



MISSION REPORT

Directorate: JRC-B, JRC-A	Unit: B6, A5
Mission Date: 10-12 April 2019	Report Author(s): Sven SCHADE (B6) and Marisa POINTI (A5)
Mission Location(s): Seville, SPAIN	Other participant(s) (JRC): Emilia Gutierrez Gomez and Vasiliki Charisi (A5)
Persons / Organisations met: Participants and co-organizers of the workshop “Exploring the interplay between Human Learning and Machine Learning - The Citizen Science Perspective”, colleagues from JRC.A5	
Mission Object: Co-organising the Workshop “Exploring the interplay between Human Learning and Machine Learning - The Citizen Science Perspective”	
Mission Order: 19-1688007 (SCHADE) 19-1688539 (PONTI)	
Project/Work Package: CSData (SCHADE); DigiTranScope (PONTI)	

Mission Summary

Context and Aim of the Workshop

This workshop was organised by the JRC work packages DigiTranScope, CSData and HUMAINT, in collaboration with the COST Action [Citizen Science to promote creativity, scientific literacy, and innovation throughout Europe](#). The workshop was the first event within this COST Action devoted to the interaction between machine learning and action learning in citizen science, and aimed to raise awareness about opportunities and issues emerging from this interrelation.

Over the past few years, machine learning technology has advanced and sophisticated models have been proposed in computer vision, music processing and bioinformatics, to name a few areas. Machine learning could help perform research tasks usually given to citizen scientists. It is possible to train an algorithm to develop specific image recognition skills which can be used in projects that require classification of large amounts of image data. For example, automatic plant image identification is now receiving attention in both botany and computer communities and could be used in citizen science. However, in other fields such as astronomy, the classification of galaxies structure is not yet considered a task for computers and the human eye is still seen as the perfect pattern recognition tool.

A general problem in citizen science (and generally in science) is that data grows much faster than the number of citizen science volunteers. Although human efforts will always be needed in citizen science, combining these efforts with big data techniques has been said to help researchers process more data faster and allow the volunteers to focus on the harder classifications.

The workshop was introductory and explored – at a broad level – several issues, including the ways in which human reasoning could complement machine learning, and the challenges of the increased influence of machines on participation in citizen science. The

event elicited the different views of attendees. There were 14 participants, including: eight Early-Career Investigators from Hungary, Portugal, Spain, Turkey, Poland and Sweden, one senior researcher from Spain (Davinia Hernandez-Leo, Pompeu Fabra, E), and five co-organizers, Emilia Gutierrez Gomez (JRC Seville), Vasiliki Charisi (JRC Seville), Sven Schade (JRC Ispra), Marisa Ponti (JRC Ispra), and Laure Kloetzer (University of Neuchâtel, CH). The Early-Career Investigators had diverse background and different levels of familiarity with the topic of the workshop. The event was a mix of case study presentations from the participants and plenary discussions. Emilia Gomez and Vasiliki Charisi presented the [JRC HUMAINT](#) project and the [TROMPA](#) project.

Main conclusions

Some perceived benefits and concerns over machine learning in citizen science emerged from the discussion. From the perspective of the Citizen Science Data work package and the [DigiTranScope](#) project, the following main points should be noted:

- **Risks of bias.** A concern was that biases caused by the demographics of citizen scientists might be reproduced into the development of machine learning algorithms, strengthening existing forms of exclusion in citizen science.
- **Outputs from the data.** Benefits of computational techniques were acknowledged to treat massive amounts of data faster. However, participants also raised a point that it is not only about data or volume, but also about the need to cleanse and structure the data to make it understandable for machines. If the quality of data collected by citizens is poor, the amount of cleansing and structuring would be too costly for many citizen science projects, making the data useless for machine learning.
- **Problem-solving.** Questions were raised about the possibility to incorporate special human ways of dealing with complex problems into algorithms.
- **Beyond traditional approaches.** Whereas the combination of human and machine intelligence for text and image recognition is already well established (but still would benefit from longitudinal and comparative studies), we identified a couple of possible research directions. First, the use of AI in social media could support Citizen Science but also poses challenges. This might include the profiling of potential participants in projects, but also the use of chat bots in order to help citizen scientists to carry out their research. Second, the embodiment of AI (i.e., robots) might support traditional approaches, and research from the HUMAINT project might help to carry this area forward.

Follow-up actions

- Submission of abstracts from the participants to develop into short papers for a special issue in an academic journal on the workshop theme.
- Deriving possible future work actions and input to the discussion on the future work of B6 Digital Economy Unit and DigiTranScope.

Links

<https://www.cs-eu.net/events/internal/workshop-wg-2-wg-4-exploring-interplay-between-human-learning-and-machine-learning>

Appendix: Meeting agenda

Agenda for the Workshop

Joint Workshop WG 2 & WG 4: Exploring the interplay between Human Learning and Machine Learning - The Citizen Science Perspective

Joint Research Centre, Edificio Expo, Calle Inca Garcilaso, 3, 41092 Sevilla, Spain

DAY 1 –April 11th, 2019 – Room A39

Topic	Time	Who
<i>Arrival & Registration at the JRC Reception (remember your passport)</i>	10:30-11:00	
Welcoming participants	11:00-11:10	Emilia Gómez, European Commission, DG Joint Research Centre (JRC), Sevilla, Spain, and Universitat Pompeu Fabra, Barcelona, Spain.
Introductory Session Set the scene for the workshop	11:10-11:20	Marisa Ponti, European Commission, DG Joint Research Centre (JRC), Ispra, Italy.
Who's who around the table? Begin share experiences and build mutual understanding between participants.	11:20-11:40	Sven Schade, European Commission, DG Joint Research Centre (JRC), Ispra, Italy
Mapping exercise	11:40-12:50	Laure Kloetzer, University of Neuchâtel, Switzerland
Case presentation (15 minutes) and discussion (10 minutes)	12.50-13.15	Tatyana Sarayeva, Umeå University, Sweden
<i>Lunch</i>	13:15-14:15	
Teacher communities: learning design support, social mechanisms, and case studies (Room A41) <i>Discussion</i>	14:30 – 15:30	Davinia Hernandez Leo

Case presentation (15 minutes) and discussion (10 minutes)	15:40 16:05	–	Esra Per, Gazi University, Turkey
Case presentation (15 minutes) and discussion (10 minutes)	16:05 16:20	–	Manuel Portela, Universitat Jaume I, Spain
<i>Coffee break</i>	16:20 – 16:40		
Case presentation (15 minutes) and discussion (10 minutes)	16:40 17:05	–	Diego Pajarito, Universitat Jaume I, Spain,
The HUMAINT and TROMPA EU projects	17:10 18:00	–	Emilia Gómez, Vicky Charisi
Discussion & day's summary	18:00 18:30	–	Marisa Ponti
<i>Dinner (free)</i>	20:00		Self-paid

DAY 2 – April 12th, 2019 Thursday, Room A39

Topic	Time	Who
Introduction to Day 2 and summary from Day 1	09:00 - 09:15	Sven Schade
Collaborative writing exercise	09:15 - 10:45	Laure Kloetzer
<i>Coffee break</i>	10:45 – 11:00	
Unconference	11:00 – 12:30	
<i>Lunch</i>	12:30 – 13:30	
Practical exercise	13:30 – 15:00	Sven Schade
<i>Coffee Break</i>	15:15 – 15:30	
Workshop's summary and conclusions	15:30 – 16:30	