The digital archive of aerial photos and its on-line publication

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Summary
One of the main aims of Venice IUAV University – Circe and of the Regione del Veneto, is that of making their archives of aerial photos and cartography easily accessible and understandable, with the use of new computer technologies and WebGIS systems. Those systems are on line services that allow the users on the net to access territorial data. In accordance to this aim it has been planned and realized a digital archive and the aerial photos of the Veneto region have been published on the WebGIS; so a more qualified service is now offered to a more demanding and various public composed of public administration, but also academics, students and even common people that need aerial photos to record the actual state of towns and landscape and to study their evolution.

Since 1977, when in Italy administrative competences on town and territory planning were transferred from State to Regions, a constant and continuous activity of land documentation and cartography were developed as basic tools for analysis and studies on social, economical and environmental planning of the territorial government. The 20 Italian Regions developed their own cartographic programs that created a rich and precious database of scientific, technical and cultural documentation of a high quality level. It is composed of: technical and thematic maps, aerial photographs at different representative scales and with different characteristics (panchromatic, colour, infrared, false colour...), photographic sortie and coverage maps, geodetic points (trigonometric points and bench mark), digital orthophotos, DTM (Digital Terrain Models), mapping guidelines, technical specifications, etc. Recently this new scenario and the evolution and application of computer technologies have created an innovative cooperation among local Authorities, Universities, archives, libraries and many other institutes that are facing the new perspectives offered by both hardware and software technologies. Data digitalization allows starting new projects and to search and consult data and images on-line.

CIRCE (Interdepartmental Centre for Survey, Cartography and Data Elaboration a department of Venice’s University IUAV) and the Territorial Information System Department of the Regione del Veneto, started years ago to gather and to classify territorial data and documents into files that are nowadays spread known and consulted by a large and various number of users, professionals, students, public employs, researchers and amateurs that are willing to analyse territory and town development and transformation through aerial photos. Circe is an organization that supports many areas of the University educational activity and research within Venice’s IUAV. It is mainly a cartographic archives a place where maps are preserved, catalogued, analysed, studied, elaborated and spread out.

The plentiful legacy of iconographic documents is a detailed portrait of Veneto’s territory history, of the current state of Italy and of other European and extra-European countries, and represents the cartographic evolution up to satellite images. Territorial maps, of towns or of parts of them, of single build-
ing or of architectural details could be supplied through appropriate and innovative techniques, and through tools that make easy to search, to consult and to locate on-line data and images.

Both Institutes developed wide and articulated agreements of cooperation that produced significant results as the publication of their data archives. They both are willing to work on projects of mutual interest, using common communication standards and programs that could be a useful tool to study and to elaborate territorial data on scientific bases. According to this aim a digital file and the publishing on the Web GIS of the Veneto’s aerial photographic database have been realized. These are new instruments that offer a qualified service in accordance with the latest Italian institutional reform of the Public Administration (Public Administration Digital Code, D.Lgs. 7.3.2005), and they allow a rational and simpler management of administrative activities and access to data. They also involve a new interaction between the Public and the Public Administration thanks to new computer technologies and the widespread use of internet.

The web site and the digital database helped to develop Geographic Information and allowed to easily consult aerial photographic databases from wherever. It gives a valuable contribution to preserve the contact print. The on-line hint of the aerial photos, which are published at high resolution and equipped with specifications on the photographic sortie, reduces the damages caused by moving the material.

Figure 1, 2. Verona. Royal Air Force, 1945, aerial photo nr. 4034 and Regione del Veneto, 1997, strip 3, aerial photo nr. 292.

It is with this aim that at the beginning of 2003 CIRCE started a project to record the aerial-photographic database in a digital media. The project could be realized thanks to the qualified stuff and appropriate equipment belonging to the Institution. 14.000 frames of the CIRCE’s archives and their data have been recorded into files made available for search and consultation. Thanks to the agreement between IUAV and Regione del Veneto, signed in January 2005, a common database that joins CIRCE’s databases with the new regional flights has been built. According to this agreement, the on line database, developed from CIRCE, is made available for user from both authorities.

