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"Onomasticon, Prosopografia dell'Università degli Studi di Perugia" The Origin of the Project, Present Database Features and Future Challenges

The paper aims to illustrate the "Onomasticon" database – Onomasticon (unipg.it) –, delving into both its scientific underpinnings and technical intricacies. Initially, a brief overview of the project's genesis, its scientific rationale, and its envisioned applications will be provided. Subsequently, attention will be directed towards the technical aspects of the database, tracing its evolution from an informatics perspective. Lastly, perspectives between the historical investigation and computational resources will be offered. The "Onomasticon" database, started in 2008 for the occasion of the 700th anniversary ceremony of the University of Perugia, serves as a repository of research findings pertaining to the institution's history of the University of Perugia and the students and professors who studied and taught there.
With a focus on prosopographical studies, the database encompasses data on professors, students, courses, and the university's evolution between the Middle Ages and the modern age. From a technical point of view, the essay will explain the transition from Onomasticon 1.0 to Onomasticon 2.0, which involved the transition from a relational data model to a graph structure, which improves flexibility and performance and offers the possibility of integrating historical data with external resources like authority files and online databases enriches its utility. Challenges for the future include ensuring data reliability, addressing interpretative aspects, and enhancing the linkage with external resources. In the current research context that increasingly focuses on interdisciplinarity, the Onomasticon project stands as a testament to the fruitful collaboration between historical research and computational resources, offering valuable insights into the longstanding history of the University.
Keywords: Onomasticon database, University of Perugia, research repository, prosopographical studies, historical data, relational data model, graph-based structure, authority files, online databases, data reliability, computational resources, historical research, university history.

Introduction

The paper seeks to present the "Onomasticon" database (onomasticon.unipig.it), exploring both its scientific foundations and technical complexities. It will begin with a concise overview of the project's origins, its scientific rationale, and its intended applications. The discussion will then shift to the technical aspects of the database, examining its development from an informatics perspective. Finally, the essay will offer a reflection on the intersection of historical research and computational tools.

1. Origin, aims, and objectives of the *Onomasticon* project

Onomasticon was created in 2008 on the occasion of the 700th anniversary of the University of Perugia to bring together and disseminate the results of a series of individual and collective research projects, which converged contextually in three documentary exhibitions[1] and in a series of volumes on the history of the University of Perugia, published in collaboration with the *Deputazione di Storia Patria per l'Umbria*.[2]

These works were the first sources of the Onomasticon database. However, more generally it aims at a tight relationship between historians and computer scientists for the development of products that serve the research purposes of both fields.

In prosopographical studies, the traditional vision of erudite historiography has given us a legacy of a series of biographical notes with the aim of highlighting, and in some cases magnifying, the exceptional qualities of illustrious characters.[3] The current synergy between historical research and information technology has facilitated the transition from this type of research to current historiographical interests towards the intellectual classes and the evolution of cultural institutions. These have been studied not only through public documents, often with programmatic value, or individual documents of particular relevance, but also through current documentation – lists, financial and administrative documents – which allowed us to reconstruct general phenomena, dynamics, and trends.

As Carla Frova mentioned in a 2017 essay,[4] the use of information technology for data processing in the field of historical disciplines began in the 1980s. Regarding the prosopography of intellectual classes, a leading example of such studies is Jean-Philippe Genet's *Dictionnaire des auteurs actifs dans les*

[1] FROVA – GIUBBINI – PANZANELLI 2003; MAOVAZ – PIERETTI – ROMANO 2008; FROVA – TREGGIARI – PANZANELLI FRATONI 2009.

[2] See: BELLINI 2007; ZUCCHINI 2008; MARCONI 2010; PANZANELLI FRATONI 2009; TREGGIARI 2009; MARCONI 2010; MERLI MAIARELLI 2010; TREGGIARI 2014.

[3] For the Perugian reality, the main works of traditional prosopography are represented by MARIOTTI 1787; VERMIGLIOLI 1828–1829, and BINI 1816.

[4] FROVA – ZUCCHINI 2017. p. 121.

champs de l'histoire et de la politique en Angleterre de 1300 à 1600.[5] In the more specific field of university prosopography, at least four major projects are worth mentioning: ASFE, Studium Parisiense, Bo2022, and REPAC, relating respectively to the Universities of Bologna, Paris, Padua and the students of the Holy Roman Empire in the Middle Ages and Modern Age.

