Emotion AI: Integrating Emotional Intelligence with Artificial Intelligence in the Digital Workplace

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Abstract

The recent advancements in artificial intelligence (AI) and digital transformation have led to a paradigm shift in the interact pattern of people with technology. With the adoption of artificial intelligence (AI) in all business processes, the biggest challenge being faced by organizations is the integration of artificial intelligence (AI) with emotional intelligence (EI). There is no denying the fact that as more and more technology is being involved, and it has become a two-way process. Human beings are trained to work with technology and the technology is taught to relate to people. An extensive secondary research is conducted to comprehend the digital transformations at workplace and explore the evolving concepts of AI and how will it connect with the emotions of the 'Analog' being applications. Through this paper, we will try to bring forth how artificial intelligence is being used as a support system to emotional intelligence and the emerging concept of emotion AI.

Keywords

Artificial intelligence • Emotional intelligence • AI • EI • Emotion AI

1 Introduction

AI refers to the use of technology and automation in doing tasks that require some degree of intelligence to accomplish (EY homepage, 2018). The use of automation and AI in business processes has led to increased productivity and efficiencies. The recent advances in AI technology in this digital era have streamlined business processes and helped in increasing employee and organizational capabilities. Their greatest support is in the area of recruitment, talent acquisition, employee development, payroll, reporting, self-service transactions, customer retention and so on. AI technologies are skilled at mastering the human cognitive capabilities that simple software cannot but emotional intelligence is one such area where AI is still in its nascent stages, making it the most valued skill in today's technological era. Although automated systems allow a more personalized and interactive HR experience both for the employer and the employee, still in this digital transformation, the tough job is 'We' the analog people. The tide of digitalization has taken the entire workspace in its storm and the fear of being replaced by machines haunts the most capable of human resource. AI is taking a crucial turn by integrating emotional intelligence with the advanced AI. Today, AI is just not restricted to Apple's Siri with Ex Machina, it is even more than a Chatbot which comes up on an organization's intranet to solve your queries or help you with new projects. The world where machines could interpret and respond to human emotions is no more virtual. The emerging concept of emotion AI or artificial emotional intelligence is already being used to develop systems that are capable of recognizing and simulating human emotions and adapt their behavior to give a suitable response to these emotions.

2 Research Objectives

This research has been carried out with the following objectives:

1. To study the application of artificial intelligence in different organizational processes.

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2. To study the evolving concept and applications of emotional artificial intelligence.
3. To propose a framework for integrating artificial intelligence with emotional intelligence.

3 Literature Review

John Mc Carthy, an American computer and cognitive scientist and his colleagues Turing, Minsky, Newell and Herb Simon organized the Dartmouth Conference in 1956 (Roberts, 2016) which established AI as a field. Through this conference, Mc Carthy explained "that every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it." He is also credited to have coined this term "Artificial Intelligence" (Cukier, 2019). The definition from Technopedia gives a reasonably good explanation of AI "Artificial Intelligence is an area of computer science that emphasizes the creation of intelligent machines that work and act like machines" (Technopedia, 2020).

With the advancement in technology and innovations, AI is taken over all the possible functions starting from smartphones apps to voice-enabled assistants so the usage of AI to ease the job of professionals in financial, health and safety services, and education is greatly promoted. As stated by Geetha, R., & Bhanu, S. R. D in their research paper on 'Recruitment through Artificial Intelligence', Jonathan Kestenbaum, executive director of Talent Tech Labs, a talent acquisition consultant in New York, has agreed to the fact that impact of AI on work may lead to anxiety in HR professionals but he positively affirms that implementing AI softwares would definitely eliminate mundane tasks and would prove to be a problem solver for HR (Geetha, & Bhanu, 2018).

AI is being efficiently used in writing job descriptions (JDs), matching them with applications received, screening of candidates using expert systems, employee education at the time of onboarding, training and learning, compensation designing, performance and potential appraisal (Copeland, 2016; Unahabhokha et al., 2007; A report by EY on The new age artificial intelligence for human resource opportunities and functions). David Mallon, Vice President and analyst at Bersin states that handling routine tasks and services will soon be taken up by computer-enabled robots or robotic process automation (RPA). Human efforts will be largely replaced by RPAs having capability of imitating human skills (Hagginbottom, 2018). The impact of AI on management functions and marketing strategies has been studied by Davenport et al. (2020). He concluded that AI will affect major shifts in formulation and implementation of marketing strategies and consumer behavior. Rai (2020) has focused on the need to look behind the "black box" of marketing and explain the functioning and rationale behind sales and service driven by AI.

