

A STUDY ON ARTIFICIAL INTELLIGENCE IN HR

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ABSTRACT Artificial Intelligence is rapidly revolutionizing so many industries at such an alarming rate that one such advanced AI robot, Sophia, joined the panel and was pitched questions during the United Nations's convention on sustainable development. Artificial intelligence is producing multiple solutions for hiring managers including basic recruiting tools, intermediate applications and advanced AI solutions. Together or independently, these tools are creating a more effective way for human resources to predict a candidate's future success with their company. artificial intelligence (AI) is transforming the human resources field altogether. The current study would throw some light on artificial intelligence breakthroughs and implications with respect to HR .

KEYWORDS: Artificial, Intelligence, Human, Resources, Functions, Implications

I.INTRODUCTION In computer science, artificial intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. Computer science defines AI research as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Kaplan and Haenlein define AI as "a system's ability to correctly interpret external data, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation". Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving". The scope of AI is disputed: as machines become increasingly capable, tasks considered as requiring "intelligence" are often removed from the definition, a phenomenon known as the AI effect, leading to the quip in Tesler's Theorem, "AI is whatever hasn't been done yet." For instance, optical character recognition is frequently excluded from "artificial intelligence", having become a routine technology. Modern machine capabilities generally classified as AI include successfully understanding human speech, competing at the highest level in strategic game systems (such as chess and Go), autonomously operating cars, and intelligent routing in content delivery networks and military simulations. Kaplan and Haenlein classify artificial intelligence into three different types of AI systems: analytical, humaninspired, and humanized artificial intelligence. Analytical AI has only characteristics consistent with cognitive intelligence generating cognitive representation of the world and using learning based on past experience to inform future decisions. Human-inspired AI has elements from cognitive as well as emotional intelligence, understanding, in addition to cognitive elements, also human emotions considering them in their decision making. Humanized AI shows characteristics of all types of competencies (i.e., cognitive, emotional, and social intelligence), able to be self-conscious and self-aware in interactions with others.

AI and automation might replace roles, it's easy to forget that these very same technologies have a huge role to play in finding, securing and retaining employees". "In this era of constant change and digital skills shortages, finding the right talent is more challenging than ever. By using AI and automation, businesses can identify a diverse range of top candidates quickly and easily, and at a pace that keeps stride with the frenzied speed of modern business."

Basic artificial intelligence programs that can help recruiters with the sourcing and screening processes include screening chatbots and automated social media scraping tools. These tools are designed to provide weak or average indicators about an applicant's likelihood of success with the company. Mya, an AI recruiting assistant created by FirstJob, is one such chatbot that interacts with applicants to verify they meet job requirements, answer questions and keep them informed on their application's status, according to the Society for Human Resource Management. This bot provides 24/7 support through chat, text message, Skype or e-mail, and will contact a human when it can't complete a task. Social media scraping tools are another type of artificial intelligence recruiting tool. These bots can collect vast amounts of data through an applicant's social media profiles and use this data to predict certain behaviors like future engagement levels. Intermediate artificial intelligence applications that are used in the hiring process include things like tests, gamification or simulations that collect data from the applicant directly. Unilever is one company that has utilized an effective artificial intelligence screening process designed with the help of their partners Pymetrics. Hiring strategy requires applicants to spend around twenty minutes playing some neuroscience-based Pymetrics games. These scientific games sneakily measure a candidate's qualities like memory, relationship to risk, ability to read contextual cues and ability to focus. These intermediate AI applications usually give hiring managers a fairly good indication of whether a candidate is a good fit for the position or not, but these predictors usually don't focus on specific job metrics. Advanced artificial intelligence solutions, however, utilize custom algorithms that are created specifically to link unique job performance measures to potential candidates that best exhibit these qualities. HireVue is a company that focuses on developing these advanced AI human resource solutions. Currently, their most successful program involves a video interview that develops questions "specifically designed to elicit responses predictive of job success and find the right behaviors." The HireVue artificial intelligence program analyzes each applicant's answers, body language, tone, emotional state and keywords. Affectiva has also recently produced emotion recognition software that helps judge a candidate's honesty and emotional intelligence. These types of AI software programs are so incredibly advanced that they can literally "detect the flash of contempt that passes over an applicant's face when he discusses his ex-boss," (WirePiazza, 2018) .