The ASFE database, developed by a research group led by Gian Paolo Brizzi, was originally designed to catalog the student population of the University of Bologna from 1500 to 1800. Over time, it has gradually expanded to include a census of Italian and foreign students who attended other universities across the Italian Peninsula during the same period. Currently, the database contains over 130,000 records.[6] The Studium Parisiense instead is dedicated to the members of schools and universities in Paris between the twelfth and sixteenth centuries. Directed by Jean-Philippe Genet and originally funded by the European Research Council, the database contains approximately 15,000 records. Each entry includes biographical and bibliographical information on professors, students, and university assistants; noteworthy is the section on book production, which includes the title, manuscript, and edition for each work.[7]

The Bo2022 database, created to mark the eighth centenary of the University of Padua, contains profiles of approximately 46,000 individuals who studied at the University of Padua from 1222 to 1989. The database primarily collects prosopographical records of graduates, and only for the medieval period, it also includes profiles of professors, staff, and students attending the University of Padua.[8] Finally, the REPAC (Repertorium Academicum) database was established in 2019 by incorporating the long-term RAG project (Repertorium Academicum Germanicum), which began in 2001 with funding from the Swiss National Science Foundation. REPAC contains information on approximately 62,000 individuals who lived between 1250 and 1550, with 400,000 observations on their life and career paths, analyzed within the framework of contextualized prosopography.[9]

In this general context, the *Onomasticon* project was designed with the intention of offering information on the foundation of the University of Perugia and on the professors and students who attended it from the fourteenth century onward. Nowadays, the database contains information on eight thousand students and professors, two thousand university courses taught

[5] See https://calame.ish-lyon.cnrs.fr/dictionnaire-des-auteurs-actifs-dans-les-champs-de-l-histoire-et-de-la-politique-en-angleterre-de.html and Corpus et bases de données | Laboratoire – LaMOP (pantheonsorbonne.fr) (accessed: 18/10/2024).

[6] See ASFE — Centro Interuniversitario Storia Università Italiane — CISUI (unibo.it) (accessed: 18-10-2024).

[7] See Studium (univ-paris1.fr) (accessed: 18/10/2024).

[8] See Banca dati (mobilityandhumanities.it) (accessed: 18/10/2024).

[9] See Repertorium Academicum Germanicum (rag-online.org) (accessed: 18-10-2024).

over time, and a thousand places of origin of students and professors.[10] The primary objective of the database is the detailed reconstruction of the activity of students and teachers of the University of Perugia. Information on their presence in other institutions, as well as details on their family background, social and economic status, and professional and political commitments are not systematically present. Instead, the university careers of students and teachers are recorded with the maximum precision allowed from the sources: the teachers' entries include onomastic variants, biography, origin, possible student career, activities in the *Studium* (years and disciplines of teaching, salary), and bibliography. The same fields appear in the entries relating to students with the addition of specific information on their enrolment, degree, and residence in a student college (when available).

Based on the fields available in the database, there are two main search paths: on one hand, it is possible to trace the activities of a specific individual at the *Studium* of Perugia; on the other, the database allows for the exploration of the history of the *Studium* in both a synchronic and diachronic sense. In fact, the database records the courses offered each academic year, the investment of the Municipality of Perugia in each course, and the overall annual budget of the disciplinary areas and the *Studium*. This allows users to understand the changes over time in the disciplinary profile of the *Studium*, the relevance of the different teaching subjects and the importance of individual teachers.

I would like to conclude this brief presentation of the *Onomasticon* database by recalling the research group that works on the database, allowing continuous evolution in structure and contents: in addition to the authors of this contribution, the *Onomasticon* research group includes Carla Frova, Regina Lupi, Marco Menzenghi, Alessandra Panzanelli Fratoni and Ferdinando Treggiari. Collective decisions regarding the database are made by the group as a whole, with members contributing both collaboratively and individually. Specifically, Giulio Quaresima created Onomasticon 2.0 and updated and implemented it from a technical point of view. Marco Menzenghi entered most of the database information, implemented the Bibliography section, and numerous biographical entries. Carla Frova and Stefania Zucchini have contributed to the analysis of the database as domain experts and are currently focusing on refining sections pertaining to sources and presenting data in graphical and cartographic formats. Regina Lupi enhances entries and research tools concerning the modern era, while Alessandra Panzanelli Fratoni and Ferdinando Treggiari are setting up the new section dedicated to works.