The emerging area of AI is emotion AI, better known as artificial emotional intelligence or affective computing which is being widely used in areas like health care, advertising, customer service and market research. It is the application of technology to study non-verbal cues of humans like their facial expressions, their postures, gestures, body language, tone and pitch of voice to analyze their emotional state.

A professor at the Hebrew University, Jerusalem Dr. Yuval Noah Harari has written in his bestselling book 'Homo Deus' that humans are nothing but a collection of biological algorithm shaped through million years of evolution. He further postulated that there are chances that organic algorithms can be replicated and taken over by non-organic algorithms. The above-stated views have also been strengthened by Dr. Max Tegmark, Professor at MIT in Boston in his book Life 3.0: Being Human in the age of Artificial Intelligence. Understanding it better leads to the conclusion that computers will be able to better manipulate and analyze human emotions than humans themselves.

4 Methodology

In this study, the authors have used qualitative and exploratory method to study the applications of AI in organizational settings. It is a conceptual study based on review of literature. Systematic literature review was done to gain deeper insights into the concept of emotional artificial intelligence and its applications in modern organizations. Systematic literature review ensures high quality of the review process and outcomes along with providing a framework that helps the researchers integrate the past findings with the existing knowledge.

The collection of related information was done through Scopus and Web of science portals with relevant contents of academic and scientific journals and papers presented at conferences using keywords like artificial intelligence, emotional intelligence, applications of artificial intelligence and emotional artificial intelligence.

5 AI as an Aid in Organizational Processes

Artificial intelligence has revolutionized the way different processes used to be conducted. Automation has helped save time and effort by streamlining various repetitive tasks, thus, allowing the workforce to devote them to more productive and creative tasks. The most common uses of AI can be seen in the areas discussed below by the authors.

5.1 Talent Acquisition

The widespread application of AI in HR is evident in acquisition of talent. The use of technology and new functionalities like screening questions, online platform for video interviews and Web portals for resume shortlisting has proved to be a great bliss for the recruiter. This augmented intelligence not only allows recruiters to be more proactive in hiring but also save time and cost. AI has impacted the recruitment process tremendously by enabling the recruiter to systematically align candidate's profile and match skill set appropriately with the industry requirement. (Geetha & Bhanu, 2018)

Although the shift toward technology-driven recruitment was need based and started in big organizations but with the world going digital, even the small start-ups have adopted technology in their various HR functions like posting jobs on job portals, using applicant tracking system and Chatbots to communicate with the candidates and narrow down the search and virtual interviews. Although Alan Stukalsky, Chief digital officer at Randstad US opines that the use of Chatbots in recruitment is at nascent stage. Automated computer-enabled tools have streamlined the entire recruitment process from designing job descriptions to screening candidates, maintaining databases, scheduling interviews and dealing with job seekers' queries. (Biswas, 2018). The authors have found out the different AI tools used in recruitment and represented in the form of the following Fig. 1.

5.2 Onboarding

After recruitment, artificial intelligence tools give the new candidate a better joining experience as the formalities can be done electronically, avoiding unnecessary paperwork. AI integrated systems introduce the new employee to the company virtually, providing all information regarding the rules and regulations, his job profile, his team and the company's hierarchy through a well-integrated application. It also enables customization of the process to better suit the individual candidate. Onboarding is a vital process as the initial treatment lays the foundation of a long term relationship between the employer and the employee. Although it has been stated that the role of AI is more of a facilitator that supports HR to complete tasks in less time, thus, saving time for more crucial roles that involve creative thinking and psychological understanding (Lawler & Elliot, 1996). The role of AI in onboarding has been depicted by the authors in the following Fig. 2.

5.3 Training and Learning

Along with recruitment and selection, companies are leveraging AI technologies with e-learning platforms to assess and enhance employee's skills. AI integrated systems can help the organizations in keeping pace with the new innovations and technology by training the employees in various domains. AI-enabled tools for training and development will help in enhancing job satisfaction among employees (Jain, 2016).

AI technology can be used to analyze data collected from years of experience and positions held and generate training need assessment data. It can create appropriate learning programs tracking employee's activities and also recommend videos or learning programs based on job requirements. The e-learning platforms help employees learn new skills and enhance their existing capabilities at their own comfortable pace and place. However, some issues relative to attitude and behavior of employees require the involvement of human being for handling the situation better (Hooda, 2018).

