InsectUp: Crowdsourcing Insect Observations to Assess Demographic Shifts and Improve Classification

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InsectUp: an Insect Identifier Mobile Application

**InsectUp Motivation**
Insect demography shift causing devastating consequences for agriculture and ecosystems

**The Original Dataset**
- Difficulties to evaluate insect demographics
- 150k labelled photos of 403 European species of insects.
- Dataset provided by the SPIPOLL, a program from the French National Museum of Natural History.

**InsectUp Mission**
Crowdsourcing insect observations

**The Classification Algorithm**

<table>
<thead>
<tr>
<th>CNN architecture</th>
<th>Top 1 Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inception v4</td>
<td>87%</td>
</tr>
<tr>
<td>ResNet152</td>
<td>84%</td>
</tr>
</tbody>
</table>

Transparent workflow using RampStudio platform

**Challenges & Potential Solutions**

**Algorithm capable of recognizing all 1 million known insect species**

- Species class balance highly variable.
- Observer bias: some species will be reported more than others.
- Few-shot learning
- Less refined classification

- Build a rigorous annotation pipeline to avoid erroneous identifications
  - Manual annotations from humans with different levels of expertise
  - High level of similarity between some species.

- Handle false observations
  - Degrades data quality and user experience
  - Use reputation score
  - Use multiple identification suggestions
  - Attract entomologists for high quality identifications
  - Moderated feed
  - Anomaly detection
  - Educate people

**InsectUp Success**

Left: Age and geographic distribution of InsectUp users.

Right: Active users from April to Nov. 2018 during the alpha phase.

**Data Collected**

45k photos uploaded during the alpha phase. Photo quality and insect species are very variable.