II. ARTIFICIAL INTELLIGENCE AND HR FUNCTIONS

Personalized employee experiences: IBM officials in their study discussed how AI can effectively be woven into an employee's on boarding program. New employees who typically want to meet people and acquire information typically may not know where to go

Vacation requests - Employees that want to put in for vacation days are informed that it is unlikely to be approved as many others have already booked vacation in that time frame.

Determining your mood - An employee takes a client call. After the call, the employee receives feedback that he seems anxious and should take a break before his meeting.

- Team training - When an organization wants to take a more systematic approach to employee training, team managers are provided a list of training opportunities for team members.
- Hiring processes - A hiring manager is presented with information that the company's recruitment approach falls short because it interviews too few candidates. Cognitive solutions can help organizations tap into multiple data sources and reveal new insights to help companies develop candidate profiles, among other things.

Automation of 'Repetitive, Low-Value Add Tasks': AI presents an opportunity for HR to automate "repetitive, low-value add tasks" and increase the focus on more strategic work. HR spending time processing the steps of onboarding a new employee (allocating space, provisioning a laptop, etc.), saving time in those arenas can help HR teams pivot to making sure they focus on "value-add work like mentoring and continuous feedback." AI tools automate away common HR tasks like benefits management and triaging common questions and requests, HR teams will be "free to do more of the creative and strategic work that has a bigger impact on the success of their companies." Smarter people analytics: For years, companies have been collecting data on their customers to gain insights to predict future behavior. HR teams have a lot of catching up to do in leveraging these people analytics. Determining what data to track, analyze, manage and protect will enable AI to play a larger role within HR. "In the never-ending war for talent, companies will look to find innovative ways to attract top talent. Technologies that enhance the candidate experience and meet the candidate's digital expectations will help distinguish companies from one another." Removing biases: In the survey by the Human Resources Professional Association, researchers found that even when employers strive to be inclusive, they may subconsciously lean toward candidates who are most like them, or what they call "unconscious bias." Another bias, language bias, has been discovered by a psychological tool called the Implicit Association Test (IAT) that shows that people's subconscious word associations indicate bias. "These biases find their way into job descriptions, as well as resume selections. Now, thanks to AI, algorithms can be designed to help employers identify and remove these bias patterns in language they use to improve their hiring communications and welcome diverse applicants," HRPA researchers noted. AI could also present managers with candidates who may have been screened out due to human tendency to favor candidates with similar traits or competencies. HRPA researchers algorithms are free of those tendencies, which allows managers to go beyond gut feelings and rely on data-driven assessments instead. Identifying employees on the way out: Veriato's AI platforms are designed to single out employees that may be heading for the exit door. It tracks employee computer activity — emails, keystrokes, internet browsing, etc. — and stores it for one month and implements an AI system that analyzes the data to determine a baseline of normal activity patterns in the organization. "Based on that knowledge," HRPA researchers noted, "it flags outliers and reports them to the employer and also detects changes in the overall tone of employees' communications to predict when employees might be thinking of leaving." Litigation strategy: Employment-related lawsuits tend to be fact-driven, which makes gathering documents and other information critical. However, only 5 percent of respondents to Littler's survey are using advanced analytics to guide their litigation strategy. Employers may not be aware of the benefits to using analytics in this context, Crews said. "The ability to leverage data early in a case, to tease out insights before you ever take a deposition or begin evaluating the credibility of witnesses, is revolutionary." Having the ability to find key documents lets

