



Functional Settlements Ontology: A Proposal

Ontology of Functional Settlements: A Proposal

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Summary

In this work we propose the development of an ontology for functional settlements, which are records of administrative acts involving the functional life of public servants. The proposal aims to facilitate the mining of texts corresponding to administrative acts referring to the human resources of Brasília Ambiental (IBRAM/DF), in a case study involving the respective publications in the Official Gazette of the Federal District and internal Personnel Bulletins. We use the Ontokem tool for documentation, creation of classes and instances, complementing the ontology with Protégé, responsible for refining the ontology. As a result, we verified the feasibility of creating an Information Retrieval System based on this ontology, which will possibly give more reliability to the formation of a single repository, contributing to efficiency and streamlining processes.

Key words: Ontology, Functional Settlements, Text mining, Ontokem

Abstract

In this work we propose the development of an ontology for functional settlements, which are records of administrative acts involving the functional life of the public servant. The proposal aims to facilitate the mining of the texts corresponding to the administrative acts related to the human resources of the Environmental Brasília (IBRAM/DF), in a case study involving the respective publications in the Official Gazette of the Federal District and internal Personnel Bulletins. We used the Ontokem tool for documentation, creation of classes and instances, complementing ontology with Protégé, responsible for the refinement of ontology. As a result, we note the feasibility of creating an Information Recovery System based on this ontology, which may give more reliability to the formation of a single repository, contributing to the effectiveness and streamlining of processes.

Keywords: Ontology, Functional Settlements, Text mining, Ontokem

1. Introduction

In compliance with the principle of publicity in Public Administration, administrative acts arising from the decisions of responsible agents, in order to be valid, are usually published in publicly accessible vehicles, such as the Official Gazette. Depending on the nature of the act (such as some involving personnel, for example), such publications are made in internal bulletins of the respective Administration bodies. Monitoring these official publications, however, is always complex. Information is almost always dispersed, without structure, in document repositories without standardization.

Information must be sought daily analogously, by reading publications. In the case of the Official Gazette, the editions (already digital) mix all sorts of documents, which deal with the most diverse decisions made by different bodies. Within each body, the relative freedom in packaging the Bulletins generally results in a

significant collection of digital documents in variable extensions, hosted in folders and without indexing that imply your contents.

The difficulty this creates is the insecurity regarding the transcription of this information. The lack of definition of specific responsibilities for mining makes each agent look for what interests him or is demanded- of. The

consequence This is the difficulty in forming a single, properly structured repository that can be a source

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reliable for queries or powering systems. In short, human mining, punctual and redundant, is responsible for extracting vital information for other processes or for generating the effects intended by publications. Often merely by attaching printed copies of publications to physical files or electronic processes, without due treatment.

In this article we intend to demonstrate the feasibility of automating this mining process, which has as its main challenge what human knowledge adds: understanding the domain of a specific administrative act, the terminology used and its formal relationships. To do this, we use ontology, which defines the concepts of the domain through properties, relationships and axioms, and should be considered as a formal representation that expresses the consensual understanding regarding the concepts of the domain (FREITAS; VIEIRA, 2008).

In a case study, we examined a human resources management problem at Brasília Ambiental (IBRAM) in the Federal District - DF, which is the formation and maintenance of the functional settlements of the employees of that body, formed by information pertinent to the various administrative acts that provide them with They concern: appointments, promotions, removals, dismissals, penalties, praise, etc. Thus, we intend to demonstrate the feasibility of using ontologies to extract knowledge from official publications to form a database and structured data. The proposed ontology takes into account the author's knowledge and experience as a graduate of the former Human Resources Management – GEREH and is not a finished work, as it requires validation by other experts in the field.

2. Administrative Acts

Administrative Acts are the way in which the public administration makes its decisions, whether on the initiative of an individual or on its own initiative. It is the sequence of Administration activities, interconnected and duly documented, that aim to achieve a certain final effect provided for by law (CARVALHO, 2014). In other words, public administration requires that decisions be covered by a set of formalities to be effective. This also includes compliance with the principle of publicity, enshrined in the 1988 Constitution. The publication of the act may constitute both a requirement for validity and effectiveness, as determined by the legislator. The purpose of publication, therefore, is to publicize, "in written form and in officially determined means", state acts, so that only after the publication of the act can its compliance be demanded from citizens, in addition to introducing changes in the universe legal (ROCHA, 1994, p. 246).