Since 2011, together with the main European databases on university history, the *Onomasticon* project has been part of the Héloïse network and the group's researchers have participated actively in all of the Héloïse ateliers.[11]

[10] Onomasticon (unipg.it) (accessed: 18-10-2024).
[11] Atelier Héloïse | European Network on Digital Academic History (hypotheses.org) (accessed: 18-10-2024).

2. The Onomasticon webapp

2.1 Brief history

The first version of the Onomasticon project was coordinated by Prof. Carla Frova and released during the celebrations of the seventh-century foundation anniversary of the University of Perugia in 2008. The first version, developed by Fabrizio Ortolani, formerly of the IT division of the University of Perugia, was a Java 5 Servlet 2.4 (JSR 154) web app built upon a relational data model backed by a MySQL 5 DBMS. Since 2009, the maintenance of the web app and the database has been assigned to Giulio Quaresima, also of the IT division of the University of Perugia.

After joining the Héloïse Network in 2011, the need of a complete redesign and technological update of the web app arose, so version 2 of the web app and database was planned and then released in 2015. This brand-new version 2 is also a Java web app, updated to Java 8 and to the 3.0 version of the Servlet spec. (JSR 315), but in this version, some frameworks have been adopted, remarkably Spring MVC 4 and Bootstrap 3. The main difference from the first version is the complete refactoring of the domain model to a new graph-based data model, backed by an embedded OrientDB 2.1 multimodal DBMS: a graph data model provides much more agility to the model designer in terms of establishing and refactoring associations between entities, easing the design and the evolution of complex graphs of relationships. Furthermore, in graph DBMSs associations traversal has a theoretical complexity of *O(n)*, compared to the *O(n log n)* complexity of the relational joins when indexed, so the modeler is encouraged to build deep graphs of relationship without fearing performance deterioration.

Many prosopographic and historical databases are implemented using general-purpose software, either in an on-premise or in a SaaS/cloud installation, configured and/or customized to match, as far as possible, the scientific goals of the project. The Onomasticon database and its front-end, on the contrary, since the first version has been designed and developed from scratch to perfectly fit the scientific purpose of Onomasticon and the historical documents and resources on which it is based on.

Such a choice has, of course, its pros and cons. On the pros side, let us say that an ad hoc product can be designed to do exactly what one need it to do, and can be easily evolved to add new features and to be integrated with other products and systems. On the cons side, one should consider the greater startup effort and the need for a dedicated development team to make it up, besides the lack of support that a community (in the case of open-source software) or a company (in the case of licensed software) can provide, especially in a medium- or long-term perspective.

In this version 2, particular attention has been paid to accessibility: a very active user of Onomasticon, a member of the advisory committee, is visually impaired. This user interacts with the Onomasticon user interface (UI) with the

aid of a screen reader: thanks to their constant support and feedback, during the development of the UI any accessibility issue is promptly detected and resolved.

2.2 The model

The Onomasticon domain model is composed of entities glued together by associations and inheritance relationships: in the corresponding graph model, entities are vertices (or nodes) and associations are edges, while the inheritance relationships are naturally implemented in Java because it supports class inheritance as any other object-oriented programming language1. An entity is defined by its parents, its attributes, and its associations with other entities: associations (edges), also, may carry their own attributes, but this feature is rarely used here.

2.3 Historical data

If we observe the model from a class hierarchy point of view, there is a class named VCommon which is the ancestor of all the vertices' class hierarchy. A direct child of VCommon, named VDatoStorico, is the common parent of all the classes representing any kind of historical data we want to model and store: some of them represent concrete or abstract entities such as persons, places, disciplines, *nationes*, etc., some other represent *factoids*[12] about entities of the first kind. All the instances of VDatoStorico are characterized by the fact of having an identity and, optionally, one or more names and a time reference.

