# Plant leaf tooth feature extraction

Version 3

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ABSTRACT

Previous studies extract features that are not strictly defined in botany; therefore, a uniform standard to compare the accuracies of various feature extraction methods cannot be used. For efficient and automatic retrieval of plant leaves from a leaf database, in this study, we propose an image-based description and measurement of leaf teeth by referring to the leaf structure classification system in botany. First, image preprocessing is carried out to obtain a binary map of plant leaves. Then, corner detection based on the curvature scale-space (CSS) algorithm is used to extract the inflection point from the edges; next, the leaf tooth apex is extracted by screening the convex points; then, according to the definition of the leaf structure, the characteristics of the leaf teeth are described and measured in terms of number of orders of teeth, tooth spacing, number of teeth, sinus shape, and tooth shape.

PROTOCOL STATUS

**Working**

We use this protocol in our group and it is working

## Experiments

### 1

To verify whether the proposed leaf structure feature description algorithm is scientific and effective, we implemented the algorithm using MATLAB 2017 (MathWorks, Natick, MA, USA) on a standard desktop PC (4.2 GHz CPU, 24 GB RAM). Processing of a single leaf took approximately 1.4 s. This could undoubtedly be improved through further optimization and/or using parallel computing.

COMMAND

```
data=toothFeature_finished('D:\ExperimentData_1\leaf_1.mat')
```

Experiment_1

windows 10

COMMAND

```
accuracy=Classification_SVM('D:\Experiment_2_data\Our_method_data')
accuracy=Classification_LDA('D:\Experiment_2_data\Our_method_data')
accuracy=Classification_SVM('D:\Experiment_2_data\Proposed_in[20]_data')
accuracy=Classification_LDA('D:\Experiment_2_data\Proposed_in[20]_data')
```

Experiment_2

windows 10

We have uploaded the code and data of this study, please reference to:
https://github.com/hollyprince/Leaf_tooth_feature

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