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An information system for historical Cadastre of Venice

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Summary

The collaboration between University IUAV of Venice and The State Archive of Venice made possible the beginning of a project for the creation of an information system for the Historical Cadastre of Venice. The purpose of this project is to build a knowledge system of phenomena and process of historical transformation of the city that, since the early years of the nineteenth century, set up the current state. The Napoleonic, Austrian and Austro-Italian cadastres are the documentation which the study is based on. The documents that record the characteristics and ownership of assets - *sommarioni*, extracts and cadastral address books, and maps - are so analyzed and converted into digital format. In addition to restitution in raster format, we are also providing for the vectorialization of each cadastral particle for use in the system, especially for the maps. The problem of correspondence between the spatial references of historical documents and current geographical spaces, with the aim of defining not so only a strict cartographic georeferencing but a criterion for localization, in order to read the qualitative similarities and correspondences in evolution of the urban context. For access to maps and alphanumeric information is developed Webgis a project based on standards defined dall'OGC (Open Geospatial Consortium).

Introduction

The lasting collaboration between “Università IUAV di Venezia” and the State Archive of Venice has given excellent results. The cartographic heritage of the IUAV was strongly enlarged because of cadastre maps kept in the State Archive had been reproduced in order to be placed at users’ disposal (both from the university and from external users). Recently the State Archive has planned and started a high resolution digital acquisition of illustrated documents (such as maps, plans, drawings) kept in the institute. The availability of those digital cadastral maps made it possible to computerized cartographic documents, as well as the related cadastre registers. Users now allow to have access to search supplemented with geographical data and information about properties and goods.

The Project

The historical cadastral base is a basic element for study and research (evolution and analysis of a city) as well as an important support to whatsoever project concerning goods protected by law restraints. According to this, the main aim of the whole project was to create a system of knowledge of the historical transformations of the city – a phenomenon which from the beginning of the 19th century has influenced the actual town scheme. Besides historical cadastres, another aim of this new sys-

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tem is to widen the study of the town planning scheme towards the current configuration, by adding both the modern cadastral source and the new digital map.

The Cadastral Documents

The documents on which this new system is based are three cadastres: the first is the Napoleon's one, the second is the Austrian cadastral and the third is the Austo-Italian one. The last one concerns the extension of the centre of Venice, except for the island of Giudecca. The Napoleonic cadastral is made up by 29 sheets (two of them reproduce the panel of union) which are in horizontal strips readable from left to right. They form a complete map of the whole historical centre. The map behind draw to a scale 1:1000. Both the survey and the structure dated from 1810-1811. All the information about properties are in the *Sommarioni*, very special descriptive catalogue related to each single map with an identification number. Each number gives some information about the good's owner, the location, the description of the property and its area (given in *perches*).



Figure 1. Napoleonic Cadastre's panel of union of Città Regia.

The Austrian Cadastre, which was started from 1838 and whose maps derived from the Napoleonic ones, gives a representation of the town divided into *sestieri* (district) and is made up by 63 sheets – six of them being panels of union concerning each area district. These sheets developed in horizontal strips readable from left to right, just like the other ones. The *Sommarioni* are structured just like the Napoleonic maps, with the ad-diction of taxable yield. The owners' name, therefore, is written only with the initials. Into *Estratto catastale* (another particular register) there is the agreement between the abbreviation and the owner's name, moreover the other prosperities list of the same subject into *Comune Censuario*.

