



Collaborative validation of visual data through the Pl@ntNet identification system

Samuel Dufour-Kowalski, Jeremy Salinier, Aurelien Peronnet, Jennifer Carré, Jean-Pascal Milcent, Hervé Goëau, Alexis Joly, Jean-François Molino, Nozha Boujema, Pierre Bonnet, et al.

► To cite this version:

Samuel Dufour-Kowalski, Jeremy Salinier, Aurelien Peronnet, Jennifer Carré, Jean-Pascal Milcent, et al.. Collaborative validation of visual data through the Pl@ntNet identification system. TDWG 2013 - Annual Conference, Oct 2013, Florence, Italy. hal-03885113

HAL Id: hal-03885113

<https://hal.inrae.fr/hal-03885113>

Submitted on 5 Dec 2022

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Collaborative validation of visual data through the Pl@ntNet identification system

S. Dufour-Kowalski, J. Salinier, A. Peronnet, J. Carré,
J.-P. Milcent, H. Goëau, A. Joly, N. Boujema, P. Bonnet, J. Barbe, J.-F. Molino, D. Barthélémy



Context & challenges

Accurate knowledge of **plants** (distribution and ecology) is essential for **sustainable agriculture** and **biodiversity conservation**

But accessing basic information about plants is still challenging

Botanical data is:

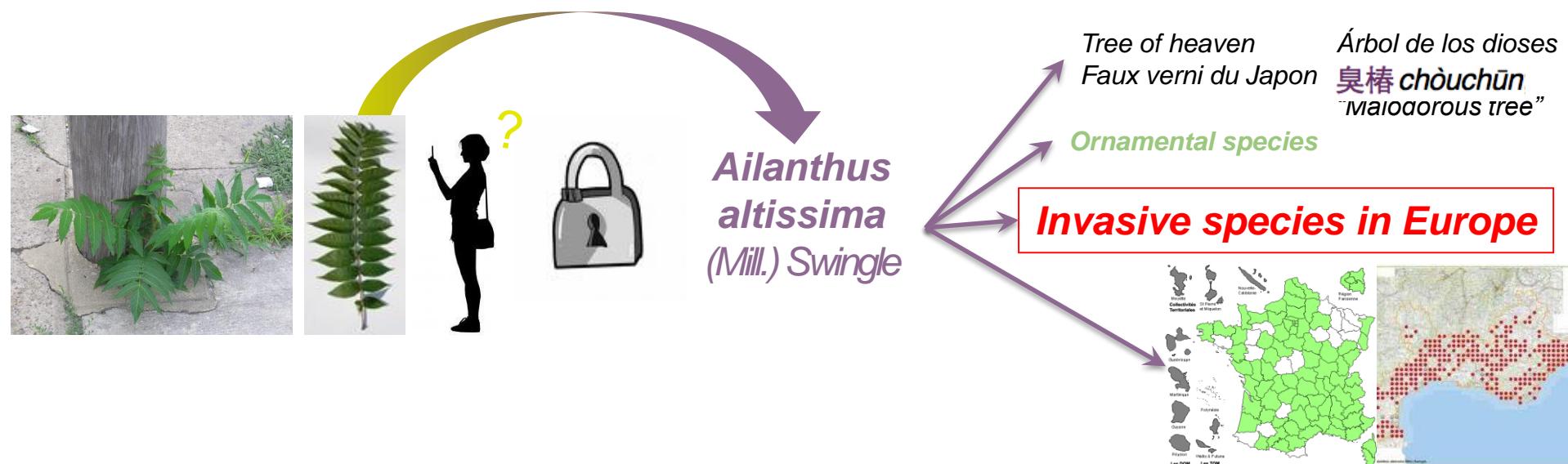
- ❖ decentralized and *heterogeneous*
- ❖ complex (un-structured tags, empirical measurements,...)
- ❖ sparse and *incomplete*
 - huge & unknown number of species
 - "long tail distribution" (1 record per species !)



