

Decision-making application for the Management of Human Resources: the automation of the recruitment to the breasts of Universities

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Abstract

The objective of this work is to develop a decisional information system for the operation Model comprising the key employees of the university (teachers, administrators). This system is based on the relationship between actors and their activities that depend on his degree and their aggregations in a graduate level. It aims to make available to managers of the university a set of dashboards able to implement a data warehouse of university resources, the principle is based on semantic annotation of the real needs of human resources at facilities of each university and the available budget items to automate the recruitment process provided. We begin by modeling the actors up and study processes on their specific organizations, their activities and their aggregations.

Keywords Information System, Decision Support Information System, data warehouse databases.

1. Introduction

Business intelligence is one of the areas of computer that is experiencing a development exemplary today. Indeed, business managers, faced with increasingly unstable environments, are expected to take the most effective decisions based on reliable data. The current problem is not to have better decision-making tool, but to structure upstream data that will feed not to be ineffective. Thus, the design of information systems tailored and scalable decision is a hot topic for all organizations around the world.

In what follows, we propose an approach based on semantic annotation of documents to automate the process of e-recruitment. The basic idea is to model the semantic content of the real needs to establishment and budget items available in a formal, explicit, simple and accurate, based on a common ontology. The concepts in this ontology are inspired by the most significant parts

of these documents and the competence is considered crucial in the proposed modeling

2. Hypotheses:

One starts by modeling [4] upstream actors taking into account the specifications and expectations of each of them, namely:

- From motivation to the job involvement: motivation * Thus appears as part of a directed behavior and completed (goal oriented).
- Training required by the actors in institutions in the university year.
- Etc.....

Given this situation, it is to correlate between the needs of university actors [1], [2] and those of the teacher and those of administration. In fact, we are faced with a situation of looking for satisfaction with a specific university. Indeed for a university, it is more about positioning and visibility of the organization. The company seeks a positioning performance level of its capital and the university aims to achieve a quality and a high ranking both domestically and internationally. The company seeks customer satisfaction; the university seeks to satisfy its stakeholders. Customer satisfaction in business is formalized in terms of costs. Satisfaction of the actors in university is renowned for meeting their needs.

3. Context

The main objective of this work is to provide a simple, detailed and comprehensive enough to meet the real needs of university decision-maker (in [5],[6]) in terms of human resource management elements so necessary to process semantic annotation and

automatic matching on needs and priorities of the indicator, using the technologies offered by the application semantics and making the results of existing work in this area. The outcome of this objective is the result of an increase in the achievement of objectives under the following:

1. Proposed a structure rich, expressive and clear for each type of document (needs and priorities of the indicator) and their codification in XML (standard data exchange on the Web) with the elements necessary for their presentation.
2. Construction and implementation of ontology for modeling the semantic content of documents in terms of their acquired or required, by limiting itself to a particular field. This ontology provides the user with an annotation feature allows management and skills underlying the documents based on a model relevant to the concept of "competence."
3. Proposal of a process of semantic annotation of documents, based on the exploitation and the instantiation of the ontology built.

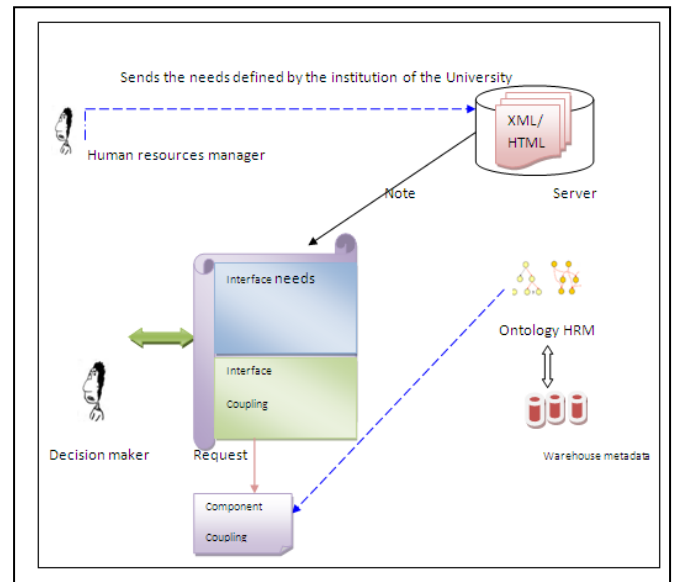


Figure 1– Architecture of our model

4. The system architecture proposed

We apply the principle of annotation and semantic matching, is shown in (Fig. 1). It consists of the following components:

1. Ontology-HRM: Ontology built for Human Resource Management. It consists of several sub-ontologies interlinked and its instantiation generates metadata.
2. The document server XML / HTML: Allows storage and document management to annotate (recruitment needs defined by each institution of the university and priority indicator)
3. The system interface: it has two functions. The annotation interface gives the user the ability to annotate a document based on the instantiation and operation of the ontology-HRM.
4. The matching component: This component allows the interpretation of user requests and the calculation of degrees of semantic matching, superficial and based competence.

