On another note

AI in talent acquisition: a review of AI-applications used in recruitment and selection

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Abstract

Purpose – *The purpose of this study is to explore the current use of artificial intelligence (AI) in the recruitment and selection of candidates. More specifically, this research investigates the level, rate and potential adoption areas for AI-tools across the hiring process.*

Design/methodology/approach – *To fulfill that purpose, a two-step approach was adopted. First, the literature was extensively reviewed to identify potential AI-application areas supporting the recruitment and selection (R&S) process. Second, primary research was carried out in the form of semi-structured thematic interviews with different types of R&S specialists including HR managers, consultants and academics to evaluate how much of the AI-applications areas identified in the literature review are being used in practice.*

Findings – *This study presents a multitude of findings. First, it identifies 11 areas across the R&S Process where AI-applications can be applied. However, practitioners currently seem to rely mostly on three: chatbots, screening software and task automation tools. Second, most companies adopting these AI-tools tend to be larger, tech-focussed and/or innovative firms. Finally, despite the exponential rate of AI-adoption, companies have yet to reach an inflection point as they currently show reluctance to invest in that technology for R&S.*

Research limitations/implications – *Due to the qualitative and exploratory nature behind the research, this study displays a significant amount of subjectivity, and therefore, lacks generalisability. Despite this limitation, this study opens the door to many opportunities for academic research, both qualitative and quantitative.*

Originality/value – *This paper addresses the huge research gap surrounding AI in R&S, pertaining specifically to the scarcity and poor quality of the current academic literature. Furthermore, this research provides a comprehensive overview of the state of AI in R&S, which will be helpful for academics and practitioners looking to rapidly gain a holistic understanding of AI in R&S.*

Keywords *Big data, Human resources, Artificial intelligence*

Paper type *Research paper*

Introduction

In 2018, the artificial intelligence (AI) industry was valued at a staggering $1.2tn according to Lovelock *et al.* (2018) and 61 per cent of businesses were reportedly using AI somewhere across their organisation (Narrative Science, 2018). No one could have predicted the meteoric rise of AI-based technologies to such a high level of ubiquity so rapidly and so soon. However, the justification for such outstanding growth makes a lot of sense from a business perspective. AI has the potential to significantly increase profitability by 30 per cent (Purdy and Daugherty, 2017). Even then, these figures are growing at a rate so alarming that regulators and academics are struggling to keep up.

Despite this promising trend, the field of AI in recruitment and selection (R&S) remains hugely underdeveloped. On the practitioner side, the literature is overly optimistic and paints a picture that is almost too positive. While on the academic side, the literature remains close to inexistent and the scarce literature available is dominated by fictional credibility (Oksanen, 2018).

The purpose of this study is, therefore, to explore the current use of AI in the R&S of candidates. More specifically, this research investigates the level, rate and potential adoption areas of AI-tools across the hiring process.

Methodology

To carry out this investigation, a two-step approach was adopted. Firstly, the literature was extensively reviewed to identify potential AI-application areas supporting the R&S process. In light of the scarce and poor quality of scholarly articles for this specific research area, most of the data were sourced from practitioner reports. So, to ensure reliability and validity, specific vetting factors were applied including strong references, credible authors (i.e. experience and education), and absence of bias. Naturally, these reports have their limitations, which is that the organisations behind them have their own agendas and are notorious for painting a picture that may not objectively reflect the reality of AI in R&S.

Secondly, primary research was carried out in the form of eight semi-structured thematic interviews with different types of R&S specialists including HR managers, consultants and academics to evaluate how much of the AI-applications identified in the literature review are being used in practice.

Findings

There seems to be a total of 11 areas where AI-tools can be applied to support the R&S process. For clarity and concision, these AI-applications areas have been dissected into Table I. Furthermore, to maintain objectivity and breadth of study, each area of AI-application has been analysed by focusing on the below questions:

- *What* (What R&S issue is this AI-application addressing?)
- *How* (What solution does the AI-application provide?)
- *Outcomes* (What are the benefits of adopting that AI-application?)
- *Adoption* (What companies and to what extent are AI-applications being adopted?)
- *Vendors* (What companies are currently selling these AI-applications?)

Although the breakdown below may give the impression that AI is being widely adopted, a few cautions need to be made. Firstly, it is unclear how many and to what extent these applications are being adopted in practice because of the bias behind the reports used. Secondly, these applications may vary in terms of ROI, level of adoption, opportunities for growth and costs. Thirdly, the magnitude of each application remains unclear as the scarce information makes it challenging to paint a clear picture. Fourthly, some may be more popular than others, some may be more mainstream or cheaper, and some are still underdeveloped but may exhibit higher potential for adoption.