Towards bridging the taxonomic gap

Identifying and naming plants is a very difficult task

Plant names are the KEY to access and to enrich botanical information on plants



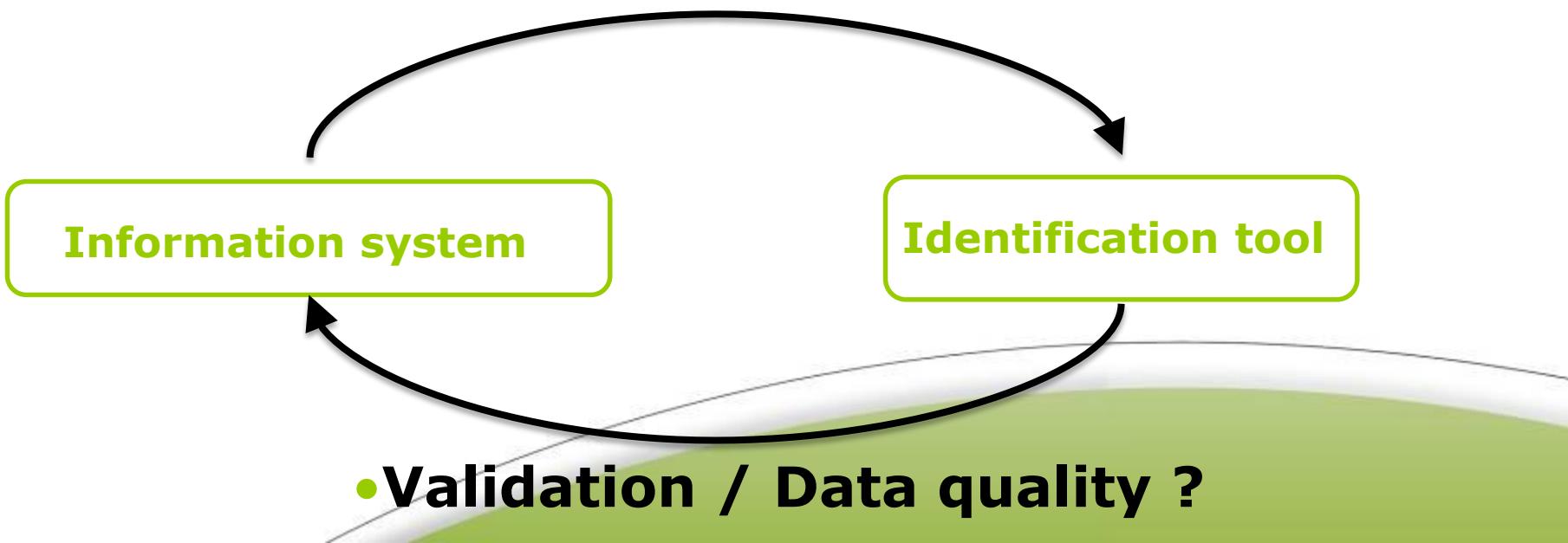
Towards bridging the taxonomic gap

Possible solutions

- ❖ **Collaborative Information Systems**
Sharing and speeding up integration of raw data
- ❖ **Large audience Identification Tools**
Multimedia image retrieval techniques ...

But ...

Few, small, biased datasets



Pl@ntNet Workflow

- Image sharing and retrieval app for plant identification
- Shared observations (Creative Commons)



- Botanical obs. management system (pictures, species, date, GIS, author)



○ Collaborative images annotation system

- Tags (flowers, leaves, etc.)
 - Quality evaluation
- Joly & al., 2013. Ecological informatics.

○ Collaborative Identification

- Identification suggestion
- Identification vote
- Forum

Pl@ntNet mobile app

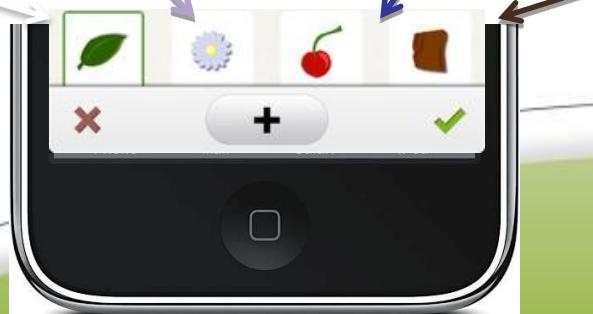
• Goëau & al., 2013. ACMM.



Public version

70 000 images

3 700 species



BETA

105 000 images

5 000 species

Dataset based on social network of botanists

- ❖ 21 500 members
 - From amateur to expert botanists
- ❖ Hundreds of contributors with different skills
 - with their own scanners, cameras & Smartphone
- ❖ Thousands of individual botanical records
 - at different growing stage,
 - different periods of the year,
 - under different light conditions (raining, sunny, ...)