4.1. Modeling of actors based semantic annotation

For human resource management application used to create positions or jobs from budget allocated to the university (state budget), either from own resources (services with job programs, contracts,). Budget items are defined according to the needs identified by each institution. These own resources are defined by assimilation to the corresponding official body. To better meet the needs of decision makers [7] [8] of the University, we developed a model of data representation (MR) as follows:

$$RM = (AC, C, AG)$$

Where we denote by: AC: Activity actor by grade and specialty at the beginning of each academic cycle, C: actor category defined degree obtained for the actor and specialty A: Aggregation defines the need to recruit actor by importance, so we had to use standards to normalize their modeling. The syntactically, document coding in XML (extensible Markup Language), considered as the transport layer syntactic Web, can benefit from all of the technologies developed around it. As for the semantic aspect, the goal of semantic annotation is to enrich the syntactic structures of Web documents with their semantic content-based ontologies. In what follows, we describe the elements needed to generate documents to be annotated, the description of the model adopted for the notion of "competence" and the detailed description of the ontology

built to model the semantic content of documents with the corresponding annotation process.

4.2. The model of competence

The human resources management is based partly on the knowledge of individuals and their skills and secondly, the knowledge of the organization and its business. This is the matching of skills that can improve employment. This requires an explicit and formal representation of skills and therefore, a model for this notion. Competence can be identified as a body of knowledge into action in the everyday tasks of each institution of the university. It manifests itself as a behavior, and can be scientific and technical (knowledge and know-how) or behavioral (the skills). The scientific and technical competence is specific when it is specific to a particular area; otherwise it is generally considered. It is important to note that there are other more accurate models for this concept «competence», as proposed in our project (in [3], [4]), based on the following definition: "A competency is to model a set of resources (knowledge, skills and behaviors), in a context given, to accomplish a particular goal." However, the use of such a model could complicate reconciliation services to offer between needs and available resources, because we must distinguish between the same sets of resources, mobilized in different environments (conditions and social, organizational, economic, physical, technological, etc.), or to achieve different objectives.

5. Experimental Phase

a. Building the Data Warehouse (ED)-based ontology of semantic content:

The experiment highlights the technical and organizational difficulties involved in building a warehouse with taking into account the overall context of the university. We identify two levels to consider when designing a SID: modeling level, application level. Ontologies are crucial in the context of e-recruitment because they allow recruiters and job seekers to share a common reference to describe the content of their documents so unambiguous, precise, and formal semantics. This repository will undoubtedly facilitate the annotation task of the user and allow enrichment with new knowledge, based on the concepts and relationships in this ontology [10].

The contribution of formalization is the ability to provide an automated reasoning for reconciliation between supply and demand of employment. The architecture of the proposed ontology is inspired by the most significant areas between the real needs[11] of each facility and

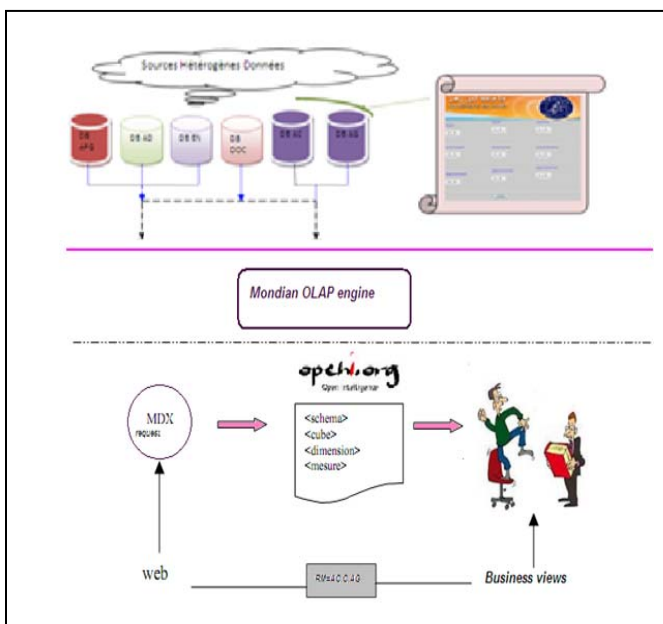
makes budgetary positions at each degree level. These are some personal information, crafts, skills and diplomas acquired explicit (case of HP), or required (if the job offer). The trade or the diploma itself mobilizes a subset of basic skills [4], which made the crucial competence of our modeling. We used the method of ontology construction.