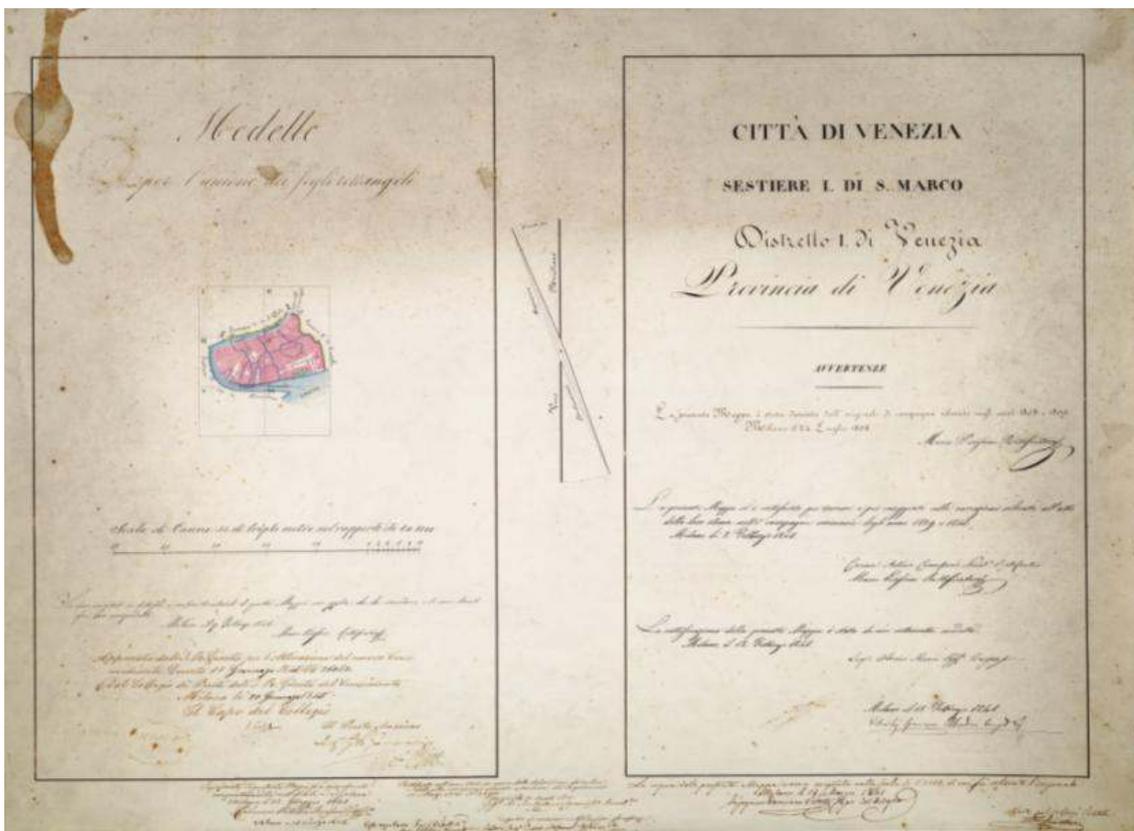


Figure 2. Austrian Cadastre's Panel of Union - Sestiere di S. Marco

The Austro- Italian cadastre is made by 65 sheets with 6 panels of union and derived from the Austrian's one. As in the Austrian cadastre, the documentation of those cadastre are *Sommarioni*, *Rubricari* and *Libri Partite*, that have a similar function of *Estratti catastali*.



Figure 3. From left to right: Sheet IV of Austro-Italian cadastre of San Marco 's Sestiere, Sheet 19 of Napoleonic Cadastre of Regia Città di Venezia, Sheet IV of Austrian Cadastre of San Marco's Sestiere.

Figure 4. Image of San Marco's Sommarione.

Preparation of data

The conversion in numeric format is still going on for each single cadastre. The conversion it will be made for all parts of the different cadastre (from maps to *Sommarioni* or *Estratti catastali*). All data are entered into a specific database, after their classification in different types.

