Pl@ntNet

EcoinfoFAIR

écoinformatique FAIR* pour et par les communautés

Cooperative learning for biodiversity monitoring:

Pierre Bonnet, Alexis Joly, Hervé Goëau, Tanguy Lefort, Antoine Affouard, J.C. Lombardo, Mathias Chouet, Joseph Salmon, Hugo Gresse, Thomas Paillot, Vanessa Hequet, Christophe Botella, Titouan Lorieul, Cesar Leblanc, Diego Marcos, Maximilien Servajean

GUARDEN

https://guarden.org/

MAMBO

https://www.mambo-project.eu

Pl@ntAgroEco

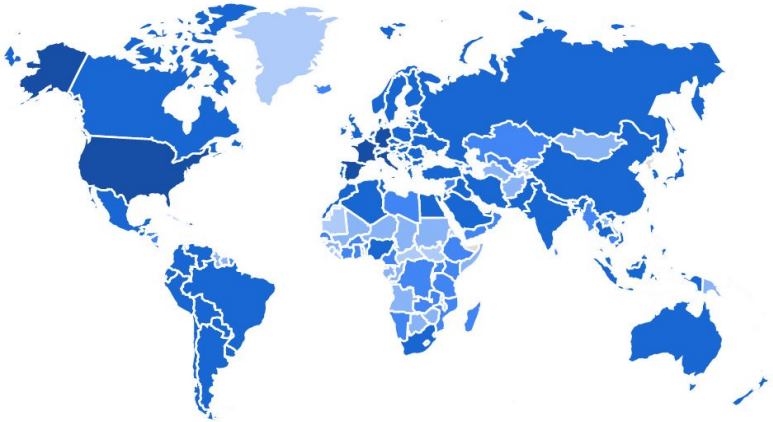
ONE FOREST VISION

Pl@ntNet

A citizen science platform that uses machine learning to help people identify plants with their mobile phones

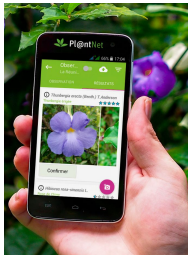
Pl@ntNet

200+ countries - 53K species
7M users ac. - 20 M users / Y.
200k-2M identifications / Day
1.2B identification queries