the employer see what people were actually doing at a certain time and can help build a story, he noted. Imagine that a repair technician who travels to residences to work on refrigerators files a wage and hour class action claiming that technicians weren't paid for all hours worked. The complaint and subsequent depositions will reveal the workers' version of what their days looked like, but analytics can be used to verify or refute their story."The more information you have, the better the decision-making process you can engage in," Crews said. The employer could gather GPS data from work trucks, routing instructions, communications about the technicians' assignments, invoices, and cellphone and login information. These data will paint a picture. The data may indicate that the technicians didn't work off the clock and were appropriately compensated for all hours—then the employer has some solid evidence on its side. But if the data reveals that the workers' claims have merit, it is better to review the data and know about it on the front end before going through lengthy and costly litigation, Crews said. Pay Equity: Data analytics can also be used to assess pay equity. Legislation in this area is changing rapidly at the state and local level. For example, at least 12 jurisdictions have passed laws prohibiting employers from asking job applicants about their prior compensation. The idea behind such laws is to stop perpetuating historic discriminatory pay practices based on gender, race and ethnicity. Technology can be particularly helpful to monitor employee compensation for discrepancies based on protected categories, Crews said, noting that some jurisdictions with pay equity laws have a safe harbor for employers that conduct audits and attempt to eliminate gaps. There are tools available that make it easy to build a user-friendly experience and to analyze, understand and communicate data, he added. "You no longer have to rely on just an Excel spreadsheet full of math." Getting a picture of what is actually happening in the organization is powerful, Crews noted. "When advanced technology is paired with good storytelling and visualization, it empowers HR professionals to have the conversation with the compensation team, executives and other decision-makers." Chatbots: Certain technology, such as chatbots, can help employees access important information about policies and procedures from anywhere and at any time. Chatbots communicate by text and can be useful for answering common employee questions. Two-thirds of respondents said that they believe employees are more comfortable using chatbots than other forms of contact for transactional inquiries about paid-time-off policies, open enrollment and leaves of absence, according to a 2017 ServiceNow survey of 350 HR leaders. ServiceNow is a cloud computing company based in Santa Clara, Calif. Employers that use chatbots need to ensure that they are complying with data security, disability and other federal and state employment laws. Legal pitfalls: When using AI to drive human resources strategy, HR professionals must monitor systems for bias. They need to look out for disparate impact—which happens when a seemingly fair or neutral standard is actually discriminatory in practice. For example, a recruiting tool may weed out candidates that are more than 10 miles away from the worksite. What if the neighborhoods surrounding the worksite are predominantly made up of affluent white families? This hiring criteria could have a disparate impact based on race and ethnicity (Nicastro, 2018).

Recruiting: We make many decisions on gut feel. One study showed that most hiring managers make a decision on a candidate within the first 60 seconds of meeting a candidate, often based on look, handshake, attire, or speech. Does we really know what characteristics, experiences, education, and personality traits guarantee success in a given role? No we don't. Managers and HR professionals use

billions of dollars of assessment, tests, simulations, and games to hire people – yet many tell me they still get 30-40% of their candidates wrong.

Algorithms based on AI can weed through resumes, find good internal candidates, profile high performers, and even decode video interviews and give us signals about who is likely to succeed. One organization uses Pymetrics' AI-based gamified assessment to screen candidates for its marketing and sales roles and their success rate has gone up by over 30%, while eliminating all the “interview bias” and “educational pedigree bias” inherent in the current process. AI in recruitment will be huge. While we are all worried about job skills (software skills, sales skills, math skills, etc.) most research shows that technical skills make up a small part of a person's success. In one of the most recent research on High-Impact Talent Acquisition, study found that the level 4 maturity companies, those with the highest financial return from hiring, allocate almost 40% of their hiring criteria to emotional and psychological traits like ambition, learning agility, passion, and sense of purpose. Will AI uncover this too? Perhaps. (Vendors in this market include LinkedIn, Pymetrics, Entelo, HireScore, IBM, Textio, Talview, Unitive, PredictiveHire, and more.) Employee development and learning: We really don't know how to “train” people perfectly. The global L&D industry is over \$200 billion and most learning professionals tell us that at least half this is wasted (forgotten, inappropriately applied, or just wasting people's time). But we don't know which half this is! Do you as an individual know what you “need to learn” to be better at your job? We all have a pretty good idea, but what if we had algorithms that monitored and studied the skills, behaviors, and activities of the highest performers in our teams and then just told us how to be more like them? These kinds of “Netflix-like” algorithms are now entering the world of learning platforms, making learning as useful and fun as watching cable TV. Again the market is young, but the opportunity is massive. Research shows that the average employee has less than 25 minutes a week to train and learn; if we make that time more relevant everyone will perform better. (Vendors in this market include Degreed, EdCast, Filtered, Volley, Axonify, BetterUp, Clustree, Workday, and more.) Management and leadership: We operate like Zen masters. We read books, we go to workshops, we copy the bosses we admire, and we glorify the successful leaders of the day. Do we really know the science of leadership? I'd suggest it's a fleeting topic. This year we are focused on purpose, mission, and followership. Only a few years ago it was “servant leadership” and when I was young it was “execution and financial acumen.” Most studies find that there are dozens of management and leadership traits that define success, and each of us brings a slightly different and unique combination of them.