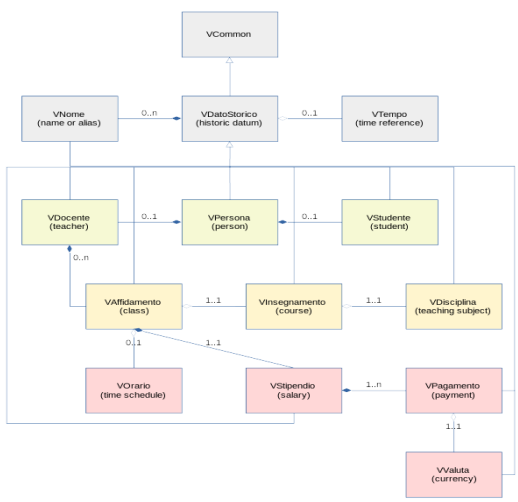

Figure 1: Class diagram of a subset of the model

[12] https://www.kcl.ac.uk/factoid-prosopography/about (accessed: 18-10-2024).

A subset of the model representing teachers and courses held is an example of how the Onomasticon model is structured. Figure 1 shows the UML of a subset of classes, all of them subclasses of VCommon through VDatoStorico, and includes classes needed to model generic persons and their characterization as students and/or teachers. Teachers are persons with one name – or more as aliases – who may teach one or more classes; each class is an instance of a course regarding a teaching subject and has a time reference (academic year through VTempo), a time schedule, and eventually an optional salary defined in terms of payments. Each class represents a kind of vertex in the graph, while aggregations and compositions (the connectors with an empty or filled diamond) set the possible edges between them.

The class structure constrains how data can be inserted in the graph database and gives meaning to it. Figure 2 shows how this class structure is translated into a graph representing the following fact:[13] Figure 2:

> there was a person named "Salustius domini Guilielmi", also known as "Sallustio da Perugia" and "Sallustio Sallusti", who was a teacher, lectured (Lettura) common law (*Diritto Civile*) in the academic year 1415–16, in the mornings (*di mattina*), with a salary of 100 *fiorini*, 16 *soldi* and 6 *denari*, plus an extra payment of 10 *fiorini*.

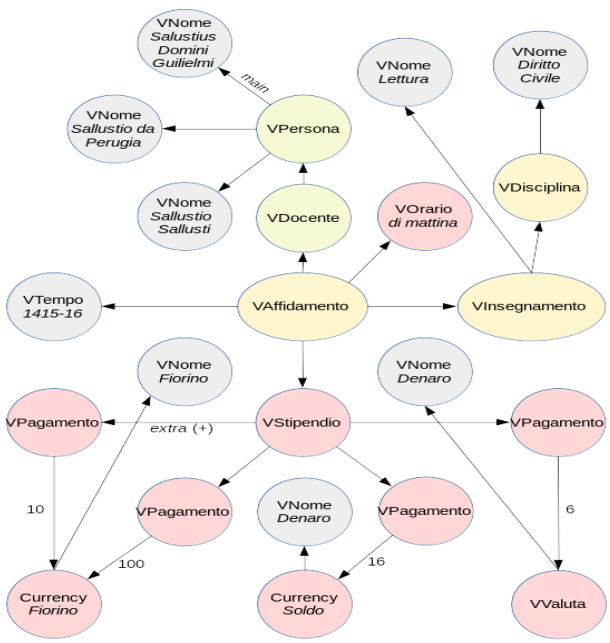

Figure 2: Actual class held by a teacher

[13] There is some information thatis not explicitly stated in the graph data but is deducted from the context: for example, the fact that each teacher taught at the University of Perugia is implicit by the scope of the Onomasticon database.

2.4 Historical resources

Another homogeneous subset of the model represents the resources used by the historian, specifically the sources of the historical information stored in the database: compared to the kind of information described in the previous paragraph, historical resources can be regarded as a type of metadata. There are two types of historical resources: scientific publications and historical sources (Figure 3), the latter being, mostly, documentary sources conserved in archives and libraries. Further associations between publications and sources may be established to express the fact that a publication is the edition of one or more documents.