Additionally, an AI system can be integrated with an algorithm that determines career path for individuals on the basis of their training. Following are the advanced uses of AI in learning and development of employees (Fig. 3).

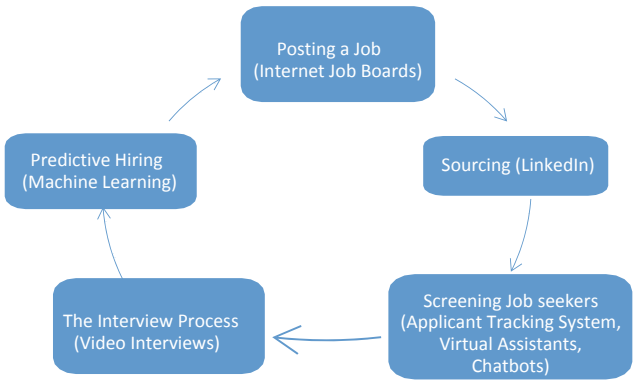

Fig. 1 AI at different stages in the entire hiring process. *Source* Self

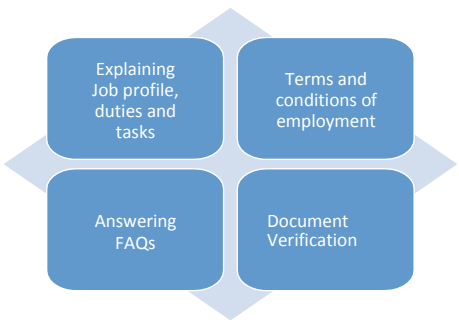

Fig. 2 Role of AI in onboarding of employees. *Source* Self

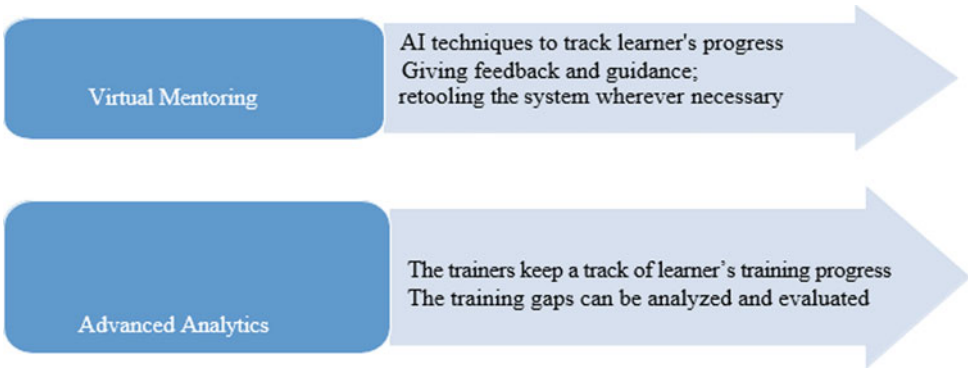

Fig. 3 Two dimensions of AI assistance in training and learning. *Source* Self

5.4 Decision Making

AI has the power to augment human intelligence and enable smart decision making. AI-enabled systems have proved to be a great support to HR department in retaining and maintaining their employees by tracking the mental and emotional well-being of their employees along with their work contributions. Technology can be used to observe and analyze employee's mood before and after a client's call. This data furthers help in their appraisal and job rotation by posting employees on job which they can handle best. AI can detect anxiety in person's behavior and tone and help the employers decide if they must intervene to make things smooth. It furthers help in making decision as regards their training. According to McKinsey Global Institute's research, "AI could deliver an additional output of $13 trillion to the world economy by 2030, which would boost global GDP by nearly 1.2% a year. Acting as a capital-hybrid, AI can aid the growth of both the economy and humans. It will definitely have a revolutionary impact on the decision-making process."

The authors have tried to depict the different AI tools used for decision making through the following model (Fig. 4).