AI can now help decode this. Three vendors who have built “AI-based” coaching tools, systems that request feedback, read comments, and intuit sentiment from employees and teams. They use this data to match these individual and teams' issues against higher performing teams, and use that data to give managers and supervisors “nudges” on how to do better. One client told that within only 3 months of using this tool their leadership teams showed a 25% improvement in corporate values just based on small behavioral nudges. (Vendors in this space include Reflektiv, BetterWorks, Ultimate Software, Zugata, Humanyze, ADP, Impraise, and more.) Fraud and compliance: The opportunities are massive. One study found that employees who steal or commit crimes are “contagious” to their peers (people who work with them pick up bad habits). AI can look at organizational network data (email traffic, sentiment of comments) and identify areas of stress, areas of possibly ethic lapses, and many other

forms of compliance risk, and the point out the “red areas” to HR or compliance officers so they can intervene before bad behavior occurs. (Vendors in this space include TrustSphere, Keencorp, Volley, Cornerstone, and more.) Well-being and employee engagement: AI is now being used to identify behaviors that cause poor work performance. In safety AI can identify behaviors and experiences that lead to accidents. A new breed of survey tools can identify patterns of stress and bad behavior and alert HR or line managers. (Vendors in this space include Limeaid, VirginPulse, Glint, Ultimate Software, CultureAmp, TinyPulse, Peakon, and more.) Employee self-service and candidate management: A new breed of intelligent chatbots can make interactions intelligent and easy. (Vendors in this space include IBM, ServiceNow, Xor, Mya, Ideal, Paradox, and more) (Joshbersin, 2018).

III.DISCUSSION

AI is not some magical computerized persona; it is a wide range of algorithms and machine learning tools that can rapidly ingest data, identify patterns, and optimize and predict trends. The systems can understand speech, identify photos, and use pattern matching to pick up signals about mood, honesty, and even personality. These algorithms are not “intuitive” like human beings, but they are fast, so they can analyze millions of pieces of information in seconds and quickly correlate them against patterns. Statistically AI systems can “predict” and “learn,” by plotting curves of possible outcomes and then optimizing decisions based on many criteria. So you could imagine an AI system that looks at all the possible demographics, job history, and interview questions with a candidate and then “predicts” how well they will perform on the job. (HiredScore, Pymetrics, HireVue, IBM, and others are working on this.)

All these applications are new, and as exciting as they seem, there are plenty of risks to worry about. The biggest is that AI cannot work without “Training data.” In other words, the algorithms learn from the past. If your current management practices are biased, discriminatory, punitive, or overly hierarchical, you may just wind up institutionalizing all the things you hate. We need AI that is transparent and “tuneable” so we can inspect the algorithms to make sure they’re doing the right things. Just like the early automobiles didn’t always drive straight, our early algorithms are going to need “bumpers” and “tuning knobs” so we learn how to make them more accurate. The systems can institutionalize bias. Suppose your company has never hired women in engineering and has very few African American engineers. The AI recruitment system would naturally conclude that women and black engineers are less likely to move into management. This type of bias has to be carefully removed from the algorithms, and it will take time to do this well.

