Flower Classification Using Multiple Feature Set

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Abstract

Flower image classification is still a challenging task because of the wide range of flower species, which have similar shape, appearance or surrounding things such as leaves, and grass.
The goal of this poster is to analyze the effect of multiple local features for flower image classification. Different local features are extracted from the flower images, each describing different aspects such as shape, texture and color. The performance of proposed method is compared with state-of-the-art method and analyzed the performance of the feature descriptors in flower image classification. By evaluating these descriptors it can be concluded that the combined SURF+ CTM gives better performance than other combination of features in the context of flower image classification.

Introduction

- Flower classification is a challenging task due to the large variety of flower classes that share similar features: several flowers from different types share similar color, shape and appearance. Furthermore, images of different flowers usually contain similar surrounding objects such as leaves, grass, etc.
- Hence, many flower classification techniques depend on extracting their features from a segmented flower region to improve accuracy [1], [2].
- Figure 1 illustrates an example of the difficulties of recognizing flower categories. These problems lead to a confusion across classes and make the task of flower classification more challenging.

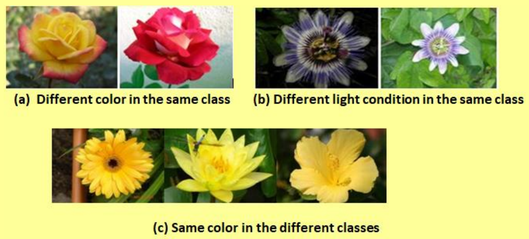

Figure 1: Here (a) and (b) are different color and different light condition in same class, (c) is same color in the different classes.

- An efficient flower classification system is an important task in various applications such as plants monitoring systems, content-based image retrieval for flower representation and indexing [3], floriculture industry, live plant identification and educational resources on flower taxonomy [4].
- Thus, novel convenient method would be of great benefit for flower classification.

