Towards the automation of recruitment processes

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Abstract

One of the essential duties of the Human Resources department is personnel selection. It is a critical task for any organization that wants to use the human factor to gain a competitive advantage. As a result, Human Resources plays a critical role in the organization as it sparks the effective growth of all activities and departments and attaining organizational goals. Therefore, investing in people and technical innovation can ensure a competitive advantage. In this work, we overview the current state-of-the-art approaches to talent recruiting, education, and training. The rationale behind this overview is to shed light on how to make people ready to meet market demands or implement new management models based on Big Data and AI that foster a company-wide culture of innovation and development.

Keywords: Knowledge engineering, e-recruitment, Big Data

1 Introduction

In recent years, there has been a shift in the general attitude about e-recruitment. Rather than the process itself, organizations place a premium on acquiring the most outstanding talent. In addition, so-called social recruiting is evolving, with digital platforms and social networks becoming powerful instruments in the selection process [1]. Passive candidates, i.e., individuals who are not looking for a job but maybe persuaded to change by a compelling proposition, are gaining traction in this fashion.

The digital transformation has had a significant impact on all industries. However, the focus of this study will be on examining the effects of AI in the field of Human Resources, notably in the recruitment process. The reason is that, when possible, organizations must conduct effective selection processes [2]. As a result, tools are required to conduct a successful selection process, but due to the complexity of the needs and job roles, making this a difficult task [3]. In this way, a process with a high degree of uncertainty needs professionals making decisions in a wide range of real situations.

Furthermore, because of the large number of resumes received for each open position, the entire process can be lengthy and complicated until the right candidate is identified [4]. The good news is that the organizations can innovate and streamline their selection processes by incorporating Artificial Intelligence (AI) and technical tools such as Big Data that try to make computer systems exploit previously acquired knowledge or knowledge that was implicitly present but had not yet emerged explicitly in the system [5].

We are currently in a period of technological progress. Machine Learning (ML) algorithms, Deep Learning (DL), and Big Data are some terms that are becoming more popular in this sector. For example, Big Data is valued for predicting and segmenting possible candidates based on specific criteria. The candidate's digital footprint allows ML and DL methods to learn more about them than just their resume. In this way, candidates' primary tools have been their cell phones, computers, or other devices with internet access [6]. The reason is that candidates can attach documents, demonstrate their capabilities through tests, answer recruiter demands, and accept interviews or video interviews according to the needs of the evaluating organization.

The goal is to have the most effective and efficient matching process possible [7, 8, 9]. This means that improved automated applicant tracking software, chatbots, streamlined and configurable online assessments, video interviews, and the utilization of social and professional networks are necessary nowadays. In this work, we give an overview of the current use of IA in the context of e-recruitment.

The rest of this work is structured in the following way: Section 2 reviews state-of-the-art personnel selection techniques using information and communication technologies. Section 3 explains what quantitative and qualitative advances AI and Big Data can bring to personnel selection. Section 4 addresses the remaining challenges that need to be solved shortly. Furthermore, finally, the significant conclusions that can be drawn from this work are detailed.

2 State-of-the-art

The complicated job market situation in many countries worldwide and the increased geographical flexibility of employees are significant labor market issues. As a result of this situation, organizations frequently receive many applications for each open position that they need to fill. Because of this complicated situation, automatically matching resumes and job offers is critical for both employers and job seekers. As a result, the development of computational methods to optimize recruitment processes today is critical [10].

Many organizations realize that AI is the next logical step in their digital transformation. Despite the excitement, there are many misconceptions regarding this technology. First, it is currently difficult to establish an accurate description of AI because that is a concept dependent on the definition of human intelligence (which has numerous interpretations to date). Secondly, because it is also rather challenging to encompass all aspects of AI in a single term. However, in the context of this work, we define it as a machine's or software's ability to replicate a person's intelligence.

In this context, ML learning algorithms are methods that can be learned without having to be explicitly written. Before generating predictions or choices, a model is trained on data and then learns from it [11]. In the last times, its operation was found in neural networks using the so-called DL methods, which are the closest to the human nervous system's operation. These neural networks are hierarchical, meaning they learn information in layers. The knowledge learned becomes increasingly abstract and sophisticated as more levels are added. In this way, DL algorithms are distinguished by their increased number of levels and complexity. In contrast, big data can analyze patterns that occur in massive amounts of information, searching for statistically significant evidence.

3 AI and Big Data for e-recruitment

A selection process is initiated when there is a need to fill a vacancy, which can be accomplished through reorganization, dismissals, or redundancies, among other methods. Then a job analysis is conducted to determine the skills, training, and experience required to perform the job responsibilities and to which the candidates must adopt [12]. Following that, recruitment takes place, which entails looking for people who might match the criteria outlined in the previous stage. This recruitment might be internal, in which case the organization examines existing employees within them to fill the vacancy, or external, in which case the organization searches for individuals outside the company. It is vital to assess all candidates to determine which one is the best fit for the job. Selection approaches such as personal interviews, professional and knowledge examinations, situational testing, and group dynamics can be used to conduct this evaluation.