In the Federal District, decree no. 37,256, of April 15, 2016, provided for rules for publishing materials in Official Newspapers, establishing the prohibition of publication in the Official Gazette in its article 6:

I – Acts of an internal nature;

AI - Acts that involve the mere reproduction of a rule already published by an official body, including the service bulletin and the personnel bulletin;

III - ordinary personnel acts, except those provided for in arts. 4th and 5th;

IV - The acts of granting medals, decorations and commendations, unless carried out by law or decree;

V - Drawings and figures of different types, such as logos, logos, coats of arms or emblems; VI – Musical scores and lyrics;

VII – speeches;

VIII – performance evaluations and praise;

IX - Absences provided for in article 62 of the Complementary Law of the Federal District nº 840, of December 23, 2011.³

Regulating internal publications at IBRAM, Instruction No. 351, of January 11, 2017, established the Service Bulletin and Personnel Bulletin, intended to publicize IBRAM's formal acts and procedures,

in accordance with item II of that decree. Regarding personnel, the Instruction states: Art. 3 The following may be published in the

Personnel Bulletin:

I - Ordinary personnel acts;

II- The absences provided for in article 62 of the Complementary Law of the Federal District nº 840, of December 23, 2011.

III- Results of performance evaluations and praise;

VI- Other acts that refer to personnel and that do not require publication in the official press.⁴

In other words, publications dealing with personnel are currently published both in the Official Gazette of the Federal District (art. 4 (as a result of legal provision) and 5 (summary of orders from administrative authorities, related to individual interests)) and in the Bulletin of IBRAM staff.

3. Text Mining

With the universalization of the use of computers, the monumental volume of information stored today in organizations or web servers tends to continue to increase, with dizzying growth in the coming years. A unique characteristic of this phenomenon is that around 80% of this information is composed of texts largely written in free form (HE; ZHA; LI, 2013), in natural language, without any structure.

This panorama contributed to the development of techniques for Information Retrieval (IR) from large document repositories using text mining. IR consists of locating materials of an unstructured nature that satisfy a specific need for information from a large collection (MANNING; RAGHAVAN; SCHÜTZE, 2008). It is an area that investigates methods and techniques for representing, organizing, storing, searching and retrieving documents. Its main objective is to facilitate access to documents relevant to the user's information needs, generally represented through keyword-based queries.

The complexity of using these techniques, however, varies according to some aspects. Within an organization there are significant differences in relation to the WEB, for example. In the case study we propose, these tasks are simplified by the relative structuring that the texts have (as they deal with specific subjects and comply with legal standards), in addition to the low heterogeneity between the documents, formed by two basic sources, the Official Gazette and Personnel Bulletin.

Whatever the case, for greater accuracy, text mining requires the use of a common vocabulary for domains where there is a need to share information. This includes machine-interpretable definitions of basic concepts in a domain and relationships between them. The ways to do this are ontologies.

4. Ontologies

In recent decades, ontologies have become quite popular in Artificial Intelligence (AI) research, whether in the area of Natural Language Processing (NLP), Knowledge Engineering (KE) or knowledge processing and representation. The reason ontologies are so popular is largely because of what they promise: a shared, common understanding of some domain that can be communicated across people.

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and computers. (STUDER; BENJAMINS; FENSEL, [sd]) The term ontology originates from philosophy, being used to describe the existence of beings in the world. As Artificial Intelligence (AI) deals with reasoning about models of the world, the term was adopted to describe what can be represented of the world in a program.

Ontology plays an important role as a way of representing knowledge, making it shareable and explicit. Its most widely used definition is "a formal and explicit specification of a shared conceptualization" (STUDER; BENJAMINS; FENSEL, 1998). Formal, as it can be processed by machines. Explicit, as it contains definitions

⁴ http://www.sinj.df.gov.br/sinj/Norma/12a9882a49b643ef9db54345182_26d/ibram_ins_351_2017.html - Accessed on 02/28/2020.

without ambiguity of concepts, attributes and relationships. Shared conceptualization by housing a conceptual model of a certain domain with shared understanding. Among other things, they allow the reuse and transmission of knowledge and are structured forms for storage using the concept of classes, relations, attributes, among others (GOMEZ-PEREZ; FERNÁNDEZ-LÓPEZ; CORCHO, 2004).