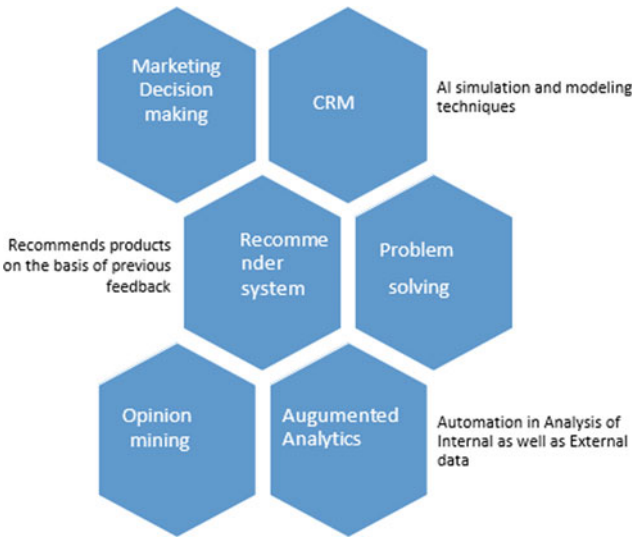

Fig. 4 Role of AI in decision making. *Source* Self

6 Emotion AI

6.1 Emotion AI Explained

Emotion AI or artificial emotional intelligence is one of the recent advancements of AI in which machines capture and evaluate the non-verbal cues of the living beings like their postures, facial expressions, gestures, and tone of voice to analyze their emotional state. It is also known as affective computing and now its rapidly being used in the field of advertising, health care, customer service and recruitment. This powerful subset of AI can measure, understand, simulate and react to human emotions on a metric which includes anger, fear, happiness, sadness and surprise. Machines may not be able to imitate humans completely but they have their own capabilities. A computer interface was developed by Takeuchi and Nagao in which facial synthetic displays were added to make the interaction more efficient (Takeuchi & Nagao, 1992). In another research by Bichshel and Pentland, it was emphasized that the man–machine interaction could also be improved by automatic interpretation of facial expressions and gestures (Bichshel & Pentland, 1993).

As explained by MIT Sloan professor Erik Brvnjolfsson, the machines are capable of capturing voice inflections and correlating them with stress or anger. They can even recognize images and micro-expressions on the face of people.

Javier Hernandez, a research scientist at MIT Media Lab (Affective Computing group) states that AI allows a true man–machine interface.

6.2 Areas Where Emotion AI Is Used

Emotional AI technology can help in better understanding of the customers by capturing the emotional reactions like

analysis of voice patterns, decoding facial expressions, capturing eye movements and measuring neurological responses (Harvard Business Review, 2019). The concept of artificial emotional intelligence has already been operationalized in many areas and industries. AI has significantly impacted industries like Healthcare, Cybersecurity and Retail (Eubanks, 2018). The most common applications can be seen in the fields of sports, entertainment, retail and health care.

6.2.1 Sports

AI is playing an important role in redefining customer service and shaping the spectator's experience in stadiums like Little Caesars in Detroit and NRG stadium in Houston by answering queries related to seats, food vendors, restrooms, and in stadium entertainment options using smart Chatbots. Facial coding can be used to collect data about the layout of venue and the stadium experience which fans respond to.

Athlete's distance, speed, stress, speed and heart rate can be monitored by wearable tech devices. This has revolutionized the sportsmen performance by predicting outcomes, minimizing risk and assisting in real-time decision making. It is application can be seen at Wimbledon where AI is used to interpret match related data, audience interaction and reactions of players to decide what content must be included in highlights, thus, saving human efforts and time for more creative aspects.

6.2.2 Entertainment

Emotion AI can be used both in production and after release response of the shows, movies or series. There are algorithms used in production enhancing the looks of an animated character to create a real look alike. Delivering personalized content in low cost and less time enhances audience engagement also. Similarly, algorithms are used in analyzing viewer's response to certain shows by capturing their responses to different characters and special effects. Emotion sensing technology is also used to sense a player's facial expressions for symptoms of stress while playing certain games. Exposing players to a virtual stressful situation prepares them to handle such real-life situations with ease.

6.2.3 Retail

Customer engagement largely depends on their emotional connect with the retail store. Computer vision, facial recognition and emotional analytics enable marketers to determine the emotions of the shoppers toward different products or the areas of the outlet. The eye movement scanners and cameras detect the facial expressions of the shoppers which are then analyzed using analytical components of AI. It further helps in setting prices, packaging, advertising and branding products. This emotional data can be used along with traditional ways of customer feedback in the gaining competitive edge.

6.2.4 Healthcare

AI-driven technology is being used in health care to determine the anxiety, stress levels, depression and heart rate of people through wearable devices and mobile apps. There are apps like Companion Mx which is capable of listening to a human voice over a telephone call and can detect anxiety and mood swings through the tone. Such apps improve self-awareness and improve stress management capacity. There are wearable devices that are used in treatment of mental illnesses, which monitor a person's heartbeat to gauze situations like stress, pain or frustration. The bioessence wearable device developed at MIT Media Lab releases scent to adjust the negative emotions if stress or pain is detected by it.

