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Fostering Earth Observation market uptake thanks to natural and holistic access to added value data generated through cutting-edge Artificial Intelligence technologies

Reporting

Project Information

SnapEarth

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[Project website](#)

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Periodic Reporting for period 2 - SnapEarth (Fostering Earth Observation market uptake thanks to natural and holistic access to added value data generated through cutting-edge Artificial Intelligence technologies)

Summary of the context and overall objectives of the project



SnapEarth project is to foster the Market growth of Copernicus by instigating the development of new Earth Observation (EO) applications and to develop general public awareness to EO data. SnapEarth is to initiate the creation of a virtuous circle of innovation by providing to EO data users an innovative platform in a Cloud computing ecosystem with leading edge EO segmented datasets, Neural Networks models.

Today, EO data are freely available in large quantities. However, the main obstacle to their use by the general public is that these data are sometimes hard to access, its interpretation can be challenging (e.g. different bands, resolution and geometry, etc.), and they are not currently highlighted by search engines.

Within the SnapEarth project 3 services were developed, constituting the SnapEarth platform, named EarthSignature, EarthSelf and EarthSearch. Moreover, 4 business pilot services (i.e. EarthPress, EarthClimate, EarthFoodSecurity, and EarthAgriculture) were developed to demonstrate how the platform can be used to reveal the potential of introducing EO data to their audience.

The EarthSignature service is based on Artificial Intelligence (deep learning models) and achieves to extract biophysical land cover semantic information from satellite imagery. The extracted information is automatically stored in its database which is continuously updated.

The EarthSelf service enables any business/user to take advantage of highly scalable cloud environments for analysis, visualization and production of EO value-added services by offering them the ability to access self-provision platforms in any DIAS or Cloud provider with minimal knowledge on the field. It allows users to create their own solutions using EarthSignature databases and combine them with their own data.

The EarthSearch service indexes automatically all data produced by EarthSignature to make them accessible within the EarthSearch Portal. This is a dedicated portal for natural language queries on images that is integrated with the QWANT's search engine.

The EarthPress is a web platform aiming to deliver value-added products to editors and journalists, allowing them to enrich the content of their publications with EO data (e.g. disaster extent maps, background imagery) and aggregated information from social media, websites, etc. on a given topic. It provides added value data to the media industry allowing them to disseminate the success of Copernicus to the citizens.

The EarthClimate is a web platform that provides services to support climate monitoring activities for air quality and carbon dioxide emissions monitoring and urban heat islands monitoring.

The EarthFoodSecurity addresses crop drought at its earliest stages, providing information can be provided for the near, mid, and far future. It is built on top of in-situ information of soil moisture conditions, and runs with Copernicus Climate Change Service (C3S) projections of climate change.

The EarthAgriculture delivers EO-based near real-time services aiming to improve of the management of agricultural practices. It proposes to agricultural users a set of value-added services to support agricultural monitoring activities, such as vegetation indicator maps and crop maps. It can also provide regular reports and statistics on user-defined areas of interest.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far ▼

The work performed during the SnapEarth project is divided into 4 main phases. In the 1st phase, the requirements collection and analysis were conducted for all services by contacting end-users through workshops and interviews. Based on the collected requirements, the specifications of each service and pilot were defined.

The 2nd phase included the design of the SnapEarth platform's architecture and the development of each component. In this phase, the development of all the methods, AI models, and technologies was achieved. Within the 3rd phase, the integration among all the independent SnapEarth components was conducted along with the establishment of their communication.

The 4th phase concerned the evaluation of the implemented services and the application of corrective actions. The evaluation of the pilots was divided into two sub-phases. In the 1st sub-phase, all the pilots were presented to their end-users, through dedicated workshops, and initial feedback was retrieved. Based on the latter, extensions and corrective actions were performed. The 2nd sub-phase concerned the final evaluation of each pilot service, where all end-users had the opportunity to use the services for a certain trial period and provide their final evaluation.

The results of the project were disseminated throughout different channels (e.g. social media, the project's website, participation in international workshops & conferences, international fairs, etc.). Within this period, 8 papers were submitted to both journals and conferences, while other dissemination material including leaflets and videos has also been developed and distributed throughout the aforementioned channels, allowing thus the EO data community, and not only, to learn about the project and its outcomes.

The assets developed within the project, will be exploited as platforms and services and be made available in the market. The disposal of these assets to the market aims to have a great impact on the community, as the journalists, governments, and decision-makers that would like to receive information about air quality, disastrous events, agricultural monitoring, and climate vulnerabilities based on soil moisture.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far) ▼

The implemented services within the project include innovative ideas and state-of-the-art methods to achieve their scope. Innovation is introduced by EarthSignature, that incorporates contemporary deep learning models, and novel weakly & noisily supervised training algorithms for semantic segmentation. Also, innovation is introduced by EarthSearch through the use of EO-segmented images in Qwant's Search engine via natural language queries. Innovative are also the pilot services, as the EarthClimate that obtains information on air quality index and indicators on the degree of surface heating and EarthFoodSecurity that monitors evolution and changes of soil moisture and drought indexes, to understand historical trends and anomalies. The EarthAgriculture reduces users' costs for the in-situ data collection by using EO data and EarthPress that detects breaking news about disastrous events through social media sensing and provides analysis of the extent of disaster using

EO data.

The market currently does not have such a competitive extended solution in the process of observing EO using AI and Machine Learning (ML), as SnapEarth services. Due to its wide distribution of enhanced EO data, SnapEarth is predicted to have a great socio-economic and market impacts. Through the SnapEarth project, several start-ups can be established, resulting in improved services and therefore engaging additional EO users. As the commercial demand for Earth Observation Data & satellite-based value-added services rises, the potential to achieve a higher turnover in SnapEarth's services is increased. Also, by federating the necessary computing environments and tools through the proposed EarthSelf service, SMEs providing EO-based services will be more competitive since they won't need to purchase, deploy, and operate powerful infrastructures to store and process EO data.



SnapEarth Logo

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