Infogistics' Intelligent HR Solution

Human Resource specialists face the increasingly challenging issue of linking an ever-greater number of job seekers with vacancies. Computers can obviously be a tremendous help for this process: candidates' profiles, together with their skills and qualifications, can be stored in a centralized database and then retrieved according to specific search criteria. There are, however, two key issues that are not addressed by current technology:

- how to construct concise, accurate and uniform profiles from resumes and job adverts automatically;
- how to find relevant candidates/vacancies whose profiles are not directly matched by a particular search criteria.

Infogistics' intelligent tools address both of these problems by applying recent advances in the areas of Artificial Intelligence and Text Analysis to process and search HR- specific documents such as resumes and job postings/adverts. The major benefits of Infogistics' intelligent HR tools are:

- Unique integrated search and browsing functionality which enables flexible mix-and-match strategy in linking candidates to vacancies;
- Real-time automatic population of candidate and vacancy databases from multiple on-line sources;
- Labor and time savings on candidate and vacancy profile construction;
- Guaranteed consistency between profiles created by different specialists;
- Increased customer retention rate.

In several case studies, Infogistics' profile construction software, Xtractor, has demonstrably speeded up profile construction by up to 10 times over standard manual method. Infogistics' search and browsing software, RealTerm, not only enables highly intuitive candidate-vacancy matching process, but also is fun to use, and therefore increases customer retention rate. Gordon Davidson, CEO of the high-profile on-line recruitment agency Intagen, says:

"Infogistics' intelligent technology will revolutionize the HR industry to the extent that the invention of word-processors and databases have done before. It not only reduces the costs of operations and allows HR consultants to spend more time facing clients, it also transforms the entire process of interaction with the computer into a pleasant experience. So the clients want to come back and do it again."

Infogistics software can be integrated easily into existing workflow systems, from large bespoke enterprise installations to multiple workstations running Microsoft Office! Moreover, since Infogistics' solutions are fully Internet-enabled, their benefits can be shared across multiple offices anywhere in the world.

Infogistics Limited is an Edinburgh-based company, launched in July 2000 as a spin-off from the University of Edinburgh and founded by internationally recognized experts in the fields of text-mining and document retrieval. Infogistics is a leading provider of text-analysis solutions across multiple markets including HR, law enforcement, knowledge management and CRM. Combining award-winning software applications with patent-pending technology, Infogistics helps organizations locate and link key pieces of information within their vast databases.

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Xtractor – automatic profile extraction engine

When HR specialists read resumes of job seekers they immediately create a profile of a candidate in their mind. This profile comprises condensed facts (extracted from the resume), about key skills and qualifications together with the contact information. This information then can be entered into the database and indexed according to the main points of the extracted profile.

This method of data entry, however, is highly labor intensive – it not only requires a highly skilled HR specialist to read through two to four page resumes for each candidate, but also to type manually extracted profiles into the computer. Also this way of processing is not scalable – there is a limit to how many resumes a single HR specialist can handle in a given period of time. Thirdly, profiles produced by different people can differ in the terminology used and thus can be incompatible within a centralized search system. Infogistics' Xtractor technology is designed to get around this well recognized bottleneck and automate the extraction and validation of candidate profiles by reading and analyzing their resumes.

Technically, the computerized extraction of such profiles is a very challenging process. Although all the facts that need to be extracted are present in the resume, they are present there in a free text form. This means that the same facts can be expressed in a great variety of different ways, and a software system needs to be able to recognize all these different ways and store them in a uniform fashion. One particular problem stems from the fact that words are ambiguous. For instance, the word "Access" can refer to a software package "Microsoft Access", and the word "C" can refer to a programming language, but this does not mean that every single occurrence of "Access" or "C" does so. Another challenge is that different contexts impose different meanings to words and phrases. For instance, "Project Manager" is a potential skill for a candidate but in the sentence "*I was reporting to the Project Manager*", it is not.

Thus, in short, a simple keyword matching approach can hardly produce adequate results for this task. This is why Infogistics technology is based on recent advances in Artificial Intelligence and Computational Linguistics. First it partitions a resume into zones including personal information, overall summary, employment history, and education background. Then it treats information extracted from these different zones differently: a programming language mentioned in the employment history is a much stronger skill than one mentioned in the education background, a town mentioned in the address of a previous employer is not necessarily the location where the candidate resides or seeks a job. Extracted qualities are then normalized to their main forms. For instance, the word "Novell" is normalized to "Novell Netware" if it stands for a software product or "Novell Inc." if it stands for the company itself.

Xtractor not only can display the profile (left hand column) for validation, but it also color-marks the original text so the correspondence between the profile and the resume can be easily seen. By clicking on particular items in the profile or in the resume the corresponding counterpart is highlighted.

Employment Record # 1 **Period:** ??/10/1995 - ??/12/2000 **Position:** Senior Software Developer **Company:** Clear Vision Tech. **Location:** London **Skills used:** • Unified Modeling Language • Java programming language • Enterprise Java Beans • C programming language • C++ programming language • Windows 9x/NT/2000 OS • Novell Netware 3.x OS	Oct '95 – Dec'00 Senior Developer, Clear Vision Tech, London At Clear Vision my main responsibilities included specification analysis and code development using UML, Java, EJB, C/C++ on win32 and Novell 3.1 platforms. I was reporting to the Project Manager and worked closely with the clients.

Using this style of presentation it is easy to identify where facts extracted into the profile come from. Verification and post-editing of such profiles is about 10 times faster than manual creation. Multiple profiles developed by this method are also guaranteed to be consistent in terminology and therefore can be searched across using the same search methods.

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RealTerm – candidate search and browsing engine

The ability to search HR databases for the right candidate for a vacancy or the right vacancy for a candidate is one most important functionality when dealing with large volumes of customers. Search facilities are usually inbuilt into databases, but there, however, is one issue which needs to be addressed very carefully. What if your search returns too many candidates and you need to assess their other qualities that make one candidate more attractive than another? Another potential problem is what if your search criteria were too specific and no candidates were found in the database? Since you do not know what precisely is there in the database you cannot figure out your perfect query.

RealTerm search engine is a solution to this problem. Like traditional search it lets you formulate a query and submit it to the system. It then retrieves candidate profiles with the required skills and qualifications and ranks them according to how many of the target criteria have matched information in the profiles. Apart from that, and what is unique to RealTerm, it builds a list of secondary skills, qualifications and preferred locations, which is also presented to the user. Using this additional information the user can quickly and intuitively browse through the set of returned candidates' profiles and populate the target hot list in a matter of seconds.

For instance, if you are searching for a Java programmer, the system can return many hundreds or thousands of candidates which have this skill. But RealTerm also displays the most important secondary skills (e.g. "C++", "EJB"), achieved awards and qualifications (e.g. "Sun Certified Java Programmer"), preferred locations, and so on, which some of the candidates in the return set possess. Then all you need to do is to click on one or more suggested secondary skills, qualifications or locations, to drill down to those candidates which posses these qualities. So, for instance, you can dynamically decide that you want Java programmers who also can program "C++" and want to work in Glasgow or Edinburgh. Note, that you make this decision according to what secondary qualities the system displays rather than by trying to craft a perfect query upfront, which is usually a frustrating experience.   Below is a screen-shot of a RealTerm search for a Java programmer:

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