Personal Usage

Nature, walks



Gardening

Phytotherapy

Professional Usage

Agro-ecology

Natural Areas Management

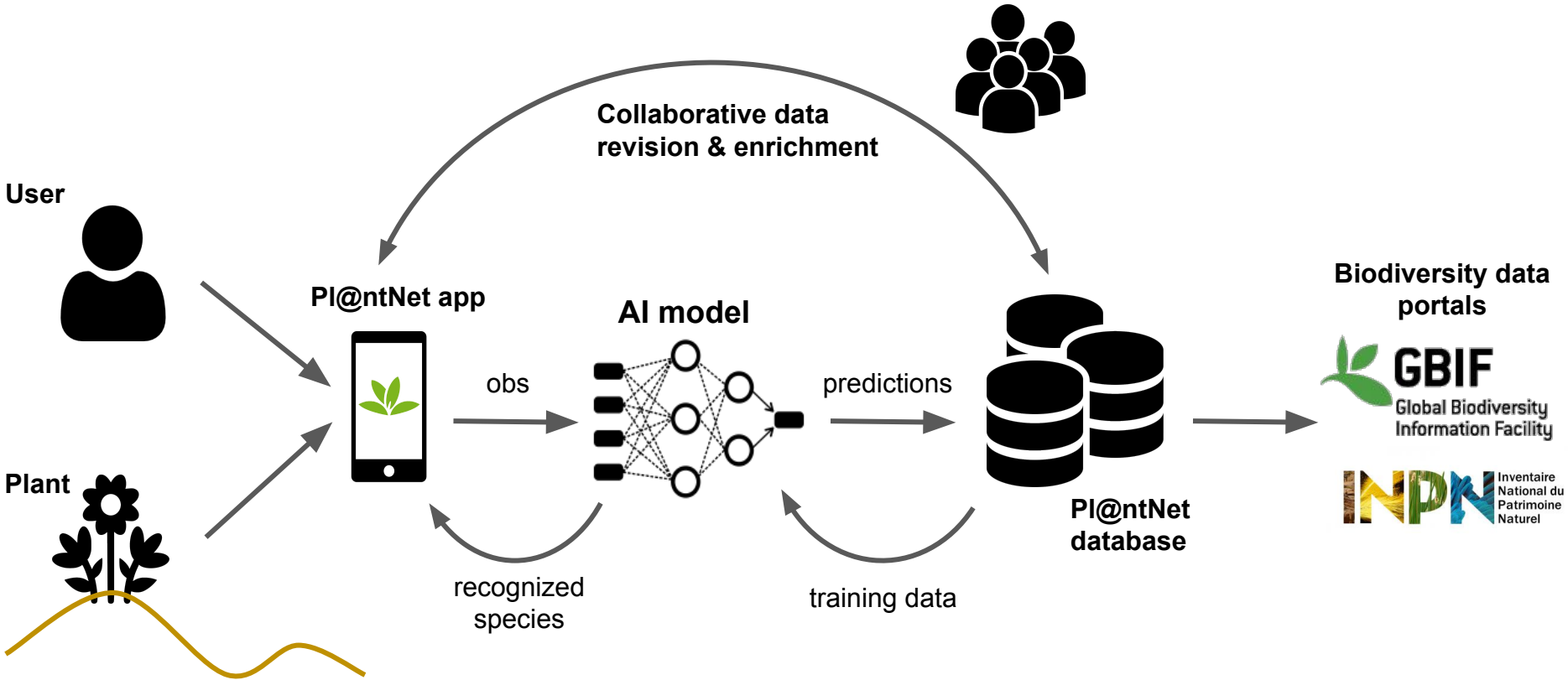
Education, animation

Tourism

Trade

Key concept of Pl@ntNet: Cooperative Learning

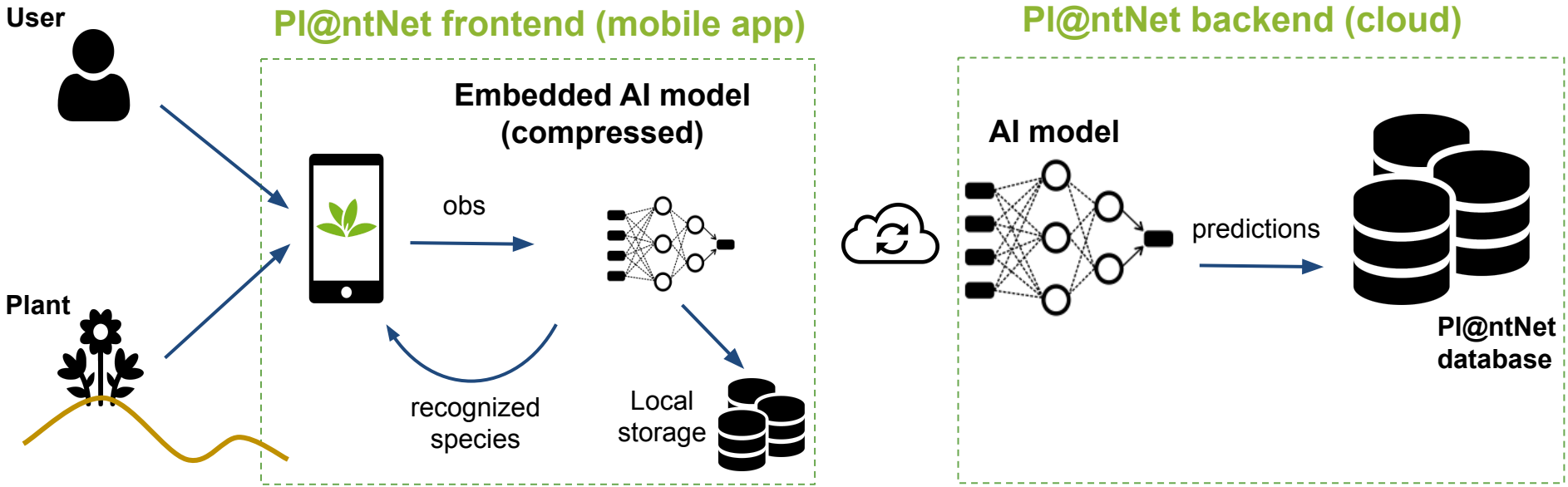
Online version



Key concept of Pl@ntNet: Cooperative Learning

