Chapter 19
Informative Top-k Retrieval for Advanced Skill Management

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Abstract The paper presents a knowledge-based framework for skills and talent management based on an advanced matchmaking between profiles of candidates and available job positions. Interestingly, informative content of top-k retrieval is enriched through semantic capabilities. The proposed approach allows to: (1) express a requested profile in terms of both hard constraints and soft ones; (2) provide a ranking function based also on qualitative attributes of a profile; (3) explain the resulting outcomes (given a job request, a motivation for the obtained score of each selected profile is provided). Top-k retrieval allows to select most promising candidates according to an ontology formalizing the domain knowledge. Such a knowledge is further exploited to provide a semantic-based explanation of missing or conflicting features in retrieved profiles. They also indicate additional profile characteristics emerging by the retrieval procedure for a further request refinement. A concrete case study followed by an exhaustive experimental campaign is reported to prove the approach effectiveness.

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19.1 Introduction

Human resources retrieval can be a very complex process due to the difficulties for recruiters in properly expressing their requirements. Given the increasing competitiveness in job market, e-recruitment systems should provide more complex and articulated procedures in order to avoid the money loss caused by a wrong—or simply nonoptimal—assignment. Hence, there is the need to face a change in the old paradigms and techniques for managing talents and skills. Currently, recruiters describe vacant job positions exploiting traditional recruiting methods, such as advertisements and referral systems. More recently, on-line recruitment websites (see http://www.monster.com/, http://www.careerbuilder.com to cite a few) have been employed, which mainly build their retrieval techniques on a keyword-based search. In spite of the speed-up reached in profile collection, such systems require a considerable engagement for the recruiter often producing unsatisfactory results. The process of describing the vacancy has to be particularly accurate to produce adequate results, turning into a very time-consuming task. Furthermore, the recruiter is not fully aware of retrieval and ranking criteria (if any) and he/she receives as output a list of possible candidates not following any explicit set criteria. So the choice of a particular profile in the returned set is made according to a further manual selection of the returned profiles. Moreover, considering that the system interrogation is keyword-based, the recruiter can express only mandatory requirements. On the other hand, a job offer is usually characterized by some features which are strictly required and some other ones which are only preferred, possibly with a preference degree. A system flexible enough to reflect such a diversification would allow a relevant distinction in job vacancy descriptions. In addition, having a ranked list of candidates (and not trivially a set of candidates) represents a significant added value, especially if the recruiter may choose the ranking criterion. Finally, after selecting a profile, a guided comparison between the required job position and the returned candidate description which explains the resulting match, would be very useful for a further request refinement step. Semantic-based techniques and technologies allow for making more efficient and flexible the recruitment process. The approach presented here is based on an automatic matchmaking process between available candidate profiles and vacant job positions according to mandatory requirements and preferences provided by the recruiter. Both, candidates and job vacancies, are described in a formal language suitable for data intensive applications allowing a good trade-off between expressiveness and computational complexity. The proposed system combines flexibility in query formulation with an explanation of solutions. The matchmaking between job positions and candidates profiles exploits top-k retrieval techniques [20] by using a matching engine which performs top-k queries over a DLR-Lite [4] Knowledge Base (KB). It returns a ranked list of candidates managing also non-exact matches. Furthermore, the informative content of resulting outcomes is enriched with additional information explaining results of comparison of each retrieved candidate with respect to the job offer. The remainder of the chapter is organized as follows: in the next section, we report on the formal background underlying the approach; in Sect. 19.3, the proposed framework