The digital archive is composed by more than 32.000 aerial photos of Veneto’s territory, mainly produced by Regione del Veneto and by the Istituto Geografico Militare Italiano (IGMI), but there are also historical shots by Royal Air Force (RAF) and by Gruppo Aeronautico Italiano (GAI flight) plus photos produced by other Local Administrations or private institutions. The aerial photos are organized and recorded in a functional database, their representative scale ranges from 1:3.000 to 1:60.000 and they date from the beginning of the 20th century to recent years. Images have been acquired with a scanner of specific technical characteristics and the resolution of all scans is of 600 dpi, both coloured and black and white. The images have been compressed in a tiff format, without loss of quality, or in ECW format, for internet browsing. The images obtained are of good quality, the best fit between scan resolution and
file dimension, which allows keeping the original characteristics. The images are stored in a hard disk memory and copied in a DVD. The acquisition of photographic sortie, a geometry information necessary for the geographic automatic query and search online, were realized in two phases: the first consisted in collecting the few vector photographic sortie available, concerning flights made during the ‘90s, the second phase, the longest and the hardest, has been that of digitizing paper data with a digitizer, calibrated for each photographic sortie. Afterwards all paper photographic sortie of aerial shots have been georeferenced in Gauss-Boaga coordinates (the Italian reference system) West Zone and the coordinate of each paper vertex has been extrapolate by the official IGMI cartography: that at 1:50.000 scale has been used for photos at large-scale and that of 1:100.000 for photos at small-scale. Each strip and each photogram has been delimited with a closed polyline, they both have been numbered and the name of the Institution / the producer and the year of the flight have than been recorded inside the database of each frame.

The softwares employed in the project are certificated trustable products with a good potential: ArcView was been chosen as software for the elaboration and creation of geospatial database, for the WebGIS a special version of ESRI ArcIMS has been used as server to organize and to manage queries on the net. Preparing and gathering the material: photographic sortie, scans, metadata, etc., have been the main activities for the building of the information system, a real online service that allows users to access territorial data on the net providing GIS potentialities that allow to consult information in their real spatial location, through simple functions of selections by queries. The data computerized operation is coming to an end, and 90.000 files are planned to be realized, divided into three different format (uncompressed tiff, ECW, preview) and more than 100 geographic layers.
The Veneto territory, composed by extraordinary morphological aspects, enchanting landscape, a typical Alps chain composed by high mountains, a huge plain where important rivers flow, the wide area of the Venice laguna and many historical towns and cities of art, has been the subject of lots of periodical aerial shots. The digital archive and its on line publishing is an important and precious tool for the scientific community, a complete and historical documentation of the area, a remarkable and worth cultural patrimony. For all that, special care should be necessary given to the aerial photographic documentation, in order to satisfy the needs of users in the most suitable way and with a more qualified service.

The access to the aerial photo consulting system is through the website of Venice’s University IUAV-CIRCE at page: (http://circe.iuav.it) through the link Cataloghi-Foto aeree-Catalogo geografico and from the website of Regione del Veneto at page: (http://www.regione.veneto.it/Territorio+ed+Ambiente/Territorio/Cartografia+Regionale/Area+SIT/web+gis.htm) or through the website (http://mapserver.iuav.it/website/afnet/Viewer.htm)
The page appears divided into three parts. The first section to the left gather general informations, changing in accordance to the selected elements (logo of the owner of the flight, map of frame, legend and vector layers related to the official cartography grid), the second section shows the map (from a regional scale with the administrative borders, to the index of the photo and the border of the frame selected) and the third is dedicated to searches that could be done on the administrative sphere or on the year of the flight. Important and useful are the “list of local authorities” and the “list of flight” that allow through the selection of a local authority to see the list of flight and the aerial photos coverage of the local authority’s territory and vice versa.

We believe that this information resource for the knowledge of the territory should be the sign of a positive work of experimentation and a solution that tries to answer at best to the difficulties opposed by the conversion into digital data of describing data and by the need of visualizing and searching documents, even on the net. A product that is in accordance with the initiatives started and developed in Europe with the INSPIRE project (Infrastructure for Spatial Information in Europe) and in Italy with the IntesaGIS project. With these projects the strategic worth and the importance of “Geographic Information” are commonly acknowledged because it provides accessible data, shared informations, easiness of consulting and user friendly applications.
Figure 12, 13. Flight technical characteristics and preview of the selected photo.

Figure 14. High resolution aerial photo.

References