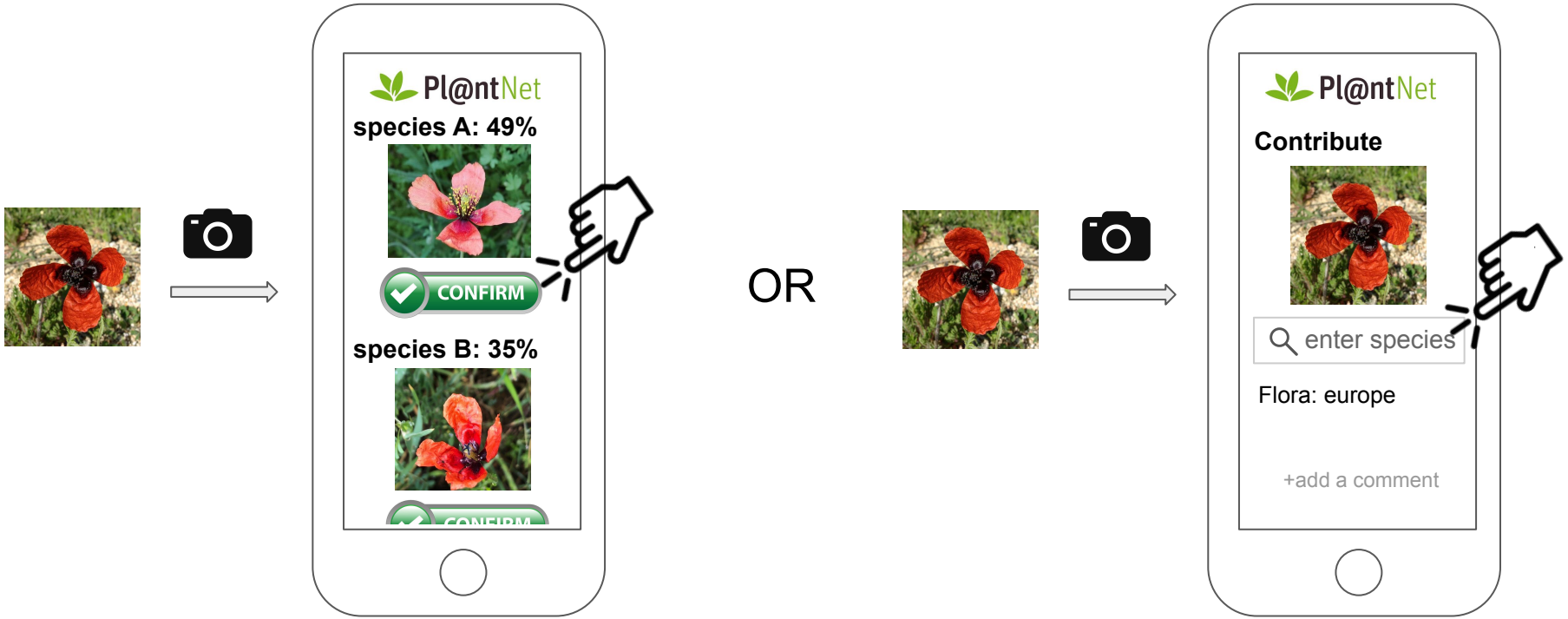
Off-line version

Identify plants without connection + resynchronisation



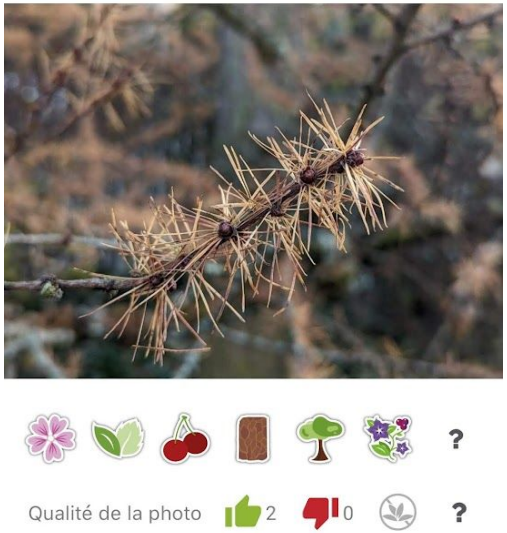
Contribution

Users can contribute their observations



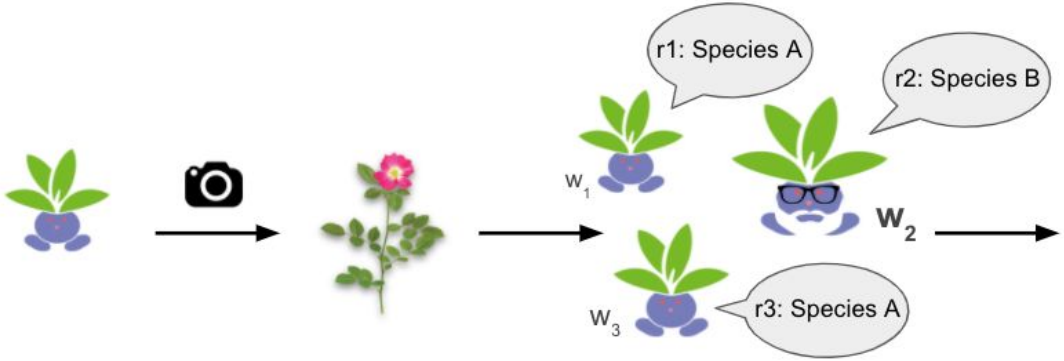
Revision

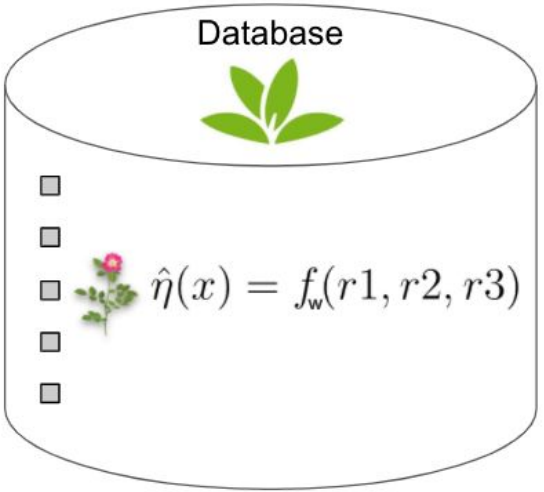