The domain of this ontology is "computer management and human resources." It consists of five sub-domain ontologies:

1. The sub-ontology "PERSON" consists of a single concept "Person" which describes the most important personal characteristics, the recruiter may require, or that the candidate may have. These are: gender, age limit, nationality. In reality, "PERSON" is not a true sub-ontology because it consists of a single concept.
2. The sub-ontology "DIPLOMA" describes the concepts relating to qualifications which are: the degree of domain families "FamiliDiplôme" diplomas valid field "Diploma" and a repository of certificates "RéférentielDiplomes". It is related to the sub-ontology "COMPETENCE" to certify the skills mobilized by a particular degree.
3. The sub-ontology "JOB": describes concepts related to the business area that are: families trade the domain "FamiliMétier", the existing business area of "Job" and a repository of business inspired CIGREF [6] enriched "RéférentielMétiersInformatique ". It is related to the sub-ontology "COMPETENCE" to certify the skills mobilized by a particular trade.
4. The sub-ontology "COMPETENCE" to describe the competency model adopted and the hierarchy of topics ("Aspect Software" or "Theme") that can have the scientific and technical competence.
5. The sub-ontology "ANNOTATION": allows associating to each resource, all acquired / required corresponding to it. The concept "Resource" to describe the document to annotate through its URI (Unified ResourceIdentifier) and type (CV or offer / position), while the concept "AcquiRequi" specializes in components with which this resource can be annotated tee, which makes the link with other sub-ontologies. The concept "Annotation" links the two previous concepts to annotate a resource with one or more acquired (if the CV) or required (supply case). The role of this sub-ontology can be replaced by a semantic annotation tool.

B- Application

After explaining the improvement of our model we use an open source product to make our application around a decision tree. We operate our business model around an application that gives us the opportunity to synthesize what we say and the challenge of using open source software that offers innovative perspectives on the treatment of information content as it is based on patterns XMLA10 for the analysis of data. We apprehend this new analysis model for our application which is discussed a development language allowing the manipulation of databases by MDX11 requests for analysis.



¹⁰ XMLA : Extensible Markup Language Analysis.

¹¹ MDX : MultiDimensional eXpression.

¹² Mondrian: Server OLAP written in Java.

¹³ Openi: GUI based on Mondrian.

Our application described in Figure2 revolves around two components: data recovery and retrieval of external data internally. Data recovery external offers pre-computed analyzes. Data recovery in house allows dynamic analysis of the real needs of schools and their aggregations.

Data recovery external For files "log" of the platform defined sub-ontologies "BUSINESS", "DIPLOMA" and "POWER" are instantiated in

advance to provide the user instances they will need during the annotation his document. We recover and also leveraging data from a bibliometric analysis around an information system to provide a decision analysis in a web interface and remote. The first part helps explain Mondrian12.

The recovery of internal data For our model (AC, C, GA) and allows the identification of needs, functions and activities by type of actors in a decision information system dedicated to the academic environment. This second component is an integral part of Openi.

The external and internal data collected and analyzed lead to business views by type of actor.

6. Conclusions

. Our medium term perspectives concerning the format of the databases used in our application. To summarize our application, only the "data analysis" is based on an analysis scheme in XMLA. For all projects in Openi, we had to import our data into a SQL database so that data were available in XML! That's why we have direct some of our research to enable an XMLA schema to make analyzes of data from databases in XML. University governance in the context of a strategic information system includes a data governance to support a business vocabulary essential to the coherence of the information system.

In this paper, an approach based on semantic annotation, to format a recruitment process Web-based information system to automate decision-making. This is a simple and complete enough, in the sense that it covers almost all points of the issue of e-recruitment, from generation to annotate documents, until the application services semantic reconciliation between the actual needs of each institution of the university budget and the posts available. It is characterized by modeling the semantic content of documents based on a common ontology to recruiters and job seekers. The architecture of the ontology is built based on the common, the most significant. It also allows management skills through formal modeling.

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