Distant reading Brazilian politics

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Abstract. In this paper we propose the use of digital humanities tools to "read" and obtain aggregated information on Brazilian politics. After presenting briefly the resource and its annotation, we describe the kinds of searches already possible, our work for grounding human entities, and some results on family relationships among Brazilian politicians.

Keywords: information extraction · Portuguese · Brazilian history

1 Introduction

The intricate relationship between traditional practices of recording knowledge and new technologies is the indelible mark of the Digital Humanities (DH) movement. They incorporate the methods and issues developed by the human and social sciences, while mobilizing the unique tools and perspectives opened by digital technology [12]. In the area most closely linked to language and literature, where there are millions of digital collections to study, observations made at a distance and from various perspectives are only possible with the aid of computers and statistical techniques capable of reducing the literature to a set of interesting and manipulable data. In this sense, work with annotated corpora in order to automate (and therefore eventually obtain) information like characters, plot, or events, is becoming mainstream. In this paper, we describe some work in this vein, concerning a Brazilian resource named *Dicionário Histórico-Biográfico Brasileiro*, DHBB for short. Although coined as "dictionary", DHBB has an encyclopaedic format, with long entries written by experts, describing relevant actors in Brazilian history. It is a reference work and, as such, it is not intended to be read in a linear (or conventional) way, but to be consulted instead. Within the scope of Digital Humanities, with its tools, methods and resources, to get the vast amount of information spread among DHBB pages in a structured way is a challenge as desirable as predictable. The following sections present the strategies and results obtained so far.

2 The Dicionário Histórico-Biográfico Brasileiro

DHBB is an encyclopedia developed and curated by Centro de Pesquisa e Documentação de História Contemporânea do Brasil, from Fundação Getulio Vargas (FGV), and is an important resource for all research, nationally and internationally, interested in post-1930 Brazilian politics [1]. It contains information ranging from the life trajectory, education and career of the individuals, to the relationships built between the characters and events that the country has hosted.

DHBB was first published on paper in 1984, in four volumes containing 4,500 entries. In the 2001 update, the resource was increased by one more volume reaching a total of 6,620 entries, and in 2010 its material was made available on the internet, with about 7,500 entries. Currently the DHBB holds ca 7,700 entries and is continually updated and improved[8]. The information system has the following structure: per entry, its designation, the kind of entry (biographical or thematic), and the text in a text field. The process and rationale of releasing this content from the database and converting it to full text aiming at natural language processing are described by [8] and [9]. Each entry became a single file that received a unique identifier, and new metadata were added, such as the gender of the biographed and the political role s/he had. All text files are available from github.[9]

In 2018 we converted DHBB into an annotated corpus, subject to syntactical analysis by PALAVRAS [2] and semantic annotation by AC/DC[10] [5], and made it available through Linguateca's site[11].The DHBB resource was thus enriched with syntactic and semantic information, quite useful for doing historical research.

2.1 General characterization of the corpus

In this section we give some figures about DHBB's content. Some of it comes directly from the metadata associated with the previous versions, other cases are a direct consequence of being in an annotated form. As we are still in a preliminary phase of work, it is possible that some of these numbers will change with time, but they are already good indicators of the richness of the material.

The universe we are working on from the DHBB comprises 7,685 entries. Our intention is that as new entries are included, then updated new versions of the DHBB will be made available at Linguateca as well. So the current version (v 2.3) corresponds to 314 thousand sentences, 9.8 million words and 156 thousand different lemmas. More than 1.6 million tokens refer to proper names, 117,993 different ones. Of those, roughly 48,500 have been analyzed as person names,

[8] Oficial webpage: `https://cpdoc.fgv.br/acervo/dhbb`

[9] Available at `https://github.com/cpdoc/dhbb`.

[10] The AC/DC project has as goal to annotate and make public corpora in Portuguese since 1999, and provides a search service that allows complex searches on words, morphosyntactic and semantic information. See [10] for more information.

[11] Available at `https://www.linguateca.pt/acesso/corpus.php?corpus=DHBB`

27,500 as organization names and 5,000 as places names by PALAVRAS (besides events, holidays, titles of books and films, etc). There are 6,717 biographical entries, the rest being thematic. Table 1 shows an overview of the roles present in DHBB (the same person can, of course, have more than one role throughout her life), demonstrating its relevance.

Table 1. Description of DHBB in terms of political roles.