Methodology

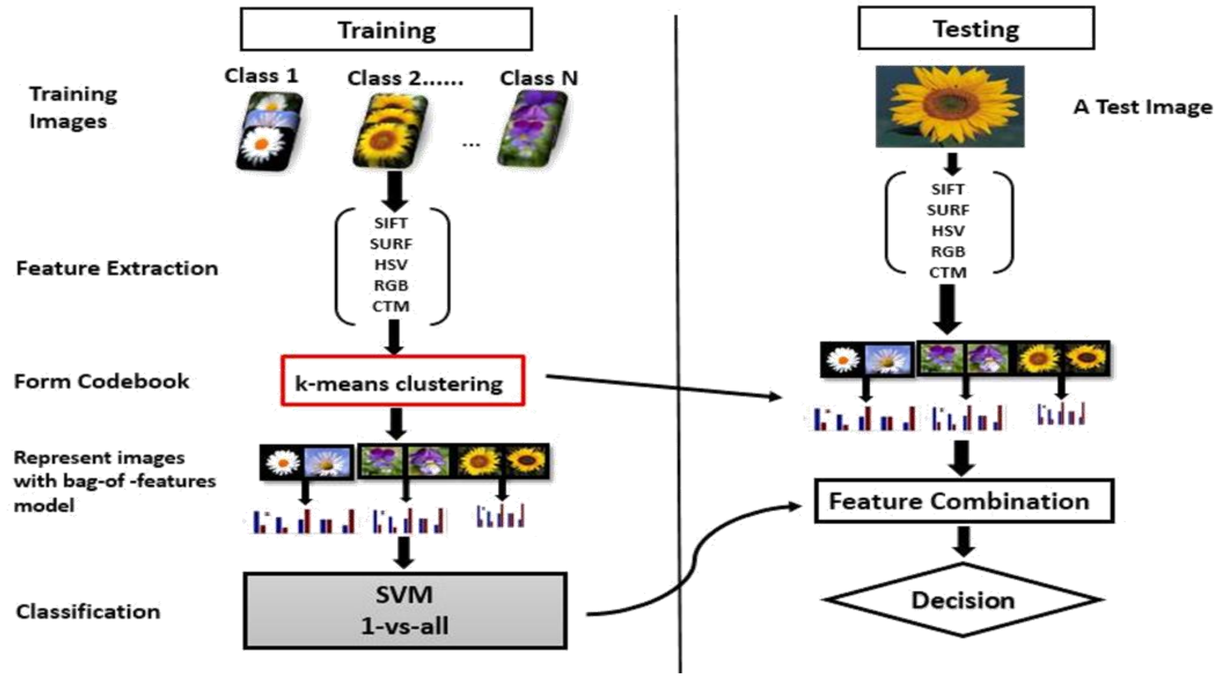

Figure 2: Proposed methodology for flower classification

- The details of the proposed methodology for flower classification is presented in Figure 2. During the whole process, multiple feature descriptors such as SIFT, SURF, RGB, HSV and CTM are used to represent flower images.
- In this experiment, 17 Flower Category Database is used. In 17 Flower Category Database, its consisting of 17 flower categories, where each category is represented by 80 different images.
- For each of these descriptors, K-means clustering algorithm is used on the entire feature database to obtain set of clusters.
- In K-means clustering algorithm, user needs to specify the number of clusters in its initial stage and there is no guarantee that the obtained clusters are visually compact. Due to that reason, K-means is run K = 500, 1000 and 1500 and found the best K to be at 1000. Finally, classifier is constructed based on the histogram of each image class.
- In this experimental setup, in order to identify the appropriate feature descriptor for flower classification, the performances of different combinations of feature descriptors that are used in this experiment are compared.
- In [5], different combinations of feature descriptors are considered to calculate the performance of flower classification and 17 Flower Category Database is also used here. So, we follow the same experiments in [5] in order to compare our proposed method with the performance done in [5].

Testing Results

- Table I shows the performance of the different combinations of feature descriptors that are used in this experiment and the method proposed in [5].
- According to the performance shown in Table I, **it can be seen that SURF + CTM and SIFT + CTM give better performance than other combinations of features**.
- Based on the recognition rate given in Table I, **proposed method gives better performance than [5].**

Features	Recognition rate [5]	Recognition rate (ours)
SIFT internal	55.1	-
SIFT boundary	32.0	-
SIFT	-	68.71
HSV	43.0	47.06
RGB	-	37.88
CTM	-	52.81
SIFT int + HSV	66.4	-
SIFT bdy + HSV	57.0	-
SIFT+HSV	-	68.71
SIFT+RGB	-	70.02
HSV+RGB	-	47.53
SIFT+CTM	-	**73.88**
SURF	-	69.18
SURF+SIFT	-	69.18
SURF+HSV	-	49.88
SURF+RGB	-	68.24
SURF+CTM	-	**74.59**

Table 1 : Proposed methodology for flower classification

Conclusion

- Flower classification method is proposed based on multiple feature descriptors.
- In this work, performance of SIFT, SURF, HSV, RGB and CTM features are analyzed in flower classification.
- According to the experimental results, we observe that multiple features empower the classifier to train a better model and achieve a better classification accurate on test sets.
- In addition, the experimental results have shown that the combined (SURF + CTM) features outperform the individual features.
- The important thing to be noted in this work is that only color features with the combination of SIFT and SURF have given a good classification accuracy when compared to other results in this experiment.

References

[1] Nilsback, M-E. and Zisserman, A., Automated Flower Classification over a Large Number of Classes, Proceedings of the Indian Conference on Computer Vision, Graphics and Image Processing, 2008.
[2] Chai, Y., Lempitsky, V., Zisserman, A., Bicos: A bi-level cosegmentation method for image classification, International Conference on Computer Vision, 2011.
[3] Das, M., Manmatha, R., and Riseman, E., Indexing flower patent images using domain knowledge, In IEEE Intelligent Systems and their Applications, vol. 15, no. 5, pp. 24–33, 1999.
[4] Chi, Z., Data management for live plant identification, Engineering online library, Springer, 2003.
[5] Nilsback, M., E. and Zisserman, A., Automated flower classification over a large number of classes, Proceedings of the Indian Conference on Computer Vision, Graphics and Image Processing, 2008.