Users can tag, vote, or revise other contributions (image, obs. level) of the members of the PN community



Cooperative learning

The weight of a user in the decision process depends on his estimated expertise





Most probable species $y = \arg\max_j \hat{\eta}_j(x)$

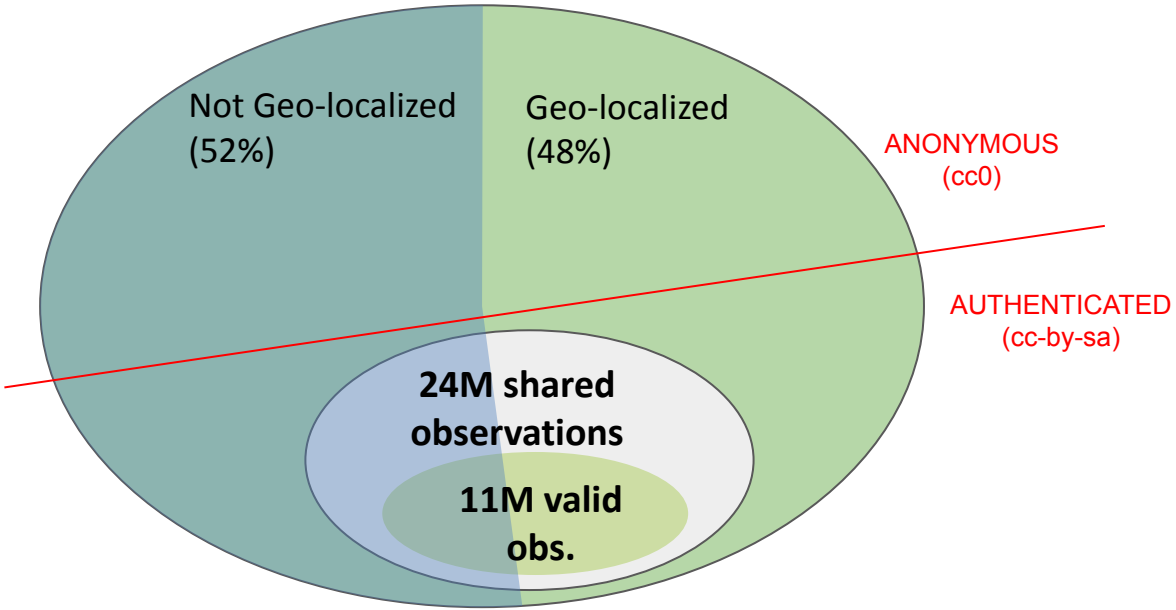
Validation decision (valid → used by AI) $\hat{\eta}_y(x) > \theta$