Role or job	occurrences
Presidentes do Brasil (presidents of Brazil)	26
Ministros (ministers)	776
Ministros do STF (judges of the highest court)	96
Ministros do STM (judges of the highest military court)	118
Senadores (members of the Senate)	627
Deputados Federais (members of the Chamber of Deputies)	3,835
Militares (Army officers)	704
Participantes de revoluções (revolution participants)	368
Jornalistas (journalists)	196

2.2 A rich source of information

In the late 1980s, a study conducted by Michael Conniff [3] and [4] with a sample of 7% of the entries (about 250 biographies at the time), enabled him to locate important changes concerning age, education, social class and geographical origin in the Brazilian political elite by close reading all these entries.

By extracting manually the information he was after, he was able to map several interesting features of this elite. For example, in the beginning of the twentieth century, most Executive members were middle-aged or older men, who typically entered political life as second career, after having had other jobs. Later on, those who aim for a political career get increasingly younger. On average those born before 1900 start at 55, those born between 1901 and 1920 start at 37, and the ones born after 1921 start at 32 years old. As to formal education, the most common one is Law (44%) followed by military education (32%). Engineers and doctors follow with 12% and 5% each. The most definite change spotted by Conniff is the decline in military careers of politicians: while for those born before 1920, 37% had military education, for the ones born after 1920 only 10% had. Until now, if a researcher is interested in e.g. the question of 'how did military politicians enter politics in Brazil, through revolution or legally?' s/he has to read every relevant entry. The same happens for the questions 'what is the path most frequently followed to attain the presidency?' or 'where do the highest military judges (*ministros do Superior Tribunal Militar*) come from in terms of regions/states in Brazil after 1965?' or even 'what is the average age for a judge to enter the Supreme Federal Court?'

By annotating the free text with morphosyntactic information and several semantic domains, we hope to be able to get most of this information automatically. In DH terms, one could describe this as distant reading [6] for history.

3 Enhancing the DHBB with further relevant information

In addition to the usual information in an AC/DC annotated corpus, we concentrated on named entity recognition. In particular, for this resource, the recognition of person names, places, organizations and political roles. Most of this is already provided by PALAVRAS, and we just checked whether there were systematic problems that should be corrected. (For example, names like *Eugênia Lopes de Oliveira Prestes de Macedo Soares* have been wrongly tokenized as two proper names instead of one – *Eugênia Lopes de Oliveira Prestes* and *Macedo Soares* –, but this is easy to correct with our rule-based tools for corpus annotation revision, described in [11]).

In addition, and due to the fact that the same politician can be referred to in several ways, especially in a context where s/he has been named before, we decided to do entity grounding: we want to assign to each person name the entity identifier it refers to, using as unique 'identifiers' the entry labels (see section 3.1 below). Also, we added information relative to family relationships to this corpus, as yet another relevant type of semantic information. We detail the processing done in the next subsections.

3.1 The grounding process

There are many more cases of distinct proper names than distinct human entities, and we want to identify who is who (i.e., to which entity they refer). So we created an attribute `entidade` that contains the entry identifier which describes that person in DHBB, and we try to assign it to all proper names which do have a "definition" in DHBB.

Table 2. Examples of correspondence rules, that indicate the right identification to proper names which do not use the entry name in DHBB. Proper names with more than one word are coded with the "=" sign instead of space in the lemma.

AC/DC lemma	Full name as entry in DHBB (`entidade`)
Aécio=Neves	Aécio Neves da Cunha
Alencar=Castelo=Branco	Humberto de Alencar Castelo Branco
Anthony=Garotinho	Anthony William Matheus de Oliveira
Getúlio=Vargas	Getúlio Dornelles Vargas
Lula	Luis Inácio da Silva

So our task is to annotate the different human proper names in the texts so that, if they refer to someone defined in DHBB, they receive the corresponding

`entidade`. Of course, there is a lot of people (spouses, parents, etc.) which are mentioned in a biographical entry but are not necessarily politicians with a DHBB entry. In cases where such people have to be mentioned in rules (see below), they are assigned the label `NV`, which stands for "*não verbetado*" (not an entry). If some people are very often mentioned in the DHBB but have not an entry of their own, they may be good candidates for future inclusion.

The semi-automatic grounding process is as follows. First, we annotated those proper names which are exactly equal to the entry form (usually the full name). This allowed us to ground at once 89,937 words. Then, we produced a (first) list of 116 correspondance rules in the form illustrated in Table 2, and managed to increase the number of grounded proper names to 147,085. In a second iteration, adding 71 new correspondences, we obtained 166,059 cases.

Another problem concerning proper names is that they can refer to different people, as Table 3 shows.

Table 3. Proper names of people including the word *Vargas* (excluding therefore organizations like *Fundação=Getulio=Vargas*).

