In this report, I introduce the technologies of Emotion AI or affective computing, and emotion measurement. I then identify and describe the market, development, and adoption trends associated with these technologies, some opportunities within the field that are in direct relation to healthcare as well as some threats and challenges that exist in the current environment vis a vis these technologies. Finally, I identify a specific opportunity for Cotiviti to explore within its preexisting repertoire of offerings.

The use of Artificial Intelligence in the field of healthcare has been rapidly expanding. This includes patient facing as well as administrative applications. Some examples are usage in drug discovery and development, machine vision and medical image recognition for diagnostics, precision medicine etc. (Rajkomar et. al.). The effective use of AI tools can also improve operational efficacy, for example, AI-based medical scribes reduces time spent by doctors on administrative tasks. This could reduce burnout and leave more time for more patients. A Tennessee-based family physician reported an 83% decrease in time spent on documentation (VSP VISion). In addition to AI co-pilots, the technology supports effortless data retrieval” . Indeed, “AI is ready to support healthcare personnel with a variety of tasks from administrative workflow to clinical documentation and patient outreach as well as specialized support such as in image analysis, medical device automation, and patient monitoring” (Rajkomar et al.). A subfield that has more recently seen progress backed by new research is emotive or affective AI which is strongly rooted in sentiment analysis and emotion recognition. Affective AI uses both natural language processing and biometrics to extract, identify, and quantify this information. It can take into consideration verbal and non-verbal cues to compute precise predictions.

In the past, the use of sentiment analysis has been of the most successful tasks in NLP and a well-established task in many business applications (Aceto et al.). Historically, this analysis has been focused on three broad categories: positive sentiment, negative sentiment, and neutral. More recently, however, research has been done to improve the specificity of emotions detected, leading to the emergence of emotion measurement. I demonstrate this in my Proof of Concept using tools by one such AI startup, namely Hume AI, that identifies up to 50 different emotions and assigns a distinct value to each emotion for each piece of content analyzed. It is also possible now to use this information to have AI respond accordingly, while simulating the appropriate emotion and natural inflection for the situation. This presents endless opportunities.

The potential has not gone unnoticed. Silicon Valley Bank, a division of First Citizens Bank, reports in June 2024 that “Venture capital deal activity in Artificial Intelligence (AI) for healthcare has surged the past five years, growing twice as fast as the tech industry overall”. Per VSP, “investment in generative AI exceeded $14B in 2023, up from $1.7B in 2022. This market…is now expected to hit $109B by 2030.” For Emotion AI, specifically, several reports including SVB and Allied Marketing Research, predict growth up to 13.8B. With several AI startups achieving unicorn status, the hype is still high albeit more realistic (Sweeney).

However, there are threats and challenges that must be taken into consideration. The first and foremost challenge is presented by questions and inhibitions about privacy, security, and data collection. Given how sensitive health data is, it is not surprising that concerns about how the data is stored and used exist among patients and their families. In fact, families of patients are motivated by concerns about surveillance to entirely reject the use of AI (Park et al.). Data security is also of concern to the companies themselves because health data belongs to a subset of personal information that does have quite well-developed laws, such as HIPAA, regulating it. The straightforward solution is to have robust security and privacy policies implemented at every step of the chain. Bridging the trust deficit for patients and families, however, would be a different ballgame. One potential effective method could be to provide a sense of control and agency, as concluded in "Why Do Family Members Reject AI in Health Care? Competing Effects of Emotions.".

Another major challenge, that exists for Emotion AI specifically, is the lack of data as well as biased data. As compared to generic generative AI, there is not much pre-existing data that can be mined for training Emotion AI models. This subfield requires the investment of both time and resources for more data collection. It is thus fortunate that research is not in the very initial stage, so the situation is not acute. However, as compared to generic generative AI, the data is still too little. The other concern is the presence of bias in data. If a disproportionate amount of data is collected from a particular group, the data and by consequence, the inferences of the model, are more than likely to be skewed towards that group or groups. The solution, in simple words, is to collect as vast a dataset from as varied and large a population as possible.

Despite these challenges, Emotion AI continues to be a growing field in healthcare. One of the most widely discussed incorporations of emotive AI has been in therapeutics and mental health (Forbes Technology Council). App-based conversational agents replicate the principles of cognitive behavioral therapy, offering guidance on sleep, worry, and stress ("Does AI Have Emotional Intelligence"). Furthermore, as Dr. Dawn Branley-Bell, Chair of Cyberpsychology at the British Psychological Society says when discussing another potential application- encouraging individuals to seek advice for stigmatized health conditions, “Being able to talk to a chatbot first may help individuals make that sometimes difficult first step towards diagnosis or treatment” ("Does AI Have Emotional Intelligence").  Another much discussed application is in dementia care. To quote The Medical Futurist, “Emotion AI can look for facial expressions, speech- and behavioral patterns in dementia patients, accurately predicting their emotional state. It can not only notify caregivers in advance of the situation but can also adjust the patients’ environment accordingly”. The use of AI can reduce the burden on caregivers to “constantly read and decipher how they’re feeling” (Forbes Technology Council), thereby reducing fatigue. Furthermore, the use of both verbal and non-verbal cues for computational analysis reduces dependence on self-assessment and self-reporting, thereby increasing efficacy and precision. Another application trend for Emotion AI includes patient monitoring . AI can be used to monitor for signs of discomfort or need of medical attention ("Ambient Intelligence and Emotion AI"). This not only reduces the human resources required but also can be performed 24/7 without blind periods, which is impossible with humans only. Here too, the pros of reducing reliance in self-reporting are applicable.

All the above applications hold great potential to radicalize the future of healthcare. One particular opportunity that may be of interest to Cotiviti, specifically, is the application of affective computing to boost consumer engagement and consumer satisfaction. One method could be integration of Emotion AI with Cotiviti’s member engagement engine, “Eliza”. While I cannot say without further information about Eliza whether the core technology behind Emotion AI is already a part of the analytics used by Eliza given its stated approach of being “rooted in empathy and behavioral science”, the purpose “future engagements to deliver an enhanced member experience” as well as the desired results “improved clinical outcomes, Population insights, Optimal consumer experience” align serendipitously with the approach, purpose, and impact of Emotion AI ("Eliza Member Engagement"). This could be an opportunity both in terms of impact and ROI, through more effective customer engagement and retention.

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