A huge visual diversity to canalise

PI@ntViews dataset

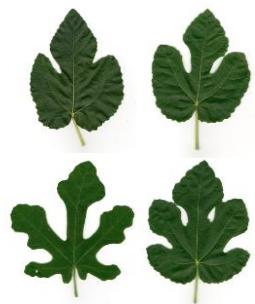
Leaf diversity



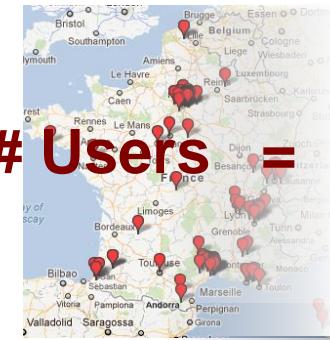
Leaf at different growing stage of *Platanus x hispanica* Mill ex. Münchh.
(London plane)



Shooting conditions and used devices,
Acer platanoides L.
(Norway maple)



Lobe number and deep of leaf lobes on *Ficus carica* L.
(Common fig)



Users =

**# localities
seasons
environments
climate
ecosystems
devices**



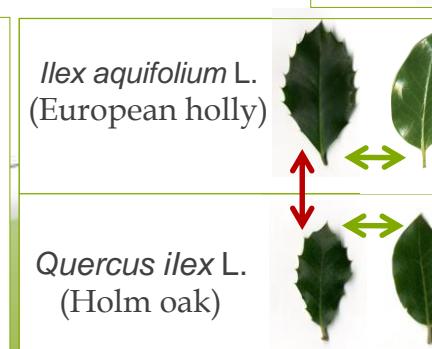
Leaflets number variability on *Fraxinus angustifolia* Vahl
(Narrow-leaved Ash)



Autumnal variability of the lamina color on *Cotinus coggygria* Scop.
(Eurasian smoketree)



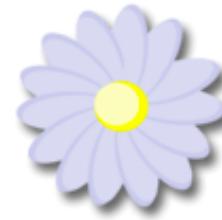
Growing stage:
two compound leaves from the same tree!
! *Gleditsia triacanthos* L.
(Honey Locust)



Intra-species diversity versus visual similarities between species

PI@ntViews dataset

Flower diversity



COLOR



Brown



White



Green



Rose



Blue



Yellow

Symmetry



Radial



Bilateral

Structure



4



5



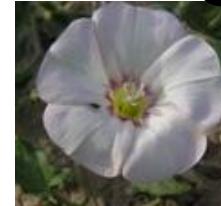
6



>>6

Number of petals

Orientation



Face



Profil

Size



small



middle



big

A collaborative website for data validation and annotation

Identiplante

Cet espace vous permet d'échanger sur la détermination d'espèces. Vous pouvez pas à déterminer une plante ? Soumettez-la aux membres du réseau. Vous avez relevé des erreurs dans les images soumises par le réseau ? Postez un commentaire ou proposez une nouvelle détermination.

Proposer une observation à déterminer

Pierre BONNET
Préférées
[Se déconnecter](#)

[Partager ce le page](#) | [Aide](#)

IDENTIFIER UNE PLANTE

Photographies, espèces, genres, familles, noms du département, communes, auteurs ou mots-clés.

TOUT | **A déterminer** | **En discussion** | **Validées**

[Rechercher](#) | [Rechercher avancée](#)

Rumex obtusifolius L.



Déterminée le 28/08/2013
Photologue : bid16
Lieu de la photo : Argenteuil-sur-Itonne (37006)
Commentaire : 1er photo "graines"

[Proposer une détermination](#) | [Ajouter un commentaire](#) | [Voir tous les commentaires](#)

Cirsium vulgare subsp. vulgare



Déterminée le 28/08/2013
Photologue : bid16
Lieu de la photo : Argenteuil-sur-Itonne (37006)
Commentaire : 1er photo "graines"

[Proposer une détermination](#) | [Ajouter un commentaire](#) | [Voir tous les commentaires](#)

Centella campestris f. hyperbolica (Miq.) Bl.Baile



Déterminée le 14/05/2013
Photologue : bid16
Lieu de la photo : Poitiers (86300)
Portée : Larvæ
plein d'eau, bord de route
par Alain LETTRANGE

[Proposer une détermination](#) | [Ajouter un commentaire](#) | [Voir tous les commentaires](#)

Halothamnus stoechasi (L.) Moench



Déterminée le 12/05/2011
Photologue : bid16
Chemin (48039)
Bord E. du chemin qui part
à l'intersection de 31+0144,
direction de la
Intersection
leau et cendrille calcaire
Altitude 830m environ.