I	CODIC N°	SUB	LETTER	CORR.	CORR. AI	INTEST_	M_CIV_	PROPR_	QUALITA_	SUPERFI	RENDI	D.O.	D.V.
398	ASM 518			NSM 1261	AISM 318	SM - Ria Terrà S. Paternian	5577	LAZZARO Dometria q. Giovanni	Mezzana	0,02	26,88	533	L 18
399	ASM 519			NSM 1261	AISM 319	SM - Ria Terrà S. Paternian	5583	BERTOLI Marca q. Stefano	Cara che si ortende ancho sopra il N° 311, e sopra parte del N° 309	0,10	228,48	558	B 98
400	ASM 520			NSM 1258	AISM 320	SM - Ria Terrà S. Paternian	5575	FIRNKRANZ Andrea, q. Giovanni-Giacoma	Cara che si ortende ancho sopra il N° 321	0,07	132,60	517	F 73
401	ASM 521			NSM 1258	AISM 321	SM - Ria Terrà S. Paternian	5574	ZAMPIERI Luigia e Coraro fratello e zaratella, q. Antonia, pupilli in tutela di ALESSANDRI Felicitara madre	Luega terrona	0,03	36	535	2 06
402	ASM 522			NSM 1253	AISM 322	SM - Ria Terrà S. Paternian	5572	SECRETAN Giacinta q. Giovanni-Claudia	Cara	0,11	140,40	5340	S 42
403	ASM 523			NSM 1252	AISM 323	SM - Ria Terrà S. Paternian	3568,3569,570,3595	FIGAZZI Andrea q. Pietra-Antonia. Livellaria alla Fabbrica della parrocchia di S. Lucia in Venetia	Cara	0,10	517,52	532	P 80
404	ASM 524			NSM 1250	AISM 324	SM - Campa S. Luca	3600,3601	COLLES Bartolomeo e Pietro fratelli q. Costanzo	Cara con battegho	0,23	1084,74	577	C 131
405	ASM 525			NSM 1248	AISM 325	SM - Callo dei Furori	5602	BIANCHINI Vitale-Denisio, Stollina, Savina, Conzolina, Alessandrina, Vittoria ed Allegrina fratello e zaratella di Leone, amministrati dal proprio padre	Cara che si ortende ancho sopra il N° 326	0,09	289,48	578	B 117
406	ASM 526			NSM 1248	AISM 326	SM - Callo dei Furori	5792	GATTERBURG - MOROSINI Canzara Loredana q. Paolo Antonia	Cara con battegho che si ortende ancho sopra parte del N° 325	0,05	206,64	507	G 31
407	ASM 527			NSM 1248	AISM 327	SM - Ria Terrà S. Paternian	3604,3605,606	DUBOIS Carlo q. Pietra	Cara con battegho	0,32	493,00	535	D 107

Figure 5. Data taken from Austrian San Marco's Sommarione

Regarding maps, the raster conversion made by the State Archive of Venice is not the unique font of data. In fact the Sistema dei Laboratori of the University IUAV of Venice is supplying to the digitalization of each single cadastre particle. This process is done to obtain a layer of entities that represent particles used by the consultation system.

A semi automatic digitalization applied to images – just grey scale or black/white images- has been used to obtain the layers. To apply this process each single image was modified to remove noise and to emphasize the relevant geometries (lines, areas, isolated cells etc.). The correction was obtained sometimes through a automatically process and sometimes manually. The semi-automatic digitalization, against of a spare of time, involve a sensible decay of geometry's quality. Some of "congruence" features of lines have loosed especially the orthogonal flow and the correct alignment of consecutive lines of buildings along roads. Moreover it's possible to recognized sensible gaps from the position of the arc reconstructed by the software and his position into the reference images. The possibility to test the different approaches – the automatic and the manually ones – give the evidence that times of work are the same to obtain the most quality of output geometries. In particular, manually digitalization can also benefit from the support of the editing, as the control of perpendicular lines and *snapping*.

The way to manage of information

The project faces the problem of correspondence between spatial reference of historical drawings and actual geographical space. The aim is not a rigours georeferencing, but a "criterion" for analogies and correspondences recognitions in urban evolution. In order to obtain this, it was established to bring the maps back to projective space of the modern maps. The actual maps are reference for the introduction of new geographical layers. The CTR (topographical map) is considered only as a placement map and not as the basis for a georeferencing in accord to the cartographic projections. The localization is performed by applying a consequence roto-translation with independent change of scale for each sheet of paper, without introducing distortion. The set of points obtained by processing each sheets is applied to the image of the map and to his corresponding vector layer of land parcels.