To some extent, the above applications deliver similar outcomes and in many ways, even overlap. So, to illustrate, Figure 1 below breaks down where and how these R&S AI-applications are being used across a standard hiring process, and how they overlap.

However, as previously underlined, these AI-applications were extrapolated from practitioner reports written by organisations keen to market their knowledge and establish

Table I Areas AI tools can be employed to support R&S

Ai tool	*Problem*	*Solution*	*Outcomes*	*Adoption*	*Vendors*
Vacancy prediction software	Spontaneous resignations increase costs	Software identifies employees' behavioural data and makes a prediction on likeliness to leave Prediction software gives a head start, which reduces these costs	Improved talent attrition Improved employer brand Reduced time to hire	Large companies (e.g. IBM) Data-driven firms (e.g. Facebook) High candidate volume (e.g. Goldman Sachs) High turnover (e.g. Call Centres)	Workday talent insights Bamboo HR Job rate Monster talent management
Job description optimisation Software	Complex jargon, boring, indirect discrimination can be off-putting Negatively affects diversity, applicant volumes and employer brand	Software provides recommendations to optimise job descriptions and tailor the language to different types of candidates	Improved diversity Reduces the risk of indirect discrimination Higher candidate engagement	Cisco American Express Johnson & Johnson Nvidia Expedia Evernote	Textio Three sourcing 15Five
Targeted job advertising optimisation	Wrong message to the wrong audience through the wrong channels is a waste of resources	Using AI, ML and data insights, firms can target accurate recommendations to relevant candidates	Improves candidate experience Maximises chances of candidate engagement Minimises advertising spend	Retail sector Newton Netflix YouTube	ClickIQ PandoLogic Recruitz Appcast
Multi-database candidate sourcing	Untapped potential of suitable passive candidates and former employees reduces talent pool quality	AI-tool scans through multiple databases (e.g. LinkedIn, Glassdoor, indeed, social media profiles) much faster and more accurately than a human recruiter	Accelerates candidate sourcing rate Frees up recruiter's time to focus on more essential tasks Improves quality and quantity of talent pool	Intel eBay Hilton Verizon IBM Accenture Warner Bros	Hiretual Pro Ideal
CV Screening Software	Reviewing CVs is time-consuming and costly Human error increases as the number of CVs increases	Software instantly reviews a large volume of CVs to filter out and rank the best ones	Reduces bias and issues associated with human fatigue Improves diversity Reduces costs Allows recruiters to focus on more essential tasks	IBM LinkedIn Hilton Goldman Sachs Amazon	IBM Kenexa Ideal. CVViZ Zoho Recruit Talent Recruit Talent Cube
AI-Powered psychometric testing	Outdated, boring and unengaging tests leads to negative candidate experience and negatively affects employer brand	Tests use AI to provide engaging tests designed to improve candidate experience while simultaneously assessing candidates	Allows recruiters to focus on more essential tasks Improves diversity in the work places Improves the candidate to hire (C2H) ratio	Unilever PwC Accenture LinkedIn Tesla	Arctic Shores Pymetrics Knack
Video screening software	Pre-screening interviews are costly, biased and time-consuming	Software analyses video interviews to assess person-organisation and person-job fit	Reduces bias and discrimination Allows recruiters to focus on other essential tasks Improves candidate experience	Vodafone Intel Urban Outfitters IBM Hilton Unilever	HireVue Montage Wepow InterviewStream
AI-Powered background checking	Background checking is time-consuming and ripe with human error Leads to problematic employee termination downstream	AI software scans through multiple databases to verify candidate details such as criminal record, credit rating and references	Allows recruiters to focus on more essential tasks Reduces costs associated with human errors	Fortune 500 firms Financial Firms Uber Axa Insurance BT McAfee	Check's Intelligo GoodHire HireRight Sterling Talent Onfido

(*continued*)