Lefort, T., et al., 2024. **Cooperative learning of Pl@ ntNet's Artificial Intelligence algorithm: how does it work and how can we improve it?**. arXiv preprint arXiv:2406.03356. In review in MEE. https://doi.org/10.48550/arXiv.2406.03356

Pl@ntNet Data



1.2 bil. observations



1 raw observation:

- 1 or more images
- organ tags
- AI-based species prob.
- (geo-localization)

1 valid shared observation

- author name
- aligned species name
- human validation > score
- cc-by-sa license
- High GPS precision
- Region-based filtering matching
- Auto. visual quality inference

Pl@ntNet Data

DataStore | Observations | Queries | Users | Projects | RealTime | Misc. | Pierre Bonnet | replication: running | prod

Queries showing 1 to 100 of 227 matches

query time: 1799 ms.
blind pagination OFF ON | Export

Author: ID, email, name...
ID: 1000688942 query
Name / reject class: = Acer campestre L.
Top: 1
Min. score: 0.95
Project: canary
Device:
Status:
Date: from: jj/mm/aaaa
Date: to: jj/mm/aaaa
Geo: min. latitude: 43.770040
Geo: max. latitude: 43.790986
Geo: min. longitude: 3.785011
Geo: max. longitude: 3.840115
Geoloc. | Off. | Auth. | Contr.
Gen. | 1 img
Tags: no tag filters – click to edit
Project type
Sort by: date
Sort direction: DESC ASC
View images only: ON OFF
Apply

« ‹ 1 2 3 › »

3 pages of 100 items

bulk edition : toggle | clear

☐ 10764880209 — Jean-Christophe Lombardo – 2 years ago

ok *Erysimum scoparium (Brouss. ex Willd.) Wettst.* — android | canary | 3.15.1 | fr

lat: 32.739243, lon: -16.933611


predicted: flower


predicted: leaf


predicted: flower

Status : ok | **code** : 200

Taxon	Score
Erysimum scoparium (Brouss. ex Willd.) Wettst.	0.423250
Phagnalon saxatile (L.) Cass.	0.072420
Carlina salicifolia (L.f.) Cav.	0.040340
Cakile maritima Scop.	0.004840

☐ 10742109844 — Jean-Christophe Lombardo – 2 years ago

ok *Erodium cicutarium (L.) L'Hér.* — android | canary | 3.14.5 | fr

lat: 27.929173, lon: -15.594940


predicted: flower


predicted: flower


predicted: leaf

Status : ok | **code** : 200

Taxon	Score
Erodium cicutarium (L.) L'Hér.	0.592570
Erodium malacoides (L.) L'Hér.	0.090390
Erodium ciconium (L.) L'Hér.	0.085370
Erodium aethiopicum (Lam.) Brumh. & Thell.	0.071830

Pl@ntNet Data shared in GBIF

- **Top-4 data provider to GBIF** (world's largest infrastructure for biodiversity data)
- **Valid observations** + **trusted queries identified by the AI** (AI score>0.9)
- **Additional quality filters**: * 2 AI classifier (potted & cultivated plants removal),
  * Region-based filtering (Kew POWO)