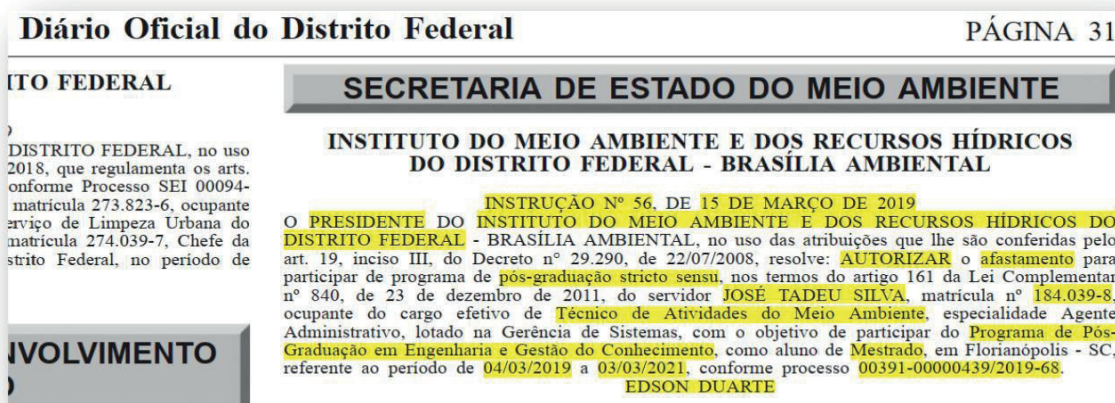
According to USCHOLD; JASPER, (1999) An ontology can take various formats, but it must include a vocabulary of terms, their meanings and how they are related. This results in the structuring of the domain and restrictions on the interpretation of terms (USCHOLD; JASPER, 1999).

In this work, despite not using a specific format or methodology, as it aims to extract information from official documents referring to administrative acts in the field of human resources, the development of an ontology to represent this domain (administrative acts involving personnel) is proposed. The aim is for such documents, using this ontology, to be read by a machine. This will allow, for example, the feeding of a structured database with all publications involving IBRAM servers, constituting a single and reliable repository for forming and updating its functional settlements.

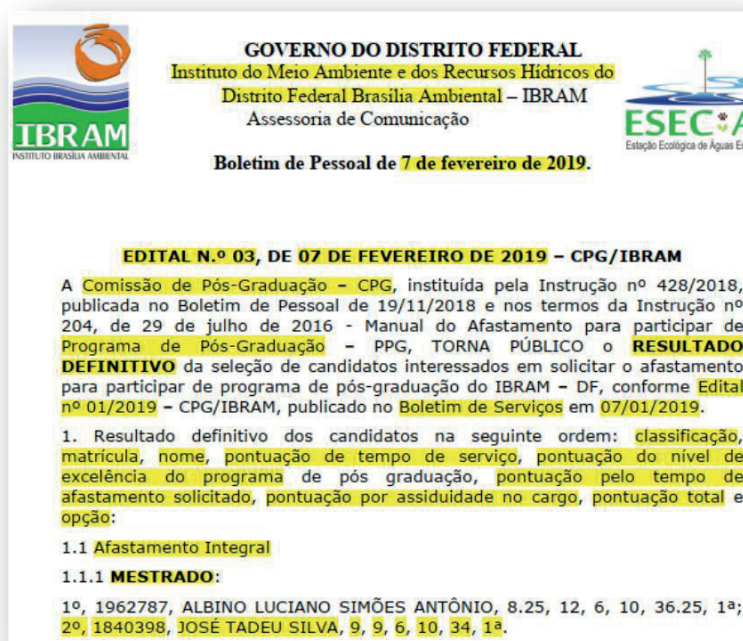
4.1. Development of a Functional Settlements Ontology

The documents of administrative acts, despite not being structured, have a relative standardization. To produce its effects, in compliance with the legislation, some information is essential, facilitating the elucidation of the terms that must be present in the publication, depending on the type of act.