Table I

Ai tool	*Problem*	*Solution*	*Outcomes*	*Adoption*	*Vendors*
Employer branding monitoring	Reputation affects the way candidates perceive a potential employer Bad reputation leads to lower talent pool quality	Software scans through public data to assess overall sentiment and identify weak points in the hiring process	Stronger employer brand improves talent pool quality Positive image for clients Reduces T2H, staff turnover and overall costs	McKinsey & Co Oracle HP Dominos	Lexalytics Semantria Microsoft Thematic DiscoverText
Candidate engagement chatbot/CRM	Direct recruiting and relationship management are costly and time-consuming Unpredictable or high volume can lead to longer responses, dissatisfied candidates, which negatively impacts employer brand	Chatbots are tool that leverages Natural Language Processing to mimic human conversational abilities and can be used to engage candidates, provide quick responses to questions anytime	Reduces T2H Allows recruiters to focus on more essential tasks Improves candidate experience and employer brand	Sephora eBay H&M Pizza Hut Burberry	IBM Nuance NextIT Kore Inbenta Personetics Aivi Mya Beamery
Automated scheduling	Scheduling calls, tests, interviews or meetings is time-consuming and non-essential	AI system that picks up on scheduling expressions to automatically execute these admin tasks	Allows recruiters to focus on more essential tasks	AT&T Disney Coca-Cola Walmart General Electric Survey Monkey	X.ai Troops Tact Olono

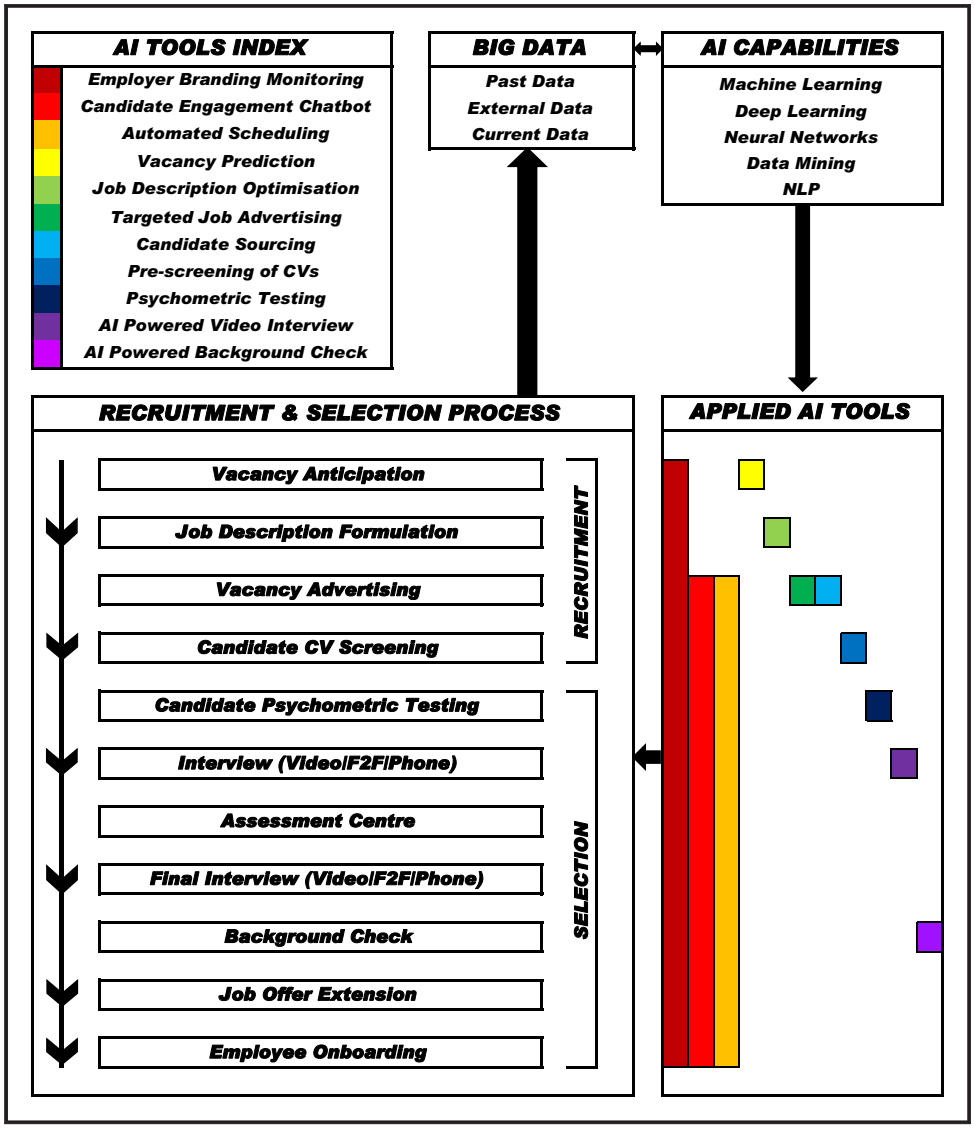
themselves as go-to sources. In addition to that obvious bias, another issue is the lack of reporting accuracy. Indeed, most of them do not give an indication of the extent to which each AI-application is being used in R&S, and those that do, provide conflicting accounts, which is understandable considering the challenges that comes with quantifying relevant measurements indicators. Finally, information expires quickly due to the rapidly changing landscape, so a figure one day may be different from the next. The list is long, but all this means, is that these 11 potential applications, as attractive as they may be, may not be used as much as these reports claim, if at all.