1. Foreground class.


noplantphoto_amphibian


noplantphoto_bird


noplantphoto_fish


noplantphoto_mammal


noplantphoto_man


noplantphoto_invertebrate


noplantphoto_reptile

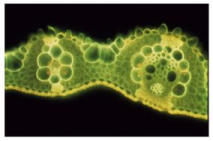

noplantphoto_mushroom


noplantphoto_food

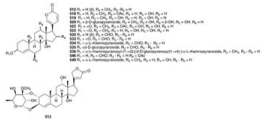

noplantphoto_landscape


noplantphoto_drawing_bw


noplantphoto_drawing_color

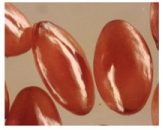

noplantphoto_microscopy


noplantphoto_humanmade


noplantphoto_digital_docs


plantphoto_herbarium


plantphoto_root


plantphoto_seed


plantphoto_habit


plantphoto_bark


plantphoto_branch


plantphoto_bud


plantphoto_flower


plantphoto_fruit


plantphoto_leaf

Pl@ntNet Data shared in GBIF

- **Top-4 data provider to GBIF** (world's largest infrastructure for biodiversity data)
- **Valid observations** + **trusted queries identified by the AI** (AI score>0.9)
- **Additional quality filters**: * 2 AI classifier (potted & cultivated plants removal),
  * Region-based filtering (Kew POWO)