Proper name	ocurrences
Vargas	3609
Getúlio=Vargas	1735
Ivete=Vargas	96
Benjamim=Vargas	52
André=Vargas	33
Lutero=Vargas	27
Alzira=Vargas=do=Amaral=Peixoto	18
Jorge=Vargas	9
Manuel=do=Nascimento=Vargas	7
Israel=Vargas	7
Manuel=Vargas	7
Darci=Vargas	6
Viriato=Vargas	6
Alzira=Vargas	5
Protásio=Vargas	4
Getúlio=Dornelles=Vargas	4

We could explore the following heuristic for ambiguous terms: mostly a shorter form will refer to the entry subject. For example, in the case of the string *Vargas* when located within the entry José Israel Vargas, it should be referring to this very person. Nevertheless, this is not always the full story because exceptions can occur. For instance, the entry of Alzira Vargas do Amaral Peixoto mentions *Vargas* to refer to Getúlio Dornelles Vargas, a very influential Brazilian president (in 1834-1945 and 1951-1954) and also her own father. So, after a manual check, we have implemented a specific form of correspondance

rules which includes exceptions, as displayed in table 4. The rules should be read as "designation X receives grounding entity Y if it appears in entry Z".

Table 4. Cases where the shortest form of the name corresponds to the entry name and cases where it does not.

AC/DC lemma	entry where it appears	correspondence entry name (`entidade`)
`Vargas`	Getúlio Dornelles Vargas	Getúlio Dornelles Vargas
`Vargas`	José Israel Vargas	José Israel Vargas
`Vargas`	Alzira Vargas do Amaral Peixoto	Getúlio Dornelles Vargas
`Vargas`	Benjamim Dornelles Vargas	Getúlio Dornelles Vargas
`Vargas`	Lutero Sarmanho Vargas	Getúlio Dornelles Vargas

Finally, another task that we foresee is doing (easy) anaphoric reference resolution by taking into consideration the person who is being biographed. In the following examples, the underlined proper names refer to the main entry, in bold.

> **Getúlio Dornelles Vargas** nasceu em São Borja (RS) no dia 19 de abril de 1882, filho de Manuel do Nascimento Vargas e de Cândida Dornelles Vargas. Vargas era descendente de uma família politicamente proeminente em São Borja, região de fronteira com a Argentina, palco de rumorosas lutas no século XIX. O pai de Getúlio, Manuel do Nascimento Vargas, combateu na Guerra do Paraguai, distinguindo-se como herói militar.

> ***Getulio Dornelles Vargas*** *was born in Sao Borja (RS) on April 19, 1882, son of Manuel do Nascimento Vargas and Candida Dornelles Vargas. Vargas was a descendant of a politically prominent family in Sao Borja, a region bordering Argentina, where rumorous struggles took place in the 19th century. Getúlio's father, Manuel do Nascimento Vargas, fought in the Paraguayan War, distinguishing himself as a military hero.*

3.2 Family relationships

One semantic domain that we are especially interested in can be illustrated by the generic question 'How many politicians in the last decades belong to a family of politicians?' In Brazil there are powerful families since the colonial period which can be said to form political dynasties. By pushing their children and relatives to the parliament and the senate, they have been analysed as strong power-maintaining devices [13], [7]. Has this phenomenon increased, or decreased, lately? Does this practice only concern rich families of the periphery, or has it also pervaded other less traditional groups? We know this information is diluted in the thousands of DHBB entries, and we have started to add semantic annotation on family relations in order to deal with it.

In AC/DC there are currently several domains that have been subject to thorough annotation (colour, body, emotions, health, clothing), and for DHBB we added family. We created a list of family-denoting words which were integrated in the semantic annotation process, and we are currently creating rules (following the explanation in [11]) to improve and correct the annotation. The lists include 50 family-denoting nouns, 10 family-related verbs and 9 other family-related terms so far.

Even though this is in a preliminary stage, Table 5 shows the most common family relationships in DHBB, while Figure 1 shows in context several cases of family relationships among grounded politicians, using a simple search command.

Table 5. Most frequent family ties in DHBB. The second translation refers to the possible meaning of the plural. Eg. the plural forms *filhos* and *irmãos* can mean respectively children (sons and daughters), or siblings.