1 - Example of publication of an administrative act in the Official Gazette of the DF



2 - Example of publication of an administrative act in the Personnel Bulletin



Sources of Knowledge:

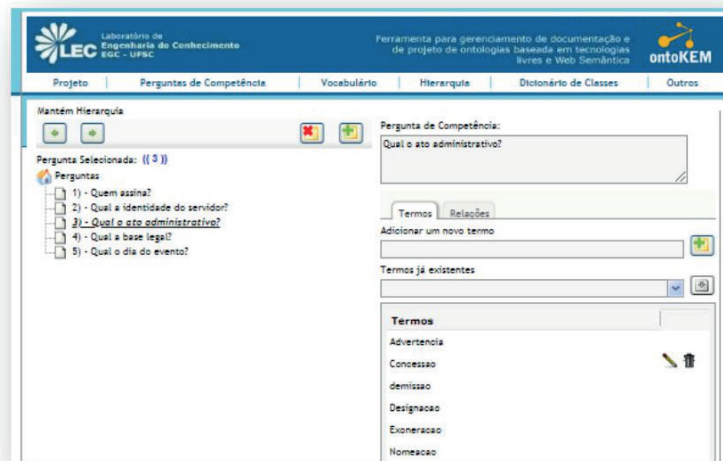
- Documentation Manual of the Government of the Federal District;
- Specialists in the personnel sector;
- Author's experience in Human Resources Management.

To build the proposed ontology, the Ontokem tool was initially used, which allows project documentation. The purposes were recorded, the definition of ontology classes and the description of the words used were created.