7 Emotion AI: Will AI Substitute EI?

The future of artificial emotional intelligence shows businesses using emotion analytics in decision making using multimodal emotion recognition and an emotion chip. Organizations have started focusing on matching AI and human emotionally to motivate and train people to work with new technology. The application of AI in improving business operations is recognized but the emotional abilities and human intelligence still play a dominant role in managing employees and customers. AI, if used in ways that augment humans instead of replacing them, can be more effective (Davenport, et al. 2020). Although AI acts as a buffer but is not likely to replace human beings, as customers still prefer to interact with employees more than robots or machines (Prentice, 2020).

R&D is being done to decode the science of building relationships and to incorporate AI with appropriate emotions to suitably interact with the analog human being. From past many years, organizations have been using AI to gain insights into people's behavior and leveraging these people analytics in innovative ways to gain competitive edge.

Additionally, a stronger digital IQ will move the business to a deeper "unconscious level of information." (EY homepage, 2018) Automated learning machines can be made to simulate human behavior by analyzing and consolidating people's statements, actions and intents on social media and their moods and reactions to different events. That gives a new dimension to the strategic application of emotion AI in the workplace to create a right combination of man and machine in the job space.

Based on the study, the researchers have tried to propose a framework integrating the application of AI with EI, thus, depicting the future of emotion AI as it improves not only

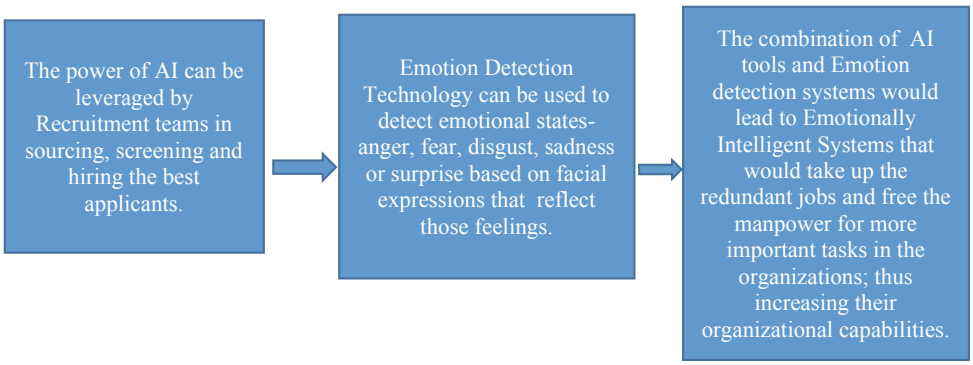

Fig. 5 Integration of AI with EI with special reference to recruitment. *Source* Self

the "doing jobs" but also the "thinking jobs". This framework has been made taken special reference of the application of this concept in recruitment (Fig. 5).

The concept of artificial emotional intelligence is being propagated rapidly and the companies that will be effectively able to imply this empathy and contextual understanding into their technologies will obviously be at the forefront in this age of technological advancement.

Although the use of AI-based technologies has swayed the entire workspace from detection of emotions of employees while performing certain tasks to detection of emotions in shoppers as they respond to certain products or services, the far reaching review of emotion research states that the science underlying these technologies is flawed and cannot be relied upon. The business of emotion detection has moved beyond science fiction to a $20 billion industry.

The problem with this would be predicting the emotional state of the people just from their facial expressions is not reliable. AI may not be able to draw correct conclusion in interpreting emotions as it may not be adapted to understand cultural differences, a smile may mean different things in different ethnicities (Harvard Business Review homepage, 2019). A group of scientists under Association of Psychological Science reviewed more than 1000 studies on this idea for 2 years and concluded that the relationship between facial expressions and emotions is convoluted, nebulous and far from universal. Moreover, humans tend to instinctively draw on other gestures such as body language, tone or pitch of voice to complete their emotional assessment but majority of emotion detection AI draw inferences mainly by mapping facial expressions only (Beck, & Libert, 2017). Such technological limitations are risky as they may draw faulty conclusions of the people in question. Certain human skills like social understanding, empathy and persuasion will prove to be real differentiators as artificial intelligence takes over the other functions. The companies should be making and training their programs to consider other aspects also like body positioning, vocal characterization and situational context like human beings.

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