Lemma	occurrences
filho (son, child)	9444
pai (father, parent)	1488
irmão (brother, sibling)	1342
filha (daughter)	1144
mulher (wife)	523
tio (uncle)	312
primo (cousin)	287
esposa (wife)	248
mãe (mother)	230
sobrinho (nephew)	186
parente (relative)	172
irmã (sister)	131
marido (husband)	130
avô (grandfather)	116
cunhado (brother in law, in-law)	102

4 Some distant reading

In addition to the family relationships just shown, and by concatenating in a single query the political role conveyed in the metadata, simple lexicosyntactic patterns, and semantic information, it is feasible to search for things such as: a) formal education of the federal deputies (*deputados federais*) elected by a specific location – for example, the state of Rio de Janeiro (Figure 2); or b) their birthplaces (Figure 3).

The results show that we have so far in DHBB 333 politicians who held the position of deputy by Rio de Janeiro at least once, were born in 117 different cities and their most common education background is: law (65), engineering

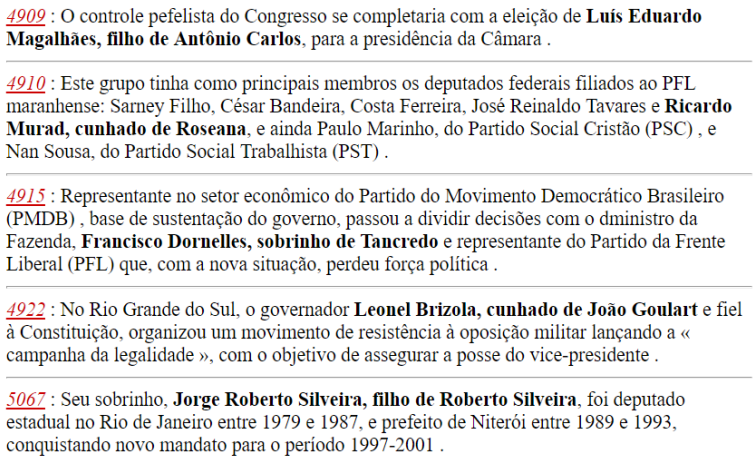

Fig. 1. Getting family relations among grounded entities in AC/DC. This print screen brings in context some of the found relations of kinship among politicians included in the DHBB, using the following search expression: `[entidade="[1-9][0-9]*"]+ "," [sema="parentesco"] "de" [entidade="[1-9][0-9]*"]+ [: entidade!="[1-9][0-9]*" :]`

(15), medicine (11), economics (7) and business school (5), followed by theology (4) and geography(4). When we contrast these results with the formal education of all Brazilian federal deputies, it is interesting to note how close they seem to be or not: geography, for instance, is not a common background in the sum of all deputies, despite appearing in the profile of some of those who held the position in Rio de Janeiro; philosophy, on the contrary, is well represented in the general framework, but not in the deputies from that state.

5 Future work

One of the goals of presenting this resource to a DH community is to get input as to further developments and intelligent ways of reading it distantly.

We plan to extract all sorts of information from DHBB and crosscheck the data with small probes done by close reading.

We plan to annotate other semantic domains that appear relevant to studies of Brazilian politics and that are brought to light by the users, things like political parties, governments and alliances. And, in a longer perspective, we also envisage map-based and chronological visualization capabilities, to endow DHBB users with different ways of interacting, and comprehending the data.

10839 : **Bacharelou-se em direito** pela PUC em 1964 .

10853 : Concluiu o ensino médio no Centro Educacional da Lagoa (CEL) em 1997, e **graduou-se em marketing** pela Faculdade Estácio de Sá em 2004 .

10897 : **Formada em pedagogia** pela SUAM (RJ) em 1986, foi secretária municipal de promoção social em São João de Meriti no mesmo ano .

10903 : De 1987 a 1988 **estudou administração** de empresas na Faculdade São Paulo Apóstolo, mas não concluiu o curso .

10942 : **Bacharelou-se em direito** pela Universidade Federal Fluminense (UFF) em 1991 .

10945 : Professora e funcionária pública, **estudou economia** na Faculdade do Centro Educacional de Niterói (Facen) , mas não concluiu o curso .