However, it is the use of AI techniques that will bring about the actual digital revolution. Organizations have been able to automate and optimize the earliest stages of the selection process by applying and integrating ML algorithms, DL, Big data, and even natural language processing solutions.

Many duties, particularly those linked to recruiting, initial screening, and selection, are made more accessible by these tools for recruiters. The most critical stages that can be automatized are screening, candidate search, candidate match, candidate classification, interview planning, and maybe applicant tracking systems.

- **Accuracy:** AI aims to avoid unsuccessful recruitment. Algorithms capable of assessing the compatibility between the candidate's skills and those stated in the published job offer. It can also help with the retention of talent. It can also forecast when an employee wants to quit the company, when a new candidate is needed, and when employees are most likely to leave.
- **Bias removal:** It allows fair assessment of the candidate and facilitates the faster screening of candidates, not losing candidates and attracting a more suitable person for the role.
- **Branding:** When a corporation employs AI in its operational procedures, it projects an image of adaptability and innovation to job applicants.
- **Effectiveness:** When compared to human behavior, AI methods have a minimal margin of error. The systems can detect behaviors that people are unaware of.
- **Improved applicant experience:** Automated methods provide better feedback than recruiters directly because of the time constraints. As a result, candidates are always kept up to date on the status of their applications.
- **Speed:** Automation makes integrating an applicant into an organization more straightforward, making the recruiter's job easier. It enables the establishment of keywords to search for candidates and eliminates different kinds of risk, the creation of high-quality databases with applicants who meet the established criteria, the analysis of their reactions, and the establishment of an applicant leaderboard.
- **Time saving:** Because the process is much faster, time spent on repetitive and low-value tasks is reduced, resulting in time savings.

We will now review some of the challenges that remain to be addressed in this context. These challenges combine the technological side and the social side since both sides of the coin will be impacted by the rapid development of these new e-recruitment models.

4 Open Challenges

New integral solutions for e-recruitment are made up of computer systems that can adapt to human demands. It is not always necessary to replace human workers in the public and private sectors but rather improve it. Organizations that view AI as a replacement for human labor are likely to stagnate, but organizations that integrate AI into their operational processes are likely to become industry leaders.

Because of the efficiency and time savings involved, the adoption of solutions that intelligently automate selection process chores is regarded as appealing. Furthermore, AI technologies streamline and optimize the most common selection process, improving the efficiency of human resources departments. However, several issues still need to be addressed soon to achieve a wider penetration of these technologies. Below, we look at the most relevant challenges to be faced shortly by both academia and industry.

4.1 Cost reduction

AI solutions require significant investments in terms of time and money, and only multinational corporations can typically assume those investments in greater quantity and quality. Furthermore, implementing this type of technology requires ongoing training for employees because they work with complex tools. Therefore, current solutions are still quite expensive, and it is urgent to develop new approaches that can facilitate access and democratize the use of this technology in a generalized way.

4.2 Lack of qualified personnel

A lack of qualifications complicates the employment process due to the increased demand for digital profiles and a scarcity of potential employees with the requisite skills and expertise. This means several things. We may lose good candidates because they are not familiar with the use of new technologies in recruiting. But also, candidates who have exceptional skills and do not know how to develop their new roles. Therefore, these aspects must be considered when developing new solutions in this context.

4.3 Solution to the associated problem of unemployment

It is often assumed that the advancement of AI will endanger workers. The question is whether AI replaces humans in all domains, it will eventually lead to job losses and a big societal impact. Although this challenge lies outside the technological field, it is an aspect to be considered because its impact on human lives can be very profound. Therefore, as progress is made in the development of computer systems to automate many tasks, it is important to be aware of and re-think the new roles in which people will be needed.

4.4 Bias and risk mitigation

The most entrenched form of bias is the human behavior that AI imitates, and this may be generalized to hiring because these systems learn from the data that a person incorporates, sometimes leading to discriminatory behavior. Therefore, special care must be taken to design methods and tools that can avoid falling into fallacies or other kinds of unfair situations when deriving explicit knowledge using this family of methods and technologies. In the future, we expect to see more related work in this direction.

5 Conclusions

We have seen how AI systems are changing how the Human Resources department fulfills its daily tasks in this work. The reason is that AI systems can enable professionals from that domain to individually evaluate the most suitable candidates identified, be fairer in hiring, and save time analyzing the data of unsuitable candidates for vacant positions, allowing them to devote their time to other tasks that add value to the organization. In this way, significant competitive advantages can be achieved.

When AI and Big data are applied to the field of personnel selection, two key concepts emerge social media and evaluation through instruments that are not based on candidate information but their behavior, but on the generation of a set of data and on systems that allow this data to be analyzed, accessed, and used to improve decision-making. Furthermore, other technologies such as computational linguistics and semantic technologies, among others, are employed to analyze texts and assign labels. The goal is to work with candidate inputs and create a system that can deal with these inputs.

In this way, it is undeniable that the techniques and tools inspired by AI and Big Data simplify candidate selection, but it is unlikely to be fully automated in the short future. The reason is that organizations now also demand human values, such as negotiating and persuasion abilities for interacting with employees and prospects, talent retention, employer branding, organizational culture, and human capital development, so it is to be expected that the human factor will continue to be important in the future.

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