[Proposer une détermination](#) | [Ajouter un commentaire](#) | [Voir tous les commentaires](#)

Gnaphalium uliginosum L.



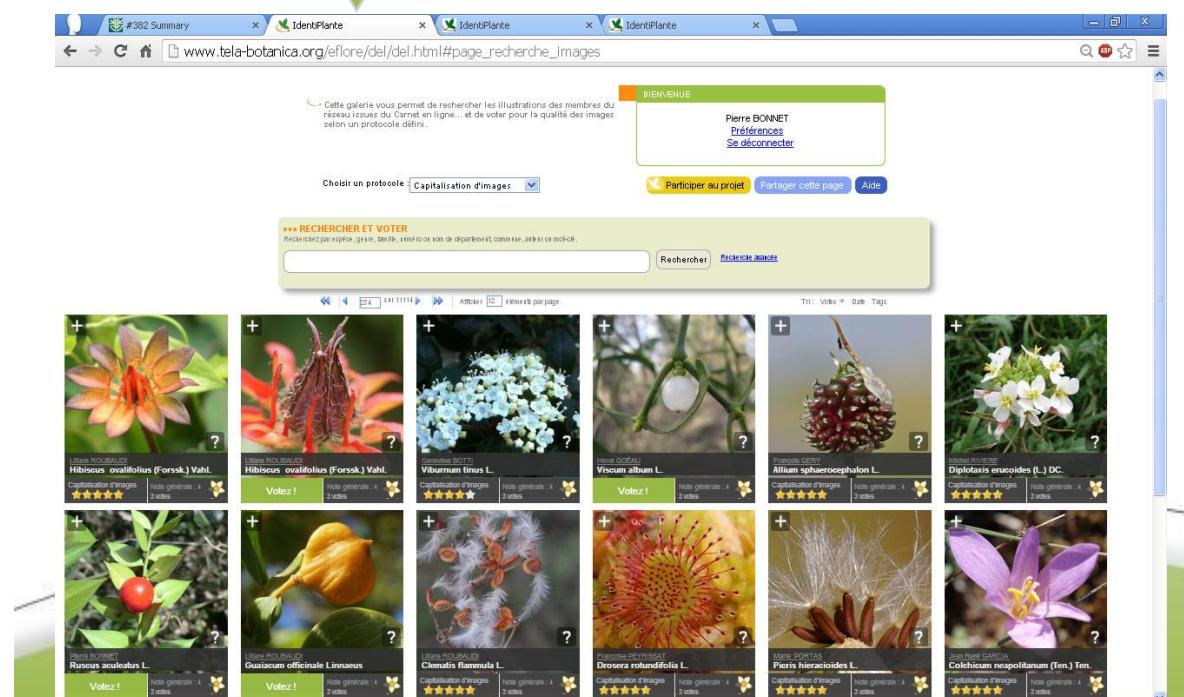
Déterminée le 21/07/2013
Photologue : bid16
Lieu de la photo : Saint-Pérayd'Aurac
Loc. des moulins, au N.E.
prairie boueuse sur
substrat calcaire
Altitude 1300m environ.

[Proposer une détermination](#) | [Ajouter un commentaire](#) | [Voir tous les commentaires](#)

Identiplante

PictoFlora

Picture validation and annotation



Identiplante, for Identification validation

The screenshot shows a web browser window with multiple tabs. The active tab is 'Identiplante' at www.tela-botanica.org/eflore/del/del.html#page_validation~1053841. The page displays a botanical record for *Clematis vitalba* L. from Cébazat (63063) on 29/09/2013. It includes a large image of the plant, its name, a proposer button, a voter score, and a 'Suivre cette observation' link. The top navigation bar shows 'BONNET' and 'Pl@ntNet'.