Fig. 2. Printscreen with some results in context of the formal education of the federal deputies elected by the state of Rio de Janeiro. Syntactic search expression: `[cargos=".*depfedRJ.*" lema="formar.*|licenciar.*|bacharelar.*|graduar.*|cursar|estudar"][word="em"]* @[pos="N|PROP.*"]`

Rio=de=Janeiro	121
Campos	22
Niterói	15
Nova=Iguaçu	7
São=Gonçalo	6
Petrópolis	6
Porto=Alegre	5
Belo=Horizonte	5
Macaé	4
São=João=de=Meriti	4
Volta=Redonda	4
Duque=de=Caxias	4
Recife	4
Três=Rios	3

Fig. 3. Distribution with the most common birthplaces of the federal deputies elected by the state of Rio de Janeiro. Syntactic search expression: `[cargos=".*depfedRJ.*" lema="nascer"] [lema="em(.*)*"] ([lema="estado|cidade|município"] [lema="de(.*)*"])* @[pos="PROP.*"] [pos="PROP.*"]* [: pos!="PROP.*":]`

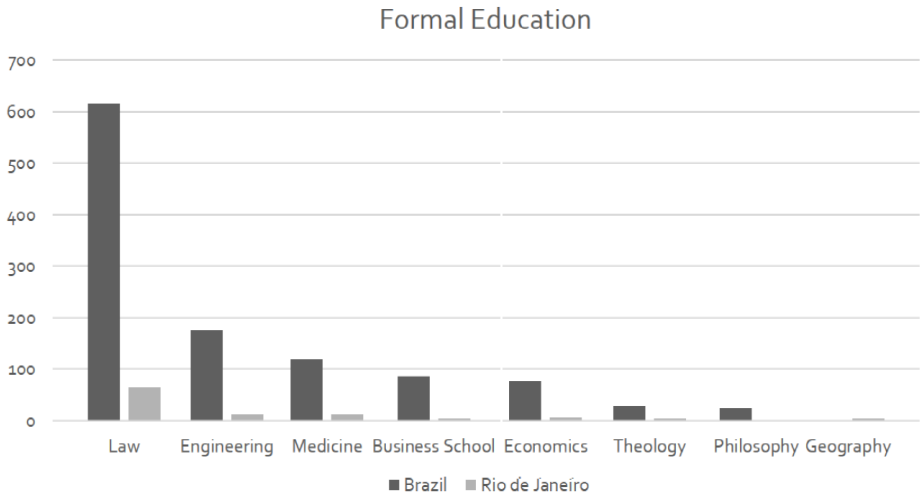

Fig. 4. Formal education of Brazilian federal deputies

References

1. Abreu, A.A.d., Lattman-Weltman, F., Paula, C.J.d. (eds.): Dicionário Histórico-Biográfico Brasileiro pos-1930. CPDOC/FGV, 3 edn. (2010), available at `http://cpdoc.fgv.br/acervo/dhbb`
2. Bick, E.: The Parsing System PALAVRAS: Automatic Grammatical Analysis of Portuguese in a Constraint Grammar Framework. Aarhus University Press (2000)
3. Conniff, M.: O DHBB e os brasilianistas. In: FGV, E. (ed.) CPDOC 30 Anos. Editora FGV/CPDOC, Rio de Janeiro (2003)
4. Conniff, M.L.: A elite nacional. Por outra história das elites. Rio de Janeiro: FGV pp. 99–121 (2006)
5. Costa, L., Santos, D., Rocha, P.A.: Estudando o português tal como é usado: o serviço AC/DC. In: Proc. of STIL 2009) (2009)
6. Moretti, F.: Conjectures on world literature. New Left Review pp. 54–68 (2000)
7. de Oliveira, R.C., Goulart, M.H.H.S., Vanali, A.C., Monteiro, J.M.: Família, parentesco, instituições e poder no brasil: retomada e atualização de uma agenda de pesquisa. Revista Brasileira de Sociologia-RBS **5**(11) (2017)
8. Paiva, V.D., Oliveira, D., Higuchi, S., Rademaker, A., Melo, G.D.: Exploratory information extraction from a historical dictionary. In: IEEE 10th International Conference on e-Science (e-Science). vol. 2, pp. 11–18. IEEE (2014)
9. Rademaker, A., Oliveira, D.A.B., de Paiva, V., Higuchi, S., e Sá, A.M., Alvim, M.: A linked open data architecture for the historical archives of the getulio vargas foundation. International Journal on Digital Libraries **15**(2-4), 153–167 (2015)
10. Santos, D.: Corpora at Linguateca: Vision and roads taken (2014)
11. Santos, D., Mota, C.: Experiments in human-computer cooperation for the semantic annotation of Portuguese corpora. In: Calzolari et al (eds.), Proceedings of LREC 2010. European Language Resources Association (2010)

12. Schnapp, J., Presner, T., Lunenfeld, P., et al.: Digital humanities manifesto 2.0. Hentet **10**, 2016 (2009)
13. Schoenster, L.: Clãs políticos seguem dominando congresso na próxima legislatura. Transparência Brasil. Disponível em http://www. excelencias. org. br/docs/parentes_ pp. 202015–2018 (2014)