

Development and management of databases for geospatial applications, plant and food sciences, and marine biology

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Abstract:

We present some of the research lines carried out at the Dept. of Agricultural Sciences aiming at developing databases for multiple purposes: i) management of geospatial data, both vector and raster data models using widespread (postgreSQL+Postgis, GeoServer) and cutting edge (rasdaman) technologies. Data other than geospatial can be stored according to reference standards. Common data include: soil, vegetation, pest, climate, environment, hydrology, and so forth. In the Mascabruno building there is a data center with ~200TB of HDD storage and 8 cores rasdaman enterprise license; ii) with the pressure of feeding an ever growing population and meeting new environmental challenges, future economies and societies will be depending on sustainable crop production and protection. Through the use of natural plant stimulants, hormones, and other nutrients, research is aiming to improve the efficiency, the physiological, and the molecular mechanisms behind these trending supports. We are involved in the development of the Sustainable Crop Production Atlas (SCPA) framework to comprehensively annotate and disseminate the knowledge involving new ways for sustainable crop production; iii) PRGdb is a web accessible open-source database that represents the first repository providing a comprehensive overview of pathogen receptor genes (PRGs) in plants. The database collects information on isolated and predicted pathogen receptor genes (PRG) and tools for facilitating their analysis. In the latest version (PRGdb 4.0) a robust prediction tool for PRG genes, named DRAGO 3, based on HMM and BLAST search is available. Furthermore, the inferred cross-link between genomic and phenotypic information allows access to a large body of information to find answers to several biological questions. In addition, the Department contributes on the implementation of Omics and Metaomics resources in Plant Genomics, Health, Food Sciences and Nutrigenomics, and in Marine Biology contributing to EU projects and to European Infrastructures like EMBRC, ELIXIR, EMSO and to the European open sciences-life initiatives.

Recent publications:

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