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APOLLON: MONITORING AIR QUALITY

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APOLLON is a software platform that implements and deploys new methods and innovation tools for environmental quality monitoring, with particular reference to air quality. Through a sensor network installed on the ground, APOLLON also assesses acoustic pollution and ultraviolet radiation (UV rays).

The approach consists of the distribution of a capillary low-cost network sensor, the use of Artificial Intelligence (AI) algorithms to provide forecasts, and the involvement of both citizens and institutions.

The platform handles multiple and heterogeneous data sources available in the territory, using semantic technologies, IoT, big data, weather and atmospheric forecasting models, and geographic information. Implementing all these data sources together gives the model the capacity to compute final data aggregations at a very high resolution, much higher than existing satellite models. Data sources are represented by:

Application scenario

Environmental quality monitoring, with particular reference to air, noise pollution and ultraviolet radiation (UV rays) in rural and urban contexts

Digital technologies

Satellite data, software platform, Artificial Intelligence, IoT, semantic technologies

Socio-economic impact

- Economic: Improving air quality driven DSS, responsibility
- Environmental: Control and mitigate air pollution, climate, air quality
- Social: Increasing awareness of air quality, health, information, security

More info: https://apollon-project.it

- Fixed and mobile sensors data stream (IoT sensors for environmental monitoring, placed on public transport or in fixed control units)
- Weather and Atmospheric forecasting models (e.g. WRF weather model and CAMS model by ECMWF)
- Mobile devices (GPRS data, smartphone data, noise data)
- Open Data (data related to environment monitoring provided by public institutions, like public transport remote control, traffic, public transport routes and data from no-vehicle streets)
- Social Media Feeds (users' interactions).

A visual dashboard displays simple and easy-to-use maps, graphs and textual reports. The tool will help citizens and institutions to increase their awareness and make better decisions.

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Purpose of the tool

APOLLON is aimed at the implementation and testing of innovative tools and methods for monitoring and predicting air quality parameters. The aim is to find relationships between air pollutants and anthropomorphic behaviours (e.g. traffic), weather conditions and land characteristics. It also implements a short-term forecasting model to predict air quality evolution. Prevention of air and noise pollution is related to the data available for the public administration to evaluate the specific risk in their area of reference. The direct involvement of citizens has the goal of improving their awareness on the specific issue. The tool will find relationships between all available data sources, and extract new realistic information to create real-time scenarios. This will enable citizens and companies to be informed about both real-time pollution conditions and short/mid-term forecasting.

The monitoring network will consist of a software platform able to correlate the flow of information collected by the sensors with other information sources, through the use of semantic technologies and tools for the management and analysis of geo-referenced data.

Description of the tool

The tool uses a citizen science approach. Data collected by citizens are integrated with other sources such as sensors (IoT, mobile and fixed) and public control units. The outcome is a visualisation platform based on a web application. Results and infographics are shown through a web dashboard, using simple and easy-to-use maps, graphs and textual reports. Machine learning and big data infrastructures are the digital technologies used to achieve this goal. This tool has multiple end-users: citizens, companies and public institutions. The online dashboard will help citizens and institutions to make better decisions.

Areas of socio-economic impacts

Social	Citizens increase their awareness of the real value of information on air and noise pollution. Contribution to encouraging citizens to adopt good practices concerning the reduction of air and noise pollution. Improved health and security.
Economic	Improved management and decision-making for companies, which are directly affected by air and noise pollution. Providing competent administration with IT tools, allowing them to adopt proper measures for the protection of citizens' health.
Environmental	Greater awareness of public administrations of the risk of air and noise pollution at local level when considering specific measures. Improved air quality.