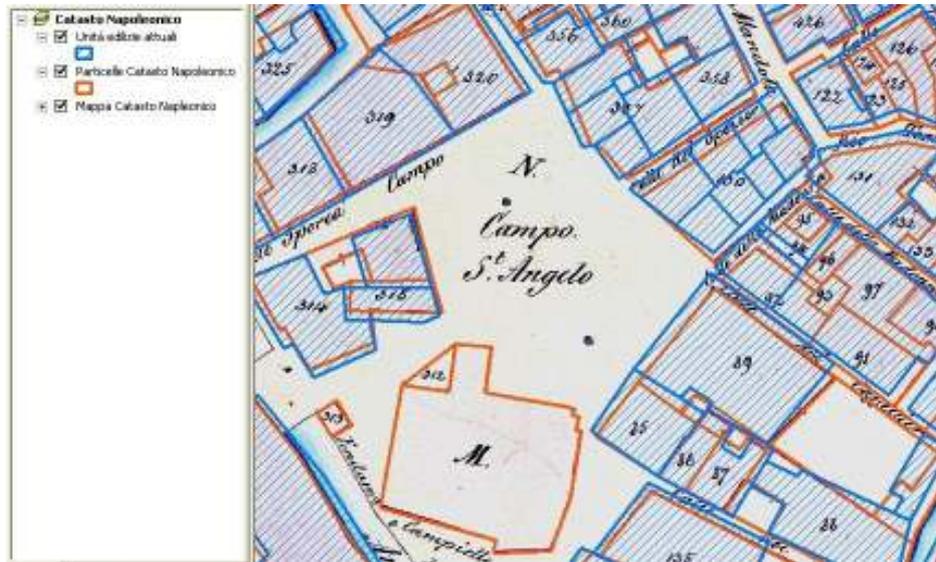


Figure 6. Image of the modern topographical map on the historical cadastre.

According to all tests, it has been found non-systematic and independent deviations. This kind of data is alike for the density of the fabric construction and for central or peripheral position within the single sheet. The differences are included into a varying range which goes from a few tens of centimetres to few meters. So variances can be regarded as acceptable in view of the implementing rules of the map, its scale, the state of paper and the acquisition procedures. In particular to define the reference space, the approach was to select into two different windows the same geographical area. Each single windows showed a different map restrain into the system. This particular procedure doesn't use any kind of morphological transformations to the original geometry. So the spatial discrepancy between maps is limited, while the semantic level remaining complete unchanged. This tool is managed by a software developed inside the project. The result of the application is to give an immediate visual indication of urban changes into historical evolution. Therefore the correspondence between particles of different cadastres is not maintained by the relationship of space, but through relationships encoded into tables of alphanumeric data. For example, each particle of the Napoleonic Cadastre report into their data the codes of the corresponding particles in the Austrian Cadastre and vice versa. So, from the database, it will be possible to retrieve and compare the data on the evolution of each particle in historical series.

The System for users

The access to cadastre's information is developed into a WebGis project based on OGC (Open Geospatial Consortium) standards. The link between the mapping component and the primary narrative ones (Sommarioni) is determined by particle's code, while the associated alphanumeric information - present in the extract or in the land Rubricari- are associated in a sort of database through the identifying owner's abbreviation. The first response of the system can provide is based on standard criteria

for searching within a database. The WebGis's interface offers possible guided questions based on the contents of the data tables. It can therefore draw, for example, all properties belonging to the same holder, the units used for a specific use, and so forth. The inclusion of data which indicate the correlation between particles in different registers allows showing changes in texture and allocation of housing units. The system, also, provides the ability to add geographic layers and information not directly related to each other land to comprehend transformations occurred in the Old Town city.

References

Bonetta R. , Scarso M., 1991, *L'informazione dei catasti storici ed attuali dell'area monumentale di San Marco a Venezia*, Bollettino della SIFET, n° 3, pp. 125-127.

Marcadella G., ottobre 2008, *Progetto di digitalizzazione della cartografia catastale storica di Vicenza e di Bassano del Grappa*, Acta Concordium n° 9, pp.91-98.

Oscar P., 2002, *Un sistema informativo per la gestione dei dati di censimento dl catasto storico di Bergamo: Catasto Lombardo-Veneto (1853) e Nuovo Catasto Terreni (1901)*, Museo e Storia, anno IV, n° 4.

Pavanello I., 1976, *I Catasti Storici di Padova*, Roma, Officina Edizioni. Scarso M., Baso G., febbraio 1989, *Catalogo dei documenti cartografici - Catasti Storici*, Istituto Universitario di Architettura di Venezia.