Web application

Individual URL
for each Botanical
record

can be logged
but not necessary

User can see
any botanical record,
from any contributors

Botanical record = Image(s) + Taxa name + Place + Date + Contributor name

National
taxonomic
indexes

National
localities
indexes

Identiplante, for Identification validation

The screenshot shows a web browser window with four tabs open, all titled "Identiplante". The main content area displays a record for *Sorbus aucuparia* L. proposed by Bernard ANDRIEU on 07/05/2014. A yellow box highlights the "Votes Pour" section, which shows 71% of votes for *Sorbus aucuparia* L. and 29% for *Sorbus domestica* L. Below this, a green box highlights the voting interface, showing a "Score Voter" button and a row of five colored circles (red, blue, green, yellow, orange) for rating the proposal. To the right, a sidebar provides links for "Pour vous aider" (Compare this image, Verify its determination, Other online tools), "Vérifier sa détermination" (eFlore), and "Autres outils en ligne" (Flores numérisées, Flore Bonnier interactive, Clés de détermination). At the bottom, there are buttons for "Proposer une détermination" and "Ajouter un commentaire".

Community members
Vote for any
suggestion

Define the most
probable species
Several suggestions

Initial identification
by members of
Suggestions

vernacular name
Can be commented

... and then discussed

PictoFlora, for Tags and image quality evaluation

The screenshot shows a web-based application for plant identification and image quality evaluation. The interface includes a top navigation bar with tabs for 'Identiplante' and a search bar. The main area is titled 'BIENVENUE' and features a user profile for 'Pierre BONNET' with links for 'Préférences' and 'Se déconnecter'. Below this, there's a section to 'Choisir un protocole' with a dropdown set to 'Capitalisation d'images'. Buttons for 'Participer au projet', 'Partager cette page', and 'Aide' are also present.

The central part of the screen is a 'RECHERCHER ET VOTER' section with a search bar and filters for 'Votes', 'Date', and 'Tags'. It displays a grid of 16 plant images, each with a 'Capitulation d'images' button and a 5-star rating. The images include various flowers, fruits, and leaves. Some images have a small flower icon next to them, indicating they have been tagged. A vertical sidebar on the right lists more plant names and images.

User can see its own votes

Each picture can be tagged

According to
Or mean of
visual concepts
of PI@ntNet
Identification
app



Results

Identiplante



PictoFlora



The most probable species name :

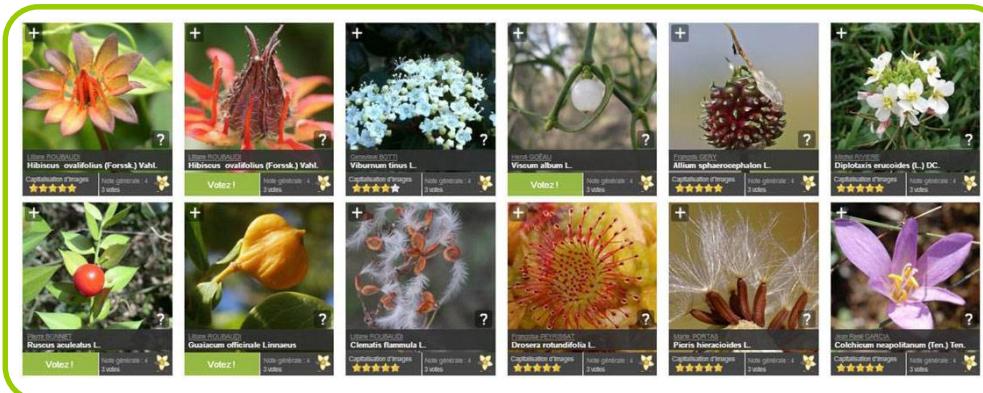
- according to collaborative votes
- among the national species index

We don't use records with determination
At the family or genus level

Pictures :

- With one tag only
- A mean of more than 3 stars

PI@ntView dataset



1100 users
10500 votes
7000 propositions
900 Comments

850 users
63 000 tags
137 000 votes

70 000 images / 3 700 species

Future directions

- ❖ Invest in user profile
(for a specific region, or group of taxa)
- ❖ Use all the data according to their quality
- ❖ Use some automatic algorithm to tag data
- ❖ Use of meta data in the identification and the validation process (localisation and/or date).
- ❖ Apply this workflow on other botanical (or non botanical) datasets

WWW.plantnet-project.org

Email : contact@plantnet-project.org



Thank You !!!