IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

Author: Dr. Sofiane Atek
Sapienza University of Rome, Italy, sofiane.atek@gmail.com

Prof. Cristiano Pesaresi
Sapienza University of Rome, Italy, cristiano.pesaresi@uniroma1.it
Dr. Marco Eugeni
Sapienza University of Rome, Italy, marco.eugeni@uniroma1.it
Prof. Corrado De Vito
Sapienza University of Rome, Italy, corrado.devito@uniroma1.it
Prof. Vincenzo Cardinale
Sapienza University of Rome, Italy, vincenzo.cardinale@uniroma1.it
Prof. Massimo Mecella
Sapienza University of Rome, Italy, mecella@diag.uniroma1.it
Mr. Antonello Rescio
Telespazio S.p.A., Italy, antonello.rescio@telespazio.com
Mr. Luca Petronzio
Telespazio S.p.A., Italy, luca.petronzio@telespazio.com
Mr. Aldo Vincenzi
Telespazio S.p.A., Italy, aldo.vincenzi@telespazio.com
Dr. Pasquale Pistillo
e-GEOS, Italy, pasquale.pistillo@e-geos.it
Mr. Filippo Bianchini
Telespazio S.p.A., Italy, filippo.bianchini@telespazio.com
Dr. Gianfranco Giusto
e-GEOS, Italy, gianfranco.giusto@e-geos.it
Dr. Giorgio Pasquali
e-GEOS, Italy, giorgio.pasquali@e-geos.it
Prof. Paolo Gaudenzi
Sapienza University of Rome, Italy, paolo.gaudenzi@uniroma1.it

SATELLITE-BASED EARTH COGNITIVE DECISION SUPPORT SYSTEM FOR COVID-19
PANDEMIC MANAGEMENT

Abstract

COVID-19 has triggered an unprecedented pandemic emergency emphasizing the importance of quickly identifying new epidemic clusters and patterns, as well as ensuring the implementation of local risk containment measures and providing the necessary healthcare to the population. This pandemic has highlighted the significance of leveraging new Information and Communication Technology (ICT) systems to manage information and provide an appropriate context-specific public health response to the epidemic. Within this domain, Earth Observation (EO) and geospatial technologies can play a game changer role. The Earth Cognitive System for COVID-19 (ECO4CO) service is designed to take on the challenging task of assisting institutions in Decision Support System (DSS) activities using geospatial artificial intelligence (GeoAI),

with the main goal of countering the spread of the Covid-19 pandemic and providing rapid insights and evidence of geolocalized events that may impact outbreaks evolution. In such context, geospatial artificial intelligence (GeoAI) is used by combining techniques from spatial science (such as Geographic Information Systems GIS), artificial intelligence (AI), data mining, and high-performance computing to analyze and extract meaningful information and knowledge from spatial big data, such as social media, satellite remote sensing, and several sensors. Earth Observation (EO) satellite acquisitions are triggered by social media analytics over possible new locations of human aggregation. Similarly, EO satellites are also used in conjunction with social media analytics to systematically monitor well-known areas of aggregation. The ECO4CO service provides geographical information that is both predictive and supervisorial, with the goal of identifying possible new clusters of outbreaks while also monitoring infrastructures (such as traffic jams, parking lots) or specific categories (i.e. teenagers, doctors, teachers, etc.). Furthermore, the system integrates data obtained from health structures to understand epidemiological trends and dynamics, to assess criticalities with respect to medical response and supplies, and to test possibilities useful to tackle potential future emergencies. The ECO4CO project was co-funded by the European Space Agency under its Business Applications programme. The paper presents current major results of ECO4CO system operations use cases, showing how the integration of Earth Observation data and ground data into artificial intelligence processes can lead to accurate predictions in the management of the pandemic state.