



Proposition of internship Algorithms for Urban trees recognition



Main topics

Feature extraction, trees recognition, classification, and geographic databases.

Laboratories

- LIRIS (Laboratoire d'InfoRmatique en Image et Systèmes d'informations), <http://liris.cnrs.fr>
- EVS (Laboratoire Environnement, Ville, Société), <http://umr5600.univ-lyon3.fr>

Place

LIRIS, Lyon, France

Duration & salary

From 4 to 6 months

Associated project

Urban-ReVeS IMU project (<http://imu.universite-lyon.fr/>): Plant Recognition and participative inventories with Smartphone in Urban environment.

Supervisors

Laure Tougne, laure.tougne@liris.cnrs.fr

Thierry Joliveau, thierry.joliveau@univ-st-etienne.fr

Context & motivation

Laboratories LIRIS and EVS have collaborated for several years on plant recognition in the ReVeS project (<http://liris.cnrs.fr/reves>). An iPhone application, named Folia, has been developed in this context and is freely available on the App Store and on the Google Play. It allows a walker in natural environment to recognize tree species from photos taken by its smartphone. Now a new project, named **Urban-Folia**, is starting. This project deals with plant recognition and participative inventories with Smartphone in Urban environment. We are pursuing a dual objective to improve recognition with this internship: first, considering barks and second, estimating the size of the tree.

Detailed goals

Three steps are proposed:

- **Barks treatment to improve recognition:**
In order to improve the recognition, the idea is to combine leaves recognition done in the ReVeS project ([ISVC2011, [CLEF2011], [CLEF2012], [CVIU2013]) with other organs recognition. The second one, which is very discriminative for trees, is bark.



Contrary to previous methods for leaves, we will treat the image in total and not segment it. The proposed approach is then to characterize repetitive structures that we can find in such images thanks to the features extracted on dominant points using for example Speeded-up Robust Features (SURF) [BTVG06] or Gabor filters with a Bag-of-Words (BoW) approach.

- **Size estimation to improve recognition and help inventories:**
 Estimating the length of a tree could help to find the corresponding specie, or at least could help to eliminate species that could not grow so tall. Moreover, the length of trees itself is an important feature as some trees are classed in the rare plant category because of their height. So it would be important to have this data in geolocalized inventories.
 To solve this problem, we intend on using the image conjointly with information from other tools available on smartphone such as the accelerometer. We already can find in the literature [HH2012], [LWP2013] or on applications platforms (for example, SmartMesure¹) methods that try to deal with such questions.
- **Folia update and study of focused user:**
 Folia considers only leaves recognition for the moment. The goal of this part is to integrate in the application the two previous steps. The tool will be developed considering the context of usage to obtain convivial protocols. We will use the research on computer science functionalities to explore the technology's promises and through the first tests of its usages, how they contribute to specify the innovative nature, the operational one, potentially distributed, of the knowledge production for the users.

Required skills

In addition to knowledge on image/signal processing and algorithmic topics, the candidate should have good practice of C/C++ and some knowledge concerning Objective C would be appreciate. Some basics on OpenCV library would be an additional value.

Bibliography

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¹ <https://play.google.com/store/apps/details?id=kr.sira.measure>

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