AI-Based Recruiting: The Future Ahead

Jorge Martinez-Gil
Software Competence Center Hagenberg GmbH
Softwarepark 21, 4232 Hagenberg, Austria
jorge.martinez-gil@scch.at

Abstract

The Human Resources industry is currently being revolutionized by the automation of tedious and time-consuming aspects of their processes. Since AI paradigms such as deep neural networks and other machine learning methods can make accurate predictions and analyze vast amounts of information, these technologies are suitable for facing some of the major challenges in this domain. We overview here how this industry is changing; from the automatic screening of the candidates to bias removal in most of the processes, through techniques for the automatic discovery of potential employees or new advances for improving the candidate's experience.

Keywords: Big Data Technologies, Text Mining, Information Systems

1 Introduction

Recent advances in AI-technologies can make an impact on almost every sector from the economy, but the case of the Human Resources (HR) sector is particularly remarkable. The reason is that this sector produces vast amounts of data that can be used to train AI-models so that these models act in much the same way as a human expert would.

The HR sector is plenty of use cases that may be subject to automation. Maybe one of the best known is the traditional recruitment process that aims to find the best profile among hundreds of potential candidates [1]. This traditional recruitment process has usually consisted of manually inspecting the information submitted by the candidates, which means the time to complete the process can be measured in weeks or even months. This brings not only great disadvantages for both parties, i.e. loss of money and time for organizations, frustration for the candidates; but at the same time, important advantages for competitors that have additional time to identify and hire talented people who in principle were willing to work in our organization.

To face this problem, new AI-based solutions are proving to work pretty well when performing an intelligent selection of qualified candidates from a larger group of job applicants [2]. Instead of using pre-selected search terms, this type of AI-based solutions is designed to learn which features correspond to successful employees to create a shortlist of qualified candidates. And this is just one example of the many to come. In this work, we would like to highlight the contributions that the IA can make (and in fact, it is already making) to the HR sector. These contributions include Automatic resume screening, automatic candidate discovery, improved candidate experience, and bias removal in the recruitment processes. In the rest of the work, we analyze how these techniques are changing the state-of-the-art, and give some hints about the advances that we can expect in the HR industry shortly.

2 State-of-the-art

How computer systems have been working in recent years has been using algorithms for talent management based on principles from schema and ontology matching [3]. For example, given a job offer describing the requirements for filling a position, the problem that was being faced consisted of identifying the most qualified candidates from a plethora of people who had initially applied for an open position. Therefore, it made sense for computers to recommend those people whose profiles had more keywords in common with the offer description. Since that method might have some weaknesses, the candidates were simply ranked by order of preference as a preliminary step to being interviewed in person. The method seems simple in principle, and it is well-known that questionable or fake input data lead to poor decisions. However, the method has traditionally worked reasonably well [4]. Moreover, many improvements have been incorporated so that high levels of sophistication have been achieved. For example, logic-based techniques for dealing with information that is not always complete or is considered irrelevant by either the employer or the applicant [5].

Concerning automatic candidate discovery, there are already several solutions based on web intelligence [6] aiming to crawl the Web to evaluate prospective candidate profiles (or even to find out how to effectively write job offers to attract more applications). For example, the case of the IT sector is well-known; the proliferation of websites such as GitHub[1] or Stack Overflow[2] makes an enormous amount of information about the development skills of a wide range of programmers to be publicly available. Some software solutions have already begun to mine this vast amount of information to facilitate the candidate discovery.

Concerning candidate experience, there is widespread negative feeling regarding the candidate experience when applying for a job. They consider that they have made a great effort, carefully preparing an application, attending several interviews and technical tests; but, only in the best of cases do they receive a generic email regretting that the organization cannot offer them the position. This is due to the high cost of preparing a thorough report for the candidate [3]. However, this way of working is gradually changing.

Finally, the current state of the fight against corporate biases is based on protocols that have been manually compiled, and whose implementation is at the discretion of recruiters. Most of the suggested actions are related to the way in which job offers should be prepared, i.e. using gender-neutral titles, being careful with the choice of personal pronouns, etc. and also with the preparation of the interview process, so that questions that may reveal details that are not strictly relevant to the assess the expected performance of the job candidate might be explicitly avoided. However, this process is prone to errors and subjective interpretations. As a result, many companies, including global players, increasingly rely on these techniques to overcome these limitations and improve their hiring processes.

3 The Future Ahead

3.1 Resume screening

Screening applicant's profiles is a task that has been traditionally performed manually mainly due to the difficulties to establish standardized criteria in this context. However, new deep learning techniques can automatically extract features that can quickly identify the most promising aspects of a profile. These features can be then handled by solutions that will generate abstract

[1] https://github.com
[2] https://stackoverflow.com

representations of experience, technological skills, and competences, languages, education, etc. which are very difficult for humans to interpret, but which possess very valuable information based on which to make decisions.