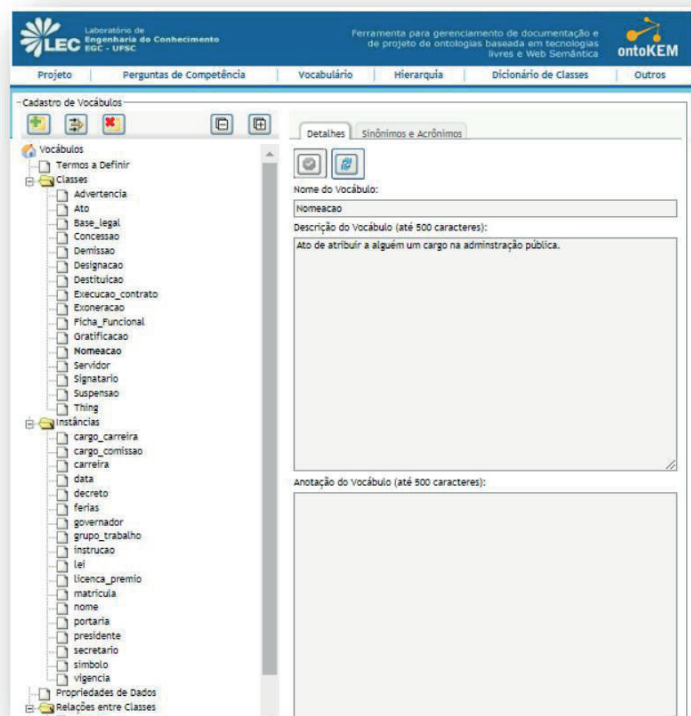
3- Description/Purpose of the ontology



4 - Competency Questions



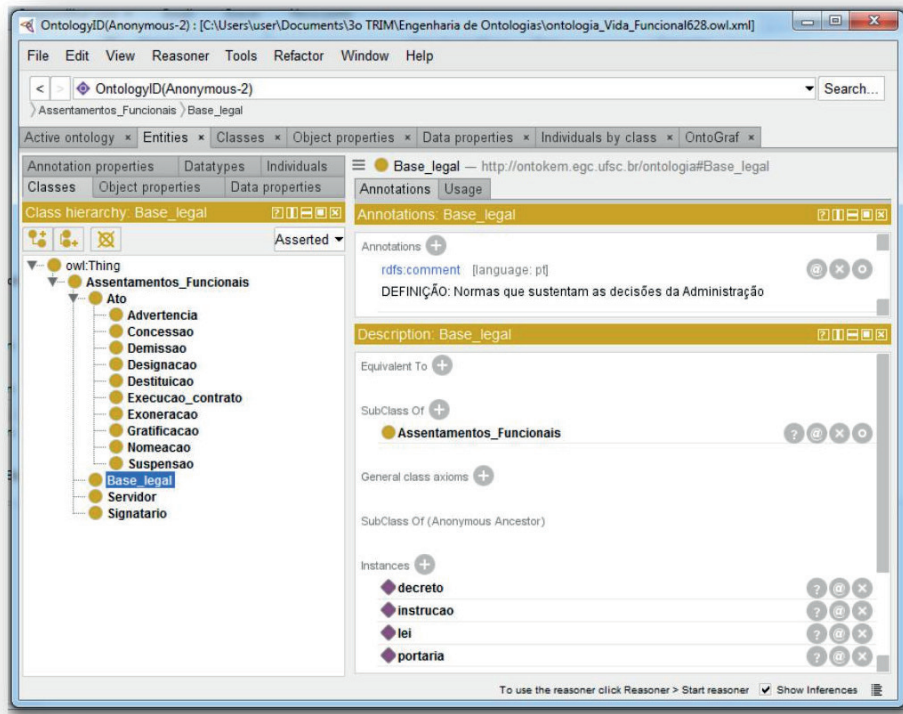
5- Creation of classes and instances



The hierarchization of subclasses and superclasses, the definition of properties and values for the classes and for each instance were left to the Protégé software, with the consequent refinement.

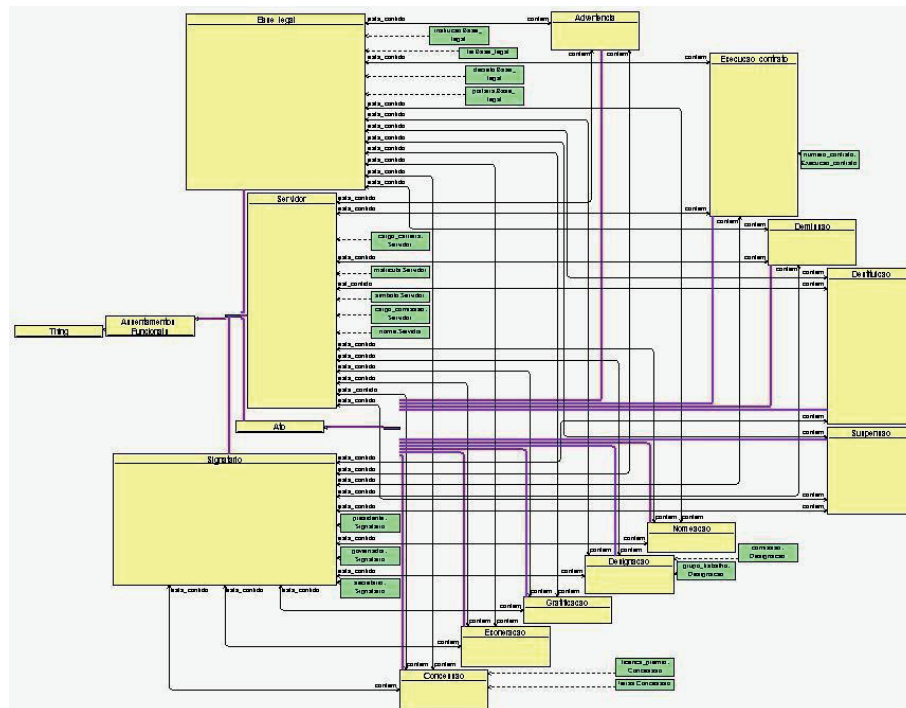
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6- Definition of Superclasses and Subclasses in Protégé.



The graphical visualization was done by the Owlgrind software:

7- Visualization of the Functional Settlements Ontology



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Final considerations

Even though it lacks maturity and the due refinement that this brings, the proposed ontology serves as a starting point for reflections on the modernization of monitoring the functional life of servers, currently the settlements are made completely manually, with daily reading of publications pertinent documents, their respective printing and packaging in steel files, in hanging folders, called "server dossiers". Nessa

situation, the demands that emanate from the administrative acts thus registered are not always in compliance, as they are subject to loss and other adversities.

Furthermore, due to the insecurity that this situation generates, some events required in the civil servant's career are usually preceded by extensive research, contributing to an even greater slowness of the processes thus subsidized. Therefore, providing the organization with a single source, permanently updated by Information Retrieval Systems means reducing human effort. Databases structured with such settlements can also be shared with other systems, enabling more efficient management and faster decision-making.

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