ALT Explored: Integrating an online dialectometric tool and an online dialect atlas

Martijn Wieling*, Eva Sassolini*, Nella Cucurullo*, Simonetta Montemagni*

*University of Groningen, CLCG – Netherlands
+Istituto di Linguistica Computazionale – CNR – ITALY

{m.b.wieling@rug.nl; eva.sassolini, nella.cucurullo, simonetta.montemagni@ilc.cnr.it}

1. Introduction
This paper presents the integration of an online dialect atlas together with an online application for dialectometric analyses. By integrating these two systems, the user is not only able to conduct a qualitative fine-grained analysis of the data via the online dialectal resource, but is also able to effortlessly obtain a quantitative aggregate view of (subsets of) the data.

The dialect atlas is the Atlante Lessicale Toscano (ALT; Giacomelli et al., 2000), a specially designed linguistic atlas focusing on dialectal variation within Tuscany and in which lexical data have both a diatopic and diastratic characterization. The online resource, ALTWeb1 (Cucurullo et al., 2006), provides facilities to inspect the data at the level of the individual question items and/or individual locations. However, facilities to carry out aggregate analyses of the data are not available, and visualization options are limited (see e.g., Figure 2 of Cucurullo et al., 2006).

The online application Gabmap2 (Nerbonne et al., 2011; Leinonen et al., forthcoming) has been developed by the University of Groningen in the framework of CLARIN-NL as an accessible open source web application to analyze language variation data. Gabmap allows both aggregate dialectometric analyses and data inspection at the level of the individual items.

In the following sections, we illustrate how we have integrated the two systems and highlight the functionality of the new system, dubbed ALT Explored. With ALT Explored linguists and dialectologists will be able to explore, quantitatively and qualitatively analyze and visualize ALT data in order to support their research. Furthermore, this study can be seen as an example of integration of resources and services within the pan-European CLARIN ERIC infrastructure. Whereas Gabmap is already part of CLARIN, ALT-Web will be integrated soon, thanks to the recent participation of Italy in CLARIN.

2. Background

2.1 Atlante Lessicale Toscano
The interviews of the Atlante Lessicale Toscano (ALT; Giacomelli et al., 2000) were conducted between 1974 and 1986 in 224 localities in Tuscany, with 2,193 informants selected with respect to various parameters, including age, socio-economic status, education and culture. The interviews were carried out on the basis of a questionnaire of 745 target items, designed to elicit variation mainly in vocabulary, semantics and phonetics. A dialectal corpus with these features lends itself to investigations concerning geographic or horizontal (diatopic) variation as well as social or vertical (diastratic) variation (see Wieling et al., 2014 for an example). ALT Explored focuses on both dimensions of linguistic variation.

Tuscany is a region which has a special status in the complex puzzle of linguistic variation in Italy. In Tuscany both Tuscan as well as non-Tuscan dialects are spoken. Specifically, Gallo-Italian dialects are spoken in Lunigiana and in small areas of the Apennines. Tuscan dialects are spoken in 213 out of the 224 investigated locations (with a total of 2,060 informants).

Each informant responded to a total of 460 onomasiological (eliciting a lexical item for a concept) and 285 semasiological (eliciting a meaning for a word form) questions. In what follows, we will focus on the subcorpus of answers to onomasiological questions.

1 http://serverdbt.ilc.cnr.it/altweb/
2 https://www.gabmap.nl/
2.2 ALT-Web

ALT-Web contains the digitized responses to all 745 onomasiological and semasiological questions. In ALT-Web, all dialectal responses are assigned different levels of representation, with a first level rendering the original phonetic transcription and other levels containing normalized representations of the original form encoded in standard Italian orthography. In this multi-level representation model, dialectal data are encoded in layers of progressively decreasing detail going from phonetic transcription to different levels of normalized representations abstracting away from details of speakers’ pronunciation. For the phonetic transcription, the Carta dei Dialetti Italiani (CDI) transcription system (Grassi et al., 1997) was used.

In what follows, we will focus on the phonetic and normalized representation levels. For what concerns the former, the CDI representation was automatically converted to the International Phonetic Alphabet (IPA) on the basis of 158 ordered conversion rules encoded as regular expressions. Concerning the latter, the most abstract normalized representation was selected, i.e. the representation level abstracting away from productive phonetic variation within Tuscany and mainly reflecting lexical and (limited) morphological variation.

ALT-Web provides flexible and dynamic query facilities which permit the user to interactively access the corpus of dialectal data and to navigate through it on the basis of his or her research interests. Information can be accessed and retrieved on the basis of a wide range of parameters which can be flexibly combined. For example, lexical data can be queried on the basis of the question, the location, and/or the socio-economic features of the informant(s). Furthermore, questions can be filtered on the basis of their relevance with respect to a given semantic field or linguistic register. ALT-Web also contains a basic geographical visualization facility providing for each answer presence/absence maps. Frequency information is thus not taken into account in this visualization. More details about ALT-Web can be found in Cucurullo et al. (2006).

2.3 Gabmap

Gabmap (Nerbonne et al., 2011; Leinonen et al., forthcoming) is an online web application for conducting dialectometric analyses. Besides enabling a researcher to conduct aggregate analyses (such as cluster analysis, or visualizing the data using multidimensional scaling) of dialect data, Gabmap also offers facilities for visualizing and inspecting the original data. All visualizations can be downloaded as vector or bitmap graphics. Gabmap has been positively evaluated by Snoek (2014: 206): “Gabmap is excellent software that permits the mapping and comparison of linguistic data in a fast and generally painless manner”.