2. Context class.

plantphoto_anthropized

plantphoto_bw

plantphoto_montage

plantphoto_with_human_body_presence

plantphoto_uniform_background_macro_dissection

plantphoto_intothewild

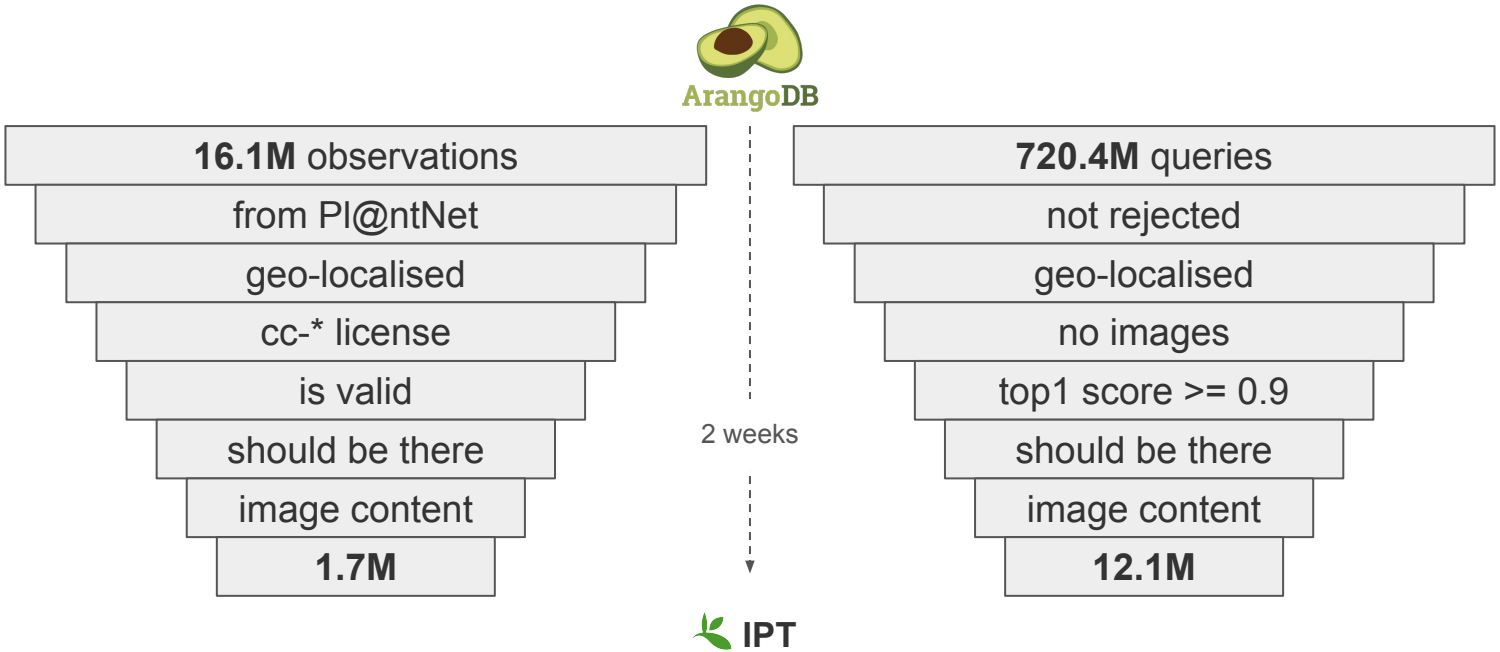
Pl@ntNet Data shared in GBIF

- **Top-4 data provider to GBIF** (world's largest infrastructure for biodiversity data)
- **Valid observations** + **trusted queries identified by the AI** (AI score>0.9)
- **Additional quality filters**: * 2 AI classifier (potted & cultivated plants removal),
  * Region-based filtering (Kew POWO)


```
],
"foreground": [
    {
        "name": "leaf",
        "score": 0.6499367952346802
    },
    {
        "name": "man",
        "score": 0.08426956832408905
    },
"context": [
    {
        "name": "human",
        "score": 0.8416258096694946
    },
    {
        "name": "anthropized",
        "score": 0.09990807622671128
    },
```


Pl@ntNet Data shared in GBIF

- **Top-4 data provider to GBIF** (world's largest infrastructure for biodiversity data)
- **Valid observations** + **trusted queries identified by the AI** (AI score>0.9)
- **Additional quality filters**: * 2 AI classifier (potted & cultivated plants removal),
  * Region-based filtering (Kew POWO)



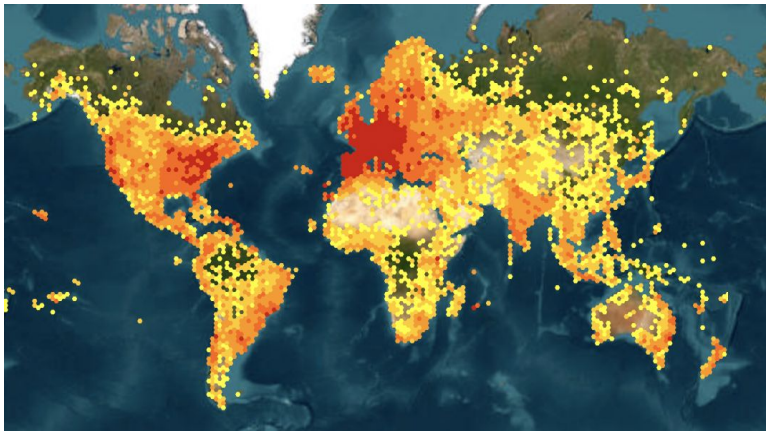
Pl@ntNet Data shared in GBIF

- **Top-4 data provider to GBIF** (world's largest infrastructure for biodiversity data)
- **Valid observations** + **trusted queries identified by the AI** (AI score>0.9)
- **Additional quality filters**: potted & cultivated plants removal, region-based filtering (Kew POWO)

GBIF

13 856 500 OCCURRENCES

(87% identified by AI, 13% by humans)