There’s a risk of data exposure and inadvertent misuse as well. Consider a common use of analytics where we try to predict the likelihood of a high-performer leaving the company. If we tell managers “this person has a highly likelihood of leaving” we may in fact create the wrong behavior – the manager may ignore this person, or treat him or her differently. We have to learn how to apply behavioral economics carefully. AI is a “tool” for suggestion and improvement – not an independent decision making system today. AI leaders at Entelo discussed the need to create “interpretive” and “transparent” AI systems. In other words, whenever the system makes a decision, it should tell us why it made this decision, so we as humans can decide if the criteria it used are still accurate. This is one of the most important criteria for new tools, and unfortunately today most AI systems are a complete black box.

Consider what happens when an autonomous vehicle has a crash. We spend a lot of time diagnosing how it happened, what visual or algorithmic systems failed, and what conditions could have led to the accident. What if AI makes the wrong recommendation on a candidate, or a salary adjustment, or a management intervention? Will we find out? Will we diagnose it? Will we even notice until it's too late? We have lots of work yet to do to instrument and learn how to "train" our management-base AI systems to work well. Right now the hype around AI is at an all-time high. Every HR software vendor wants you to believe they have a machine learning team and a best-of-breed AI solution. Yes, these capabilities are immensely important to this industry, but don't believe the hype. The success of an HR tool will be dependent on many things: the accuracy and completeness of its algorithms, the ease of use of its systems, but more important than all its ability to provide what is called "narrow AI" – or very specific solutions that solve your problems. This can only be done when the vendor has massive amounts of data (to train its system) and they gain lots of feedback on how well it works. So I believe the barriers to entry are going to be focus, business strategy, and client intimacy, not just having great engineers. And don't buy a system that's a black box unless you can really prove it in your company. Every company's management and people decisions are often culture based, so we'll have to take time to try these systems in the real world and tune them for best use. IBM, for example, has spent years optimizing its AI-based compensation and career solutions for its company, culture, and business model. They are now bringing these tools to corporate clients and finding that each implementation teaches IBM new things about the algorithms to make them better for that industry, culture, or organizational need. Despite these challenges and risks, the upside is enormous. Companies spend 40-60% of their revenue on payroll and much of this enormous expense is driven by management decisions we make on gut feel. As AI systems in HR get smarter, more proven, and more focused on specific problems, I believe we will see dramatic improvements in productivity, performance, and employee wellbeing. We just have to be patient, vigilant, and willing to invest.

IV.IMPLICATIONS

The time of spending hundreds of man-hours filtering through thousands of CVs and online job-board profiles for new employees is coming to an end. For example, ideally, a company, specializing in AI recruiting services, claims on their blog and estimates their AI candidate sourcing algorithm can "reduce time to hire from 34 days to 9 days". This is a 73.53% increase in candidate sourcing and on boarding efficiency utilizing a non-biased process that removes stereotypes from sourcing and finds candidates that are technically appropriate for the position. is another task that can be automated by AI technology. By using this intelligent-style method much more online data can be collected such as information from social media profiles, previous online job records, and educational qualifications that will then enhance the ranking system of candidates for recruiters to select from.

Given AI technology can efficiently source and screen multiple candidates in a short period of time the acceptance criteria set by the business and the candidate profile has to be matched to identify and match the most promising candidates for the job. Using this gathered data AI programs can then rank candidates on a scale using various pieces of information such as experience, work history, skill sets, and salary expectations to find the right person. This method of processing data is becoming highly valued in today's market because of its ability to locate passive candidates, who are generally the most

desired, as they aren't actively looking for other positions and they are content with their current position meaning they are an asset to their company which in turn means there is less competition to place them.

