious from exclusively visual cues.
- Rather than trying to detect all variations in text appearance, we propose to detect the background.

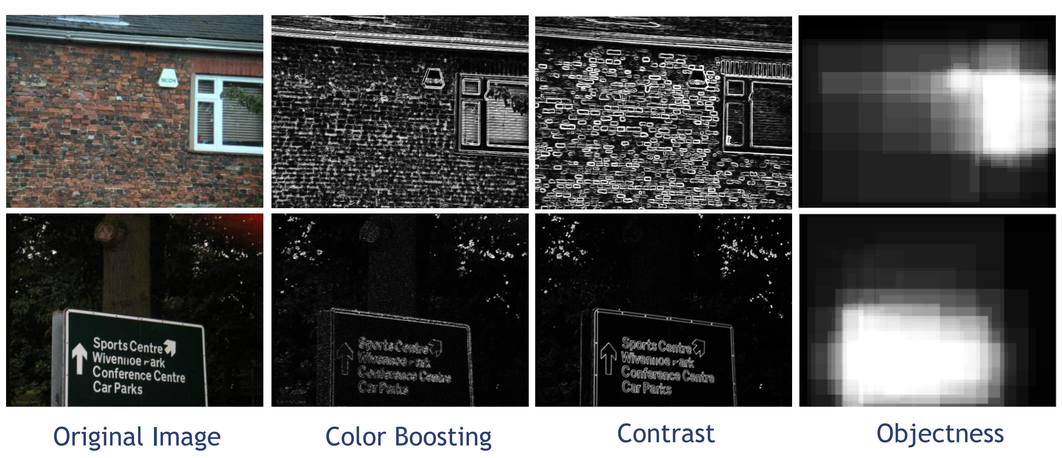


Motivation to Remove Background for Text Detection

- To reduce majority of image regions for further processes.
- To reduce false positives caused by text like image regions (fences, bricks, windows, and vegetation).
- To reduce dependency on text style.

METHODOLOGY

Automatic BG seed selection



- Color, contrast and objectness cues are used in combination with Random Forest classifier to detect background pixels.

BG Reconstruction

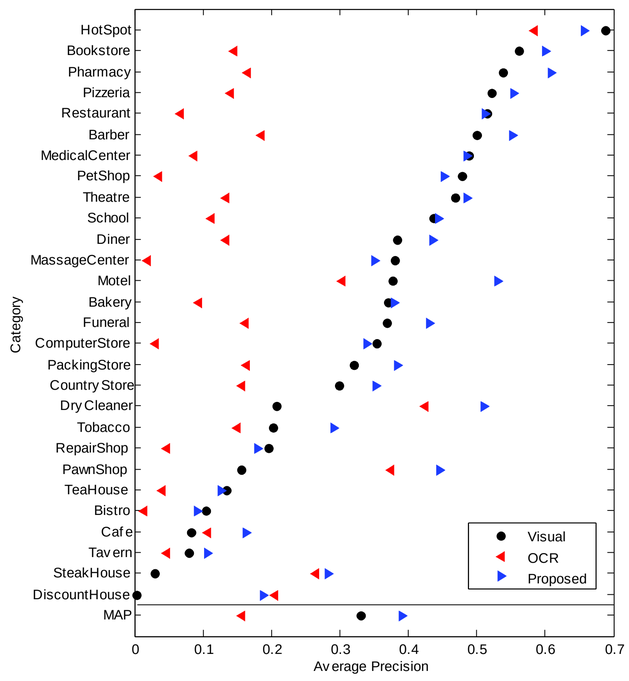
- Intensity-level pixel connectivity with conditional dilation is used to reconstruct the background.

EVALUATION 1: ICDAR 2003 DATASET

- ICDAR03 dataset contains 249 images with 5370 annotated characters.
- Improved ABBYY character recognition from 36% to 63%.
- 87% of the non-text regions are removed where on average 91% of the test set contains non-text regions. It retains approximately 98% of text regions.

EVALUATION 2: ImageNet DATASET

- ImageNet *building* and *place of business* dataset contains 24255 images with 28 different classes.
- The dataset is the largest ever used for scene text recognition.
- **Visual features :** 4000 visual words, standard gray SIFT only.
- **Text features:** Bag-of-bigrams , ocr results obtained for each image in the dataset.



TEXT (ocr)	VISUAL (BOW)	FUSION
15.6 ± 0.4	32.9 ± 1.7	39.0 ± 2.6

CONCLUSION

- Background removal is a suitable approach for scene text detection.
- Color, curvature and objectness prove valuable cues for background modeling.
- A new fine-grained classification problem is introduced based on ImageNet subcategories and a baseline for further research is build.
- We have shown that multimodal information fusion of visual and textual cues improves fine-grained classification on this dataset by 6%.

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