https://doi.org/10.15468/mma2ec

940 CITATIONS

IUCN RED LIST

nature

PLOS ONE

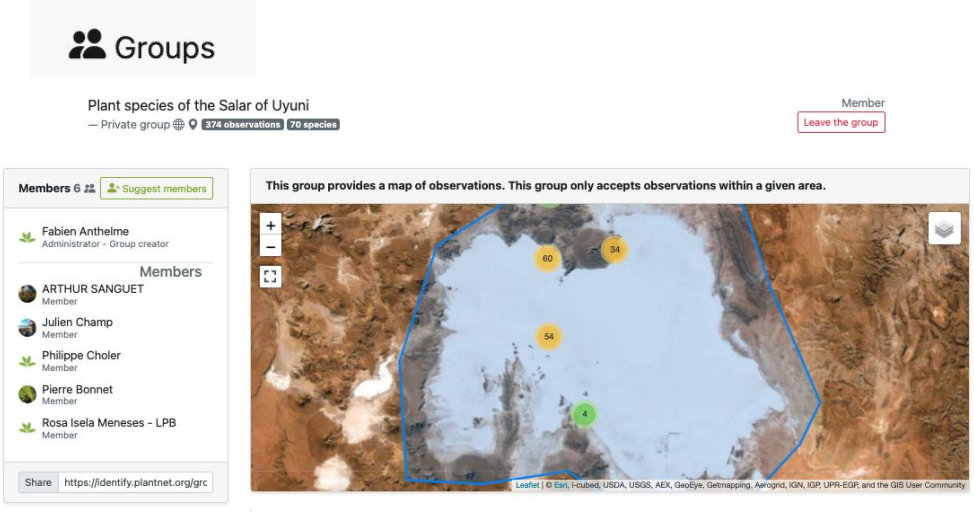
ANNALS OF BOTANY Founded 1887

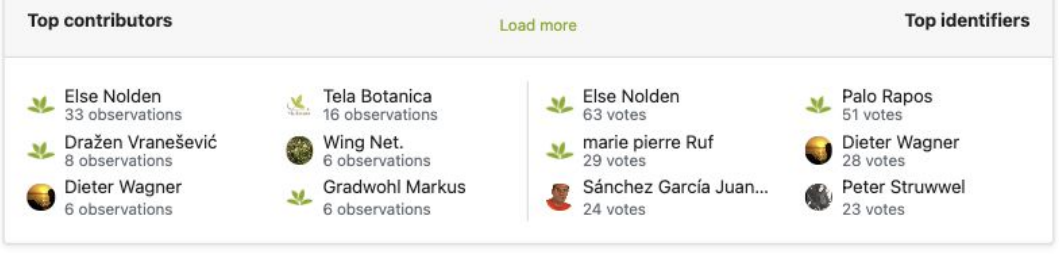
WILEY Publishers Since 1807

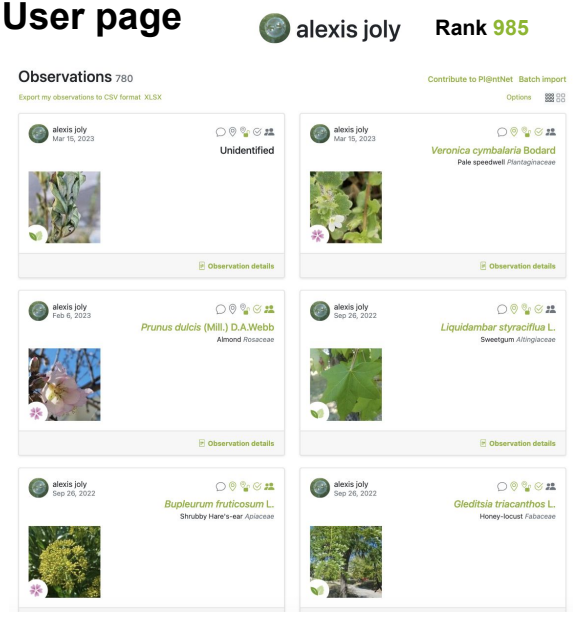
NON SOLUS

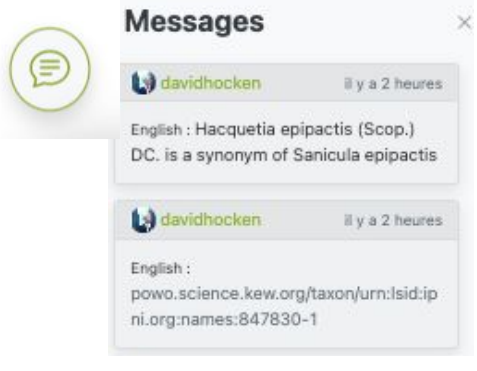
ELSEVIER

Other collaborative tools









Thank you


informatics mathematics
Inria


cirad


IRD
Institut de Recherche
pour le Développement
FRANCE


INRAE


agropolis fondation


FRANCE 2030
PROGRAMME DE RECHERCHE
AGROÉCOLOGIE ET NUMÉRIQUE


GUARDEN


MAMBO


anr


GENCI


L'AVENIR DEPUIS 1220
UNIVERSITÉ DE
MONTPELLIER