A huge part of the recruiting timeline, after you've found the 'perfect fit' for the role, is interviewing. In today's international job market, numerous expats are actively seeking roles abroad while not always being able to go to the respective country of their desired job just for an interview. There are a few startups that are specializing in AI interviewing software such as HireVue and Mya. These companies are shifting their focus on simplifying the interviewing process by utilizing video as the medium. Programs such as HireVue use preset questionnaires that the candidate can then film themselves answering. This allows for the recruiter to generically interview a higher number of potential candidates via pre-recorded videos, which can then be sifted through to select individuals who will progress in the talent acquisition process.

Using AI technology, the footwork is taken care of from sourcing to interviewing which drastically reduces the recruitment timeline. This, in turn, allows for the talent acquisition team to engage with prospective candidates and determine their ability to perform in the specific role, and inevitably, make a placement at a much faster rate.

Along with numerous man-hours, countless company dollars are being spent on old-fashioned recruitment in today's market. A 2016 Society of Human Resource Management survey found that "the average cost-per-hire is \$4,129". That is a staggering dollar amount to place one individual. Let's put it in perspective.

In 2017, CNN reported that Amazon had "541,900 employees in the third quarter of 2017, which was up from a little more than 300,000 in the same period a year earlier." This means that over that period 12 month period, Amazon hired an estimate of 241,900 new employees. Granted Amazon is already using AI technology in its recruitment services but for the sake of the argument let's pretend they didn't (like a lot of large companies today) and let's pretend their cost of hiring one employee was that of the average found by SHRM. The cost would look like: \$4,129 (Average cost to hire) x 241,900 (New employees) = \$998,805,100 in recruitment costs per 1 year (Pay, 2018).

It's estimated that in this scenario Amazon could have spent upwards of \$1 Billion USD on recruitment costs alone over the period of 12 months. This is quite astounding and nearly incomprehensible, but possible. With many of the AI recruitment and Human Resources programs available offering tailor-made packages on a monthly, quarterly, and yearly subscription basis, it's not hard to see that you can save a pretty hefty penny by transitioning to AI technology solutions.

In the recent IBM Think 2018 panel, Richard Hughes, Senior Vice President at UnitedHealth Group, stated, "The future is going to be centred on the employee experience and taking engagement down to the individual level. There is no way we can do that on any scale without applying the best that 'data science' has to offer." AI isn't just about giving humans a hand at doing lower level tasks, it's about data. Vast amounts of data can be collected at an exponentially higher rate with AI than humans can

wish to accomplish. This data is what drives businesses in general, not only in the Human Resources department.

V.Conclusion As much as the HR technology landscape continues to be disrupted by AI. HR teams need to balance these cognitive tech advancements with transparency. HR leaders and practitioners need to have a clear understanding of how decisions are being made to mitigate unknowingly injecting bias into their programs,. This transparency will be essential in making sure that employees trust the new technology.

As you've gathered by now, there are multiple advantages to utilizing AI technology for your human resources and recruiting needs, but nothing is perfect in life, certainly not a budding form of technology that has yet to reach its maximum potential. Many services and programs offered could lack different aspects one might be accustomed to in manual the non AI world, such as the ability to leave feedback to a candidate after a video interview, or specific CV search criteria. One major aspect that AI technology lacks is empathy and human interaction or the opportunity to handpick a candidate and get to know them personally during the recruitment process which simply cannot be done at this time while relying on AI technology to do all the work for your company. AI sees data whereas humans sense emotion and this is something that will not be changing in the foreseeable future.

Therefore, it is up to you to decide if AI technology is the right solution for your businesses' needs. Are you a corporation with thousands of employees, spending big bucks on recruitment annually and desperately need a way to streamline the process and cut costs? Are you a mom-and-pop shop that has less than 15 employees and takes pride in getting to know each employee like family? Every business has different goals, budgets, and desires, but the beauty of the AI industry is that there is a solution for everyone, no matter how big or how small.

It is up to you to decide what works for your business, whether that is adapting to the constant growing AI industry or keeping things as they are or just introducing small changes over time. Either way, AI technology is only going to keep growing and at some point in the future AI will be the norm and the old-fashioned ways of recruiting and human resource processes will seem like the stone ages.

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