In this way, recruitment processes can be shortened considerably. This means that what once required many days of work can now be achieved almost immediately. This has undoubted usefulness, as it can save many resources in the form of effort and time that recruiters can use in analyzing and evaluating only a group of selected candidates.

3.2 Candidate discovery

New advances on AI-based recruiting reduce the need for recruiters to have well-founded or specialized knowledge of an industry or skill set. As a result, the automatic discovery of prospective candidates gets easier. The reason is that these techniques can understand what is behind most of the exploratory queries. For example, if it is necessary to find people with good Object Oriented Programming skills, new AI-based solutions can look for candidate's profiles with strong expertise in C++, Java, etc. on the web or the social networks. Moreover, these new solutions can dive into the historical record of an organization to discover candidates whose profile did not fit well enough in the past, but who might fit in with new job opportunities.

In this context, novel solutions also allow analyzing public profiles to identify those people that more likely to change their current job and even getting a detailed analysis of the current state of the market concerning a given profile. This means that these solutions can analyze both the supply and demand sides of the market for a specific position or skill set to understand where to find the right people and what salaries and corporate benefits should be offered to them.

3.3 Improved candidate experience

New AI-based recruiting solutions avoid the need to probe each candidate from scratch. New machine learning algorithms are being developed to evaluate both the attitude and aptitude of the candidates through customized interviews. Therefore, it is possible to automatically analyze a wide range of features ranging from facial expressions to the richness of vocabulary the candidate uses. Also, recent advances for natural language processing are focused on the design of chatbots that provide candidates with real-time responses, comments, and suggestions.

All these advances can take the candidate to experience one step further. This is achieved in several ways: the candidate saves a considerable amount of time due to the elimination of the need for long interviews, and that at the end of the recruitment process, whether successful or not, it is always possible to receive a detailed report on all the strengths and weaknesses shown during the process. There is no doubt this is a very valuable source of feedback that has never been offered before mainly due to its high cost. Moreover, based on the candidates' answers and comments, chatbots can be trained to offer an improved interaction with other candidates in the future.

3.4 Bias removal in the recruitment processes

New AI-based recruiting solutions are assumed to help to remove many obstacles during the application process. The reason is that solutions of this kind can be properly configured to assess prospective candidates solely on objective criteria. In this context, machine learning techniques can be gender, ethnicity, age and class blind, what brings new perspectives not only to many talented people who may have found it very difficult to get a chance before but also to employers, which can now identify very promising candidates without being blurred by unfair biases.

Moreover, new techniques to assist in the process of writing more effective and bias-free job descriptions are currently under investigation. All this will facilitate a fairer job market, where merit, skill, and ability must prevail over subjective criteria.

4 Conclusions

We have presented our perspective on how AI-based recruiting is changing many aspects of the HR industry. We have seen how the recent advances in deep neural networks and other machine learning methods are changing such aspects as automatic resume screening, automatic candidate discovery, improved candidate experience, and bias removal in the recruitment processes. And these are just a few hints of what the near future holds for us.

However, the success of all these new techniques will heavily depend on whether both parties can establish a relationship of trust with the novel systems. For example, it is rather unclear that AI-based technology will lead to decisions based solely on objective criteria. This technology may work great for verifiable credentials like certifications, or programming skills, but less so for more subjective job requirements, such as the ability to fit in a team. In addition, we will hear more often concepts such as algorithm aversion, i.e. the effect by which people are more prone to lose confidence in computer models than humans after seeing both of them make the same mistake. Therefore, not even the most enthusiastic visionary can spot the time when AI-based technologies might completely eradicate the need for human intervention during the recruitment process.

References

[1] Frank Färber, Tim Weitzel, Tobias Keim:An Automated Recommendation Approach to Selection in Personnel Recruitment. AMCIS 2003: 302.

[2] Kunmei Wen, Yong Zeng, Ruixuan Li, Jian Qiang Lin: Modeling semantic information in engineering applications: a review. Artif. Intell. Rev. 37(2): 97-117 (2012).

[3] Jorge Martinez-Gil, Jose F. Aldana-Montes: An overview of current ontology meta-matching solutions. Knowledge Eng. Review 27(4): 393-412 (2012).

[4] Jorge Martinez-Gil, Alejandra Lorena Paoletti, Klaus-Dieter Schewe: A Smart Approach for Matching, Learning and Querying Information from the Human Resources Domain. ADBIS (Short Papers and Workshops) 2016: 157-167.

[5] V. Senthil Kumaran, A. Sankar: Towards an automated system for intelligent screening of candidates for recruitment using ontology mapping (EXPERT). IJMSO 8(1): 56-64 (2013)

[6] Jorge Martinez-Gil: An overview of textual semantic similarity measures based on web intelligence. Artif. Intell. Rev. 42(4): 935-943 (2014).