A recent update of the database has introduced a tree structure for the historical sources, useful to describe its detailed composition, so the user can establish a fine-grained connection between single documented facts (for example the data described in Figure 2) and the exact parts of each documentary source that document them.

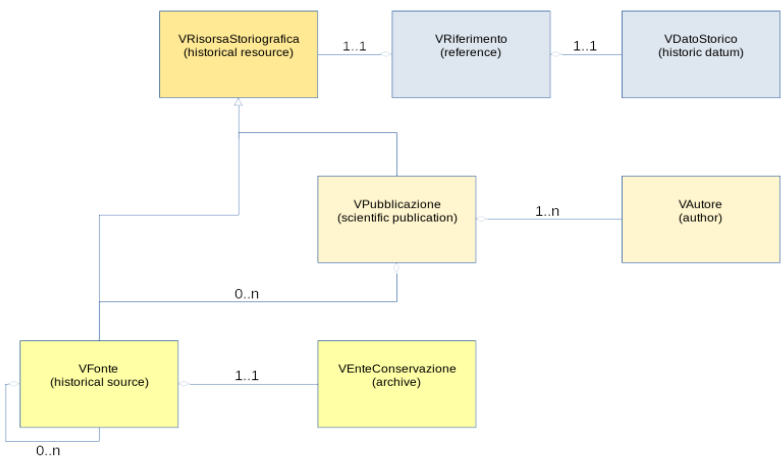

Figure 3: Class diagram of the Historical Resources submodel

2.5 Authorities and external references

The possibility to link historical data to authority files or other kinds of external references is one of the latest features introduced in the Onomasticon database. The model structure theoretically allows the connection of any

historical data with any kind of external resources but, at the moment, only six external resources regarding persons are supported:[14]

- Dizionario Biografico degli Italiani
- ISNI (International Standard Name Identifier)
- IVS Commune *online*
- RAG (Repertorium Academicum Germanicum)
- VIAF (Virtual International Authority File)
- Wikidata

References to Wikidata items are particularly useful, because Wikidata records usually provide links to other authority files so when a Wikidata ID for a person is provided, Onomasticon can automatically obtain the IDs for the other supported authorities, if available, leveraging the Wikidata Toolkit APIs.

2.5.1 IVS Commune *online*

One of the external resources referenced by Onomasticon is IVS Commune *online*,[15] an online database focused on works and editions of legal texts from the medieval to the early modern age, where Maria Alessandra Panzanelli Fratoni, Associate Professor at the University of Turin is editor-in-chief. The Onomasticon Advisory Committee, of which Prof. Panzanelli Fratoni is a member, decided to establish communication between the two databases. The original domain model of Onomasticon did not include the works of the teachers, while IVS Commune is focused on them, so the Onomasticon model has been enriched with a dedicated entity for teachers' works. The link between persons in the two databases is automatically established through the ISNI and VIAF identifiers, supported by both databases: when a user opens the page of a teacher in Onomasticon, if this teacher has an ISNI or VIAF record associated with them, IVS Commune is queried via its REST API to search that record: if the same teacher is found, Onomasticon pulls the updated list of its works from IVS Commune and publishes it, with links to the corresponding IVS Commune's pages. To avoid an excessive number of requests, the list of works is automatically updated only when a user visits the teacher's page and if at least 24 hours elapsed since the last update.

3. *Problems to be solved and challenges for the future*

In recent years, the *Onomasticon*'s research team has focused on the problems faced over the years and on future challenges.
The main problem related to the contents of the database lies in the nature and reliability of the data itself, deprived of its context and of any historiographical reflection which characterise traditional research works. We reported this and other problems and challenges at the "Heloise" 2020/21 workshop in Bologna

[14] With the exception of IVS Commune *online*, for which also references to teachers' works are supported, as we will see below.
[15] https://www.iuscommuneonline.unito.it/ (accessed: 18-10-2024).

and at the Heloise 2022 workshop in Paris, proposing a series of solutions, which we have started to apply.[16]

In particular, at the workshop in Bologna, the use of computer science as a tool for analysing historical sources and more broadly the use of methods and resources of Computer Science in historical research were addressed.

