Auto-tagging of images using Low-Dimensional Scene Classification

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Background Information

In this project a novel approach to scene categorization is used.
in this project we introduce an intermediate space, based on a low dimensional semantic “theme” image representation. however instead of learning the themes in an unsupervised manner, they are learned with a weak supervision, from casual image annotation.
The image can be associated with multiple themes at the same time.
since, the main goal of this project is to implement a low-dimensional semantic theme representation, we will not duel on the choice of the classifiers and will use the most promising ones such as SVM, KNN.

Procedure

Listing of the steps to solve this problem.

- Data Retrieval
- Semantic Theme Representation
- Scene Classification
- Conclusion

Data Retrieval

The Data used for this project will mainly be the 15-scene categories of the images from various sources mainly from the MIT 67 Dataset which is publicly available.

We also plan to use the Corel stock photos that are used for image annotations comprising of 50-scene categories.
The corel dataset has 100 high resolution images per category, which appears to be the maximum number of the scene categories studied so far

Dataset Link: http://web.mit.edu/torralba/www/indoor.html
http://www.cs.princeton.edu/cass/benchmark/

Semantic Theme Representation

The semantic theme representation consists of the methods that are used to represent an image using a “theme”. The “theme” in this context is defined as the general atmosphere of the image instead of the particular “objects” used previously in the classification of the images, which in our context are called “semantic scene categories”.

Some example of the differences between the ‘theme’ and ‘semantic scene cat.’ can be demonstrated as following, images in “Street” class contains the themes such as “road”, “sky”, “people” or “cars”, these are called the ‘themes’ whereas the ‘Street’ is labeled as the ‘semantic scene cat.’

The semantic theme representation also includes the casual annotations of the images so that they contain ‘themes’ in the form of ‘captions’

Scene Classification

This part contains the major crux of the project as in this part we can classify the images from the dataset that we have generated using various classification algorithm such SVM or KNN.

This part is important as it will be used to check the efficiency of the previous Semantic Theme representation in numeric value.

In this part we will use the images along with the captions that are causally allocated to the images to train our classifier.

Conclusion

In this project we expect that this approach using low dimensional semantic representation to be atleast on par if not better than standard approach based on the latent space models which has a high dimensionality.

Moreover, we expect to learn the effect the dimensionality on the classification performance as we would be working with a non-conventional system where low dimensionality is used, and we would be expected to compare the results of this system from a similar system that use latent-space models of high dimensionality.

Finally, using the above approach we will get the probabilities of various ‘themes’ of the images which can be used to assign ‘captions’ to the images.

References

This project is based on a CVPR research paper.

Paper: http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4587372

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