This limitation also seems to be mirrored by interviews carried out with different types of recruitment professionals. According to respondents*, companies are only scraping the surface when it comes to using AI-applications in their R&S process*. By all accounts, the overall consensus is that there are *more companies using* AI in R&S than most people think, but *not as much* as people think.

Furthermore, based on interview findings, AI-adopters tend to be *large organisations* with an abundance of resources or *tech firms* with the flexibility to leverage internal talent to implement these tools or *innovative firms* with enough ambition to take on first-mover risks. Even small and medium sized enterprises, which, in the UK for instance, constitute 99 per cent of all businesses and 60 per cent of the workforce is starting to use AI in their R&S because of firms experimenting with AI-products tailored to their market niche (ICAEW, 2014).

Despite the relatively high percentage of companies adopting AI in R&S, companies are far from using all 11 application. Those that are in fact adopting AI in R&S, tend to gravitate around the same three applications, which by order of popularity are chatbots/CRM apps, admin-related task automation and screening software (CVs and videos). In addition to only 3/11 apps being adopted, the actual commitment made by those AI-adopting firms remains

Figure 1 Use of AI applications in R&S



extremely low. Most companies are piloting these applications rather than actively using them.

Considering the alleged benefits of implementation, such a low level of adoption is disappointing. However, the reason behind it makes sense. These AI-tools have only started to build up momentum over the past few years. As a result of this, most AI-applications are still at an embryonic stage, present a multitude of technical and human challenges, and need further development.

Recommendations

Based on these findings, this explorative research posits the following recommendations for practitioners.

1. *HR Managers*: How to navigate this constantly changing the landscape?

"Considering the alleged benefits of implementation, such a low level of adoption is disappointing. But the reason behind it makes sense. These AI-tools have only started to build up momentum over the past few years".

- Recommendation one: be cautious of buying AI-products from vendors as they may present some technical issues. Ensure meticulous vetting of products before purchase.
- Recommendation two: precaution is good but late adoption is bad. Preserve a front-row seat and eyes on the ball to optimise the timing of entry into AI for R&S. Indeed, there are first-mover disadvantages, but this resource (human talent) is harder to catch up with.
- Recommendation three: sponsor data scientist training courses. It will elevate your profile in the industry, you will develop contacts and have first pick on the talent needed to build in-house solutions.

2. *Vendors*: How to survive in this changing environment?

   - Recommendation one: clients will always be sceptical of your products. To address that, convince the people these companies listen to, namely, big consultancies like the Big 4 who advise most Fortune 500 companies.
   - Recommendation two: to stay relevant, make it challenging for companies to replicate your product in-house. The following strategies might help. Firstly, make you are offering so compelling (value for money) that it defeats the point of replicating it in-house. Secondly, forge and maintain strong relationships with key industry players (i.e. competitors, suppliers, governing bodies, etc). Thirdly, establish yourself as a go-to player. Finally, ensure your workforce is happy enough to reduce the risk of intellectual property poaching.

3. *Recruitment Agencies*: your existence is threatened by AI-vendors with better offerings and/or companies building cheaper in-house solutions. Conveniently, some companies lack the confidence to undertake that transition, and there will still be a need for human interaction in R&S, especially around senior vacancies. In the interim, below are some suggestions:

   - Recommendation one: think about integrating AI into your business model.
   - Recommendation two: stay a step ahead of AI-vendors by offering a more compelling product.
   - Recommendation three: hire a tech-savvy workforce to reduce resistance to change and stimulate innovation.

4. *Candidates*: AI in R&S is coming whether you like it, and revolutionises the way you need to present yourself, which is good news for minorities and disadvantaged groups (Min, 2017):

   - Recommendation one: research how to please the machine and the interviewers. Find out what the system looks for to increase your chances of getting hired (e.g. displaying appropriate body language in video screening software).

5. *Entrepreneurs*: AI in R&S is filled with unexplored niches, to name of few:

   - Industries (e.g. call centres, tech and sport).
   - Company sizes (e.g. large vs SME).
   - Labour skill type (e.g. coders, yacht-crew, waiter).
   - Geographies (e.g. US/UK/China vs unexplored markets).

Furthermore, companies are acquiring vendors rather than building in-house tools, which presents a buyout opportunity. However, an eye needs to be kept on important aspects such as changing regulations, ethical dilemmas and threat of new entrants.

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