To use Gabmap, a free account needs to be created. After logging in, language variation data can be uploaded and the results of the dialectometric analysis can be inspected. The data file should contain the transcribed pronunciations (or lexical variants) of all items in each location. In addition, a mapping file (i.e. a kml file) with the geographical coordinates of each location as well as the outline of the dialect region is necessary to adequately visualize the results on a map.

3. Design and functionality of ALT Explored

As Gabmap is available as open source software, we have customized the original source code to allow for the integration with ALT-Web. The changes can be classified in three categories, which are illustrated in the following subsections.

3.1 Custom Gabmap projects

The first change involved the creation of four custom Gabmap projects on the basis of the dataset containing all answers to the onomasiological ALT questions. We created four projects to represent both the phonetic data (converted to IPA) and the normalized data, both for all locations in the ALT dataset (224) and for the subset of 213 locations where a Tuscan dialect is spoken. For this purpose the ALT-Web data was converted to the tabular form required for Gabmap and the appropriate mapping files including the locations were created. In each location, the pronunciation (or normalized form)

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3 https://github.com/coltekin/Gabmap
of each individual speaker was retained. Note that a relatively similar customization of Gabmap has been made for another dataset containing English lexical variation (i.e. BBC Voices explored, Wieling, 2013). The four individual projects can be accessed directly via the links at http://www.gabmap.nl/~alt (see Figure 1).

3.2 Integration of Gabmap distribution maps
The second change involved the extension of the Gabmap application by allowing direct (url) access to the distribution maps. Consequently, when the user supplies both the question item and the variant as url parameters, the corresponding distribution map is shown visualizing the relative frequency of use of the variant throughout Tuscany. This functionality is in the process of being integrated in the ALT-Web application and will replace the original ALT-Web visualization, which does not allow for the visualization of relative frequencies. As the ALT-Web application uses a different transcription system than Gabmap, the CDI to IPA conversion script (see above) is used here to convert the CDI transcription of individual items (transmitted via the url) to the IPA transcription used in Gabmap. For example, the CDI transcription [suSi8na] (a dialectal variant of susina, ‘plum’) would be converted to [suz’ina] in IPA. Figure 2 visualizes the distribution map of this variant, which can be viewed online by using the following url:

http://www.gabmap.nl/~alt/bin/accountALT?action=ALT&username=tmpALT&description=Bantu&kmlurl=http://www.gabmap.nl/~app/examples/Bantu.kml&dataurl=http://www.gabmap.nl/~app/examples/Bantu.utxt

3.3 Inspection of custom-generated data
The final change involved creating a second direct url-based interface to Gabmap. The purpose of this interface was to allow a user to inspect language variation data in (a temporary account in) Gabmap, without the need for creating an account or manually uploading data (but instead by simply clicking a link). Clearly, this interface facilitates the integration of Gabmap in online repositories of dialect atlas data, such as ALT-Web. For example, ALT-Web is currently in the process of being adapted to allow users to analyze custom subsets of ALT data in Gabmap. Each subset is created on the basis of setting specific filters. The current filters allow the user to specify the age range, the gender, the job type and the education level of the speaker, the province(s) in which the locations should be located, and the semantic field(s) of the questions included. After setting one or more filters, the ALT-Web application creates the appropriate Gabmap datafile (transcriptions are converted to IPA), stores it on the ALT-Webserver and generates a direct link to Gabmap. When the user clicks on this link, the data is uploaded to Gabmap, and the resulting analyses can be directly inspected in a temporary Gabmap account. As the integration in ALT-Web is still under construction, the following example url illustrates this functionality with a different dataset (in the final version of this paper, a url from ALT-Web will be used):

http://www.gabmap.nl/~alt/bin/accountALT?action=ALT&username=tmpALT&description=Bantu&kmlurl=http://www.gabmap.nl/~app/examples/Bantu.kml&dataurl=http://www.gabmap.nl/~app/examples/Bantu.utxt

4. Conclusion
The main contribution of this this work can be summarized as follows. From the perspective of on-line digital (dialect atlas) resources such as ALT-Web, the integration with Gabmap in ALT Explored provides quantitative analyses which were not possible before. From the perspective of Gabmap, the flexible extensions represent a unique opportunity to become the visualization and exploration tool for an entire linguistic atlas.

While the two online applications are both useful in their own right, their integration becomes more than the simple sum of the two parts. Within ALT Explored, the dynamic combination of macro- and micro-analysis, or to put it in Moretti’s words of “close and distant reading”, allows the dialectologist to alternate between views of the data, zooming in and out, searching for large-scale patterns and then focusing on fine-grained analyses. The combination of close and distant reading of textual data is becoming more and more important in the field of digital humanities. To our knowledge, our contribution represents the

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4 http://www.gabmap.nl/voices
first attempt in this direction in the sub-area of digital dialectology.

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Figure 1. Four custom Gabmap projects in ALT Explored.

Figure 2. Distribution map of [suz’ina] for the concept susina, ‘plum’. Darker colours indicate a greater relative frequency of use.