Introduction

4.1  4.2  4.3  Conclusions & FW

In a nutshell

Task number: 4

**Task title:** Advanced Support on Citizen Science

**Type of mini-project:** Path finding

**Duration:** 12 months

**Start:** Project Start (January 2015)

**End:** December 2015

**Three Tasks:**

- **Task 4.1:** Updated analysis of ongoing initiatives on nature observation and selection of an example of framework to be supported from the DCC.
- **Task 4.2:** Exploration of pattern recognition tools that could benefit of EGI resources.
- **Task 4.3:** Citizen engagement: outreach and inreach
Task 4.1: Updated analysis of ongoing initiatives on nature observation and selection of an example of framework to be supported from the DCC

- Selected iNaturalist
- At this moment being adapted by gbif-rjb (ongoing by Real Jardín Botánico)
- Will be presented in Vitoria Event (18th and 19th November)
Task 4.1 addon: Biodiversity Observatory

- Twitter observatory on biodiversity: heatmap, trends, statistics, etc.
- Available at: http://social.kampal.com/visualization/lifewatch/twitter_stream
Task 4.2: Exploration of pattern recognition tools that could benefit of EGI resources

- **Adopted caffe**: [http://caffe.berkeleyvision.org/](http://caffe.berkeleyvision.org/)

- **Deployed in**:
  - Local host (GTX960 - Maxwell)
  - FedCloud (K20m – Kepler)
  - Foreseen deployment in Kepler GPUs in new nodes in Seville integrated within FedCloud

- **Three datasets classified using two models**:
  - Oxford 102, 102 genus (AlexNet and VGG_S), 93% accuracy
  - Portuguese flora, 63 genus (AlexNet and VGG_S), 56% accuracy
  - RJB Orchids, 6 genus, 70% accuracy
Task 4.2: Exploration of pattern recognition tools that could benefit of EGI resources

Why GPU? Why cuDNN?

Figure 1: cuDNN performance comparison with CAFFE, using several well known networks. CPU is 16-core Intel Haswell E5-2698 2.3 GHz with 3.6 GHz Turbo. GPU is NVIDIA GeForce GTX TITAN X.
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Caffe GPUs Framework Android Citizen Science

**Task 4.2:** Exploration of pattern recognition tools that could benefit of EGI resources

Why cuDNNv3 - needed Maxwell or Kepler architecture

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**TRAIN MODELS UP TO 2X FASTER**

- Alexnet
- OverFeat
- VGG

**FFT CONVOLUTIONS UP TO 10X FASTER**

- 3x3
- 5x5
- 7x7
- 9x9

cuDNN 3 vs cuDNN 2 on Caffe, Ubuntu 14.04 LTS, Intel(R) Core(TM) i7-4930K CPU @ 3.40GHz, 24GB RAM, GeForce Titan X
Task 4.2: Exploration of pattern recognition tools that could benefit of EGI resources

- **Outcome #1**: Framework to train your own dataset and create your own trained model

- **Outcome #2**: Framework to classify your images using your trained model

Source code available at GitHub
Task 4.2: Exploration of pattern recognition tools that could benefit of EGI resources
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Caffe Demos

The Caffe neural network library makes implementing state-of-the-art computer vision systems easy.

Classification

Click for a Quick Example

<table>
<thead>
<tr>
<th>Class</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allium</td>
<td>0.99999</td>
</tr>
<tr>
<td>Armeria</td>
<td>0.99999</td>
</tr>
<tr>
<td>Arabis</td>
<td>0.99999</td>
</tr>
<tr>
<td>Teucrum</td>
<td>0.99999</td>
</tr>
<tr>
<td>Dianthus</td>
<td>0.99999</td>
</tr>
</tbody>
</table>

CNN took 1.381 seconds.

Provide an image URL or upload an image.
**Task 4.2 addon:** Mobile app

- Access to the classifier available from a smartphone
- Allow to upload new images
- Developed with Android Studio
- Prototype for Android phones
Task 4.2 addon: Citizen Science App

- Help improving data sets for training and validation
- Data sets of higher quality means better trained models and, consequently, better classifiers
**Task 4.3:** Citizen engagement: outreach and inreach: Citizen Science Event

**Jornadas de Naturaleza y Ciencia Ciudadana**

Vitoria (Spain)

18th and 19th November (Program not closed)

Link:

http://natura.blog.euskadi.net/events/ii-jornadas-de-naturaleza-y-ciencia-ciudadana/
**Conclusions**

- **iNaturalist** selected as a data collection app and under customization
- **Framework** adapted to train a neural network with the available datasets
- **Framework** classifies with a reasonable accuracy images alike to the ones of the trained dataset
- **Web and Android** app to provide access to the framework
- **Citizen Science** app to improve datasets
- **Event** to engage general public ready to be done in November
Conclusions

Future Work

- Final deployment of the prototype (currently available, but under development)

- Improve Android app to:
  - Support further Citizen Science features
  - Provide image validation letting uploaded images becoming part of the dataset what means a larger and better trained dataset

- Full integration of the different parts
Conclusions

Final deployment of the prototype (currently available, but under development)

Improve Android app to:

- Support further Citizen Science features
- Provide image validation letting uploaded images becoming part of the dataset what means a larger and better trained dataset

Full integration of the different parts

Thank you for your attention!