When databases are made available online, they offer users access to a wealth of information. This information can certainly be aggregated, but they remain somewhat decontextualized. Indeed, this information often lacks the comprehensive insights derived from historiographical research, including the associated historical interpretations. These interpretations encompass various aspects such as dynamics, trends, student and faculty demographics, as well as the evolving interactions with political and religious entities. These interpretations encompass various aspects such as dynamics, trends, student and faculty demographics, as well as the evolving interactions with political and religious entities. This absence, limiting in itself, becomes even more harmful when the data presented in the database do not come from a reliable source but rather from a historiographical interpretation which is not accounted for, except with a brief bibliographical reference.

In this case, it is not a material error in reporting information, but rather a distortion caused by the need to fit information into a certain schema.

Building upon these overarching reflexions, the *Onomasticon* research group has begun to work concretely on four specific issues: reduce the number of clerical errors when entering data; reduce the margins of distortion of graphs and maps deriving from heterogeneous data by origin and nature; highlight the level of reliability of each information contained in the database; link database information with external resources.

With regard to the first issue, it is important to note that from the very beginning of the project, there has been a deliberate choice to permit online data entry into Onomasticon at any time. This deliberate decision prioritizes the dynamic nature of a work in progress over stringent and conclusive control of the entered information. Moreover, the absence of a hierarchical structure of interventions ensures that all operators have the capability to amend, augment, or remove information as required across the whole of the database. In order to identify the origins of errors or potential inaccuracies, a set of control mechanisms, such as private notes and change history, have been

[16] During the Xth Heloise Workshop held in Bologna on March 29–30, 2021, themed "Universities in Europe: common contexts and local peculiarities through source analysis (origins – 20th century)", Stefania Zucchini delivered a presentation entitled "Informatica e critica storica: una riflessione sull'uso dei database per la ricerca e la divulgazione storica". Additionally, at the XIth Heloise Workshop in Paris on May 12–13, 2022, focused on "Digital Academic History and the Challenge of Uncertainty," Stefania Zucchini contributed with a presentation titled "At the Origins of Databases: The Data, Their Interpretation, and Representation. Solutions Adopted in 'Onomasticon: Prosopography of the University of Perugia'". See: Schedule: XIth Heloise Workshop, 12–13th May 2022, Paris | Atelier Héloïse (hypotheses.org);
Xth Heloise Workshop 29 – 30 March 2021, Bologna | Atelier Héloïse (hypotheses.org) (accessed: 18-10-2024).

implemented and refined. These mechanisms do not directly impact the errors themselves; rather, they enable the identification of contributors to the modifications and facilitate the reconstruction of the genesis of errors.

In addressing the interaction between computer science and historical criticism, attention was given to the challenge of partially restoring the critical and interpretive dimension to the individual information within a prosopographical database. The intrinsic nature of a database, functioning as a structured repository of information separated from its original context, presents a potential challenge in maintaining the critical interpretative dimension, that is typical of historical reconstruction. Particular focus was therefore directed towards reinstating the critical dimension of information, beginning with the acknowledgment that the presented data may lack certainty or originate from indirect sources or conjectural historiography. This aspect holds significant importance, especially when dealing with data sourced from a single or mutually dependent set of historical accounts, potentially distanced in time from the events they describe.

Another problem, again relating to the interpretation of facts and phenomena, is represented by the use of heterogeneous and discontinuous sources for the creation of maps and graphs with the risk of producing a distorted representation of reality. Consequentially, during the data processing phase using graphs and maps, uncertain information or data sourced from vastly different origins should ideally be excluded from the dataset under consideration. This to ensure that the type of data used is as uniform and reliable as possible. Currently, efforts are underway to enhance the reliability of such representations, however, a solution to acquire automatically homogeneous and thus comparable data has not been found yet.

In addition to selecting homogeneous sources for building graphs and cartographic representations, a very useful tool for reconstructing the context of information production and processing is represented by the possibility offered to users to directly access sources and bibliographies already available online and to connect with other databases.[17]

In summary, our research team identifies the upcoming challenges as twofold: ensuring database users with reliable information and interpretations and reconstructing a solid historiographical context. The promotion of connections between different resources within the network, with projects within the Héloïse network playing a leading role due to their scientific compatibility and interoperability, plays a crucial role in reaching these goals.

[17] For further information, refer to paragraph 2.5 above.

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