ARTIFICIAL INTELLIGENCE FOR VISION IMPAIRED PEOPLE

Padma Shneha[1], Prathyusha Reddy[2], V.M.Megala[3]

Abstract—This paper approaches on how Artificial Intelligence can enhance the regular life of the vision impaired individuals. They suffer a lot when they are submitted with unexpected situations which they might not be aware of. People are anxious about their safety when they walk alone in the city. Sighted people can look out for any signs of danger, imagine about the vision impaired individuals who are not aware of their surroundings. To surmount this problem, the AI system recognizes what the nearby person is doing, if he is about to attack, the system will detect and warn the user that someone is about to attack him and also it gives the instructions to do the necessary action. Artificial emotional Intelligence also known as emotion recognition and emotion detection technology. This technology is used to detect the emotions of the person. AI technologies such as image processing, deep learning, voice output, and voice recognition are used to build the system. Even Big data can be used to store the images and voice files. Companies such as Microsoft, Facebook, Accenture are all intended to help the blind using AI.
Keyword-Big data, Deep learning, Face recognition, Image processing, Image recognition,Speech recognition, Voice output, Voice recognition.

1. INTRODUCTION

Artificial intelligence is the study and creation of computer systems that can perceive, reason and act. The goal is to develop an intelligent machine. The intelligence must be represented by learning, thinking, making decision, solving problems. AI is a collaborative field which requires knowledge in all fields such as psychology, computer science, engineering, logic, mathematics, ethics and so on. It is a new field which is expanding meteorically. AI can store large amounts of information and can process at high speed. It is a representation or duplication of human intelligence, AI systems are supposed to learn from the previous experience and self-correct through deep learning. As there is an increase in the growth of technology, these intelligent systems are also useful for the humans in the everyday life. It can be our companion, do our daily task, understand our emotions and help accordingly. The vision impaired individual find it difficult to self-navigate outdoor in the well known environment and even simply walking down the crowded street. They are unable to judge what's happening around them. Many blind individuals rely on their dogs to get around from place to place since the dogs have the ability to sense danger to act accordingly and guide them too, unfortunately the dog itself gets attacked brutally. Humans mostly communicate through non-verbal activities such as facial expressions, gestures, body language and tone of voice, to communicate their emotions. Likewise, there are hundreds of thousands of emotions. To collect all these emotion we use big data as normal storage device will not be able to handle so much data. And when the machines find something new it needs to store that data too.Emotional intelligence (EI) is the area of cognitive ability that facilitates interpersonal behaviour. Five components of emotional intelligence are self awareness, self , motivation, empathy and social skills.Emotional intelligence (EI), also known as Emotional quotient (EQ) and Emotional Intelligence Quotient(EIQ)[1], is the capability of individuals to recognize their own emotions and those of others, discern between different feelings and label them appropriately, use emotional information to guide thinking and behaviour, and manage and/or adjust emotions to adapt to environments or achieve one's goal.Although the term first appeared in a 1964 paper by Michael Beldoch, it gained popularity in the 1995 book by that title, written by the author, and science journalist Daniel Goleman . Since this time, Goleman's 1995 analysis of EI has been criticized within the scientific community, despite prolific reports of its usefulness in the popular press. There are currently several models of EI. Studies have shown that people with high EI have greater mental health, job performance, and leadership skills although no causal relationships have been shown and such findings are likely to be attributable to general intelligence and specific personality traits rather than emotional intelligence as a construct. For example, Goleman indicated that EI accounted for 67% of the abilities deemed necessary for superior performance in leaders, and mattered twice as much as technical expertise or IQ. Other research finds that the effect of EI on leadership and managerial performance is non-significant when ability and personality are controlled for, and that general intelligence correlates very closely with leadership.

[1] III Year IT ,Department of Information Technology, Sri Venkateswara College of Engineering, Chennai, Tamilnadu, India
[2] III Year IT, Department of Information Technology, Sri Venkateswara College of Engineering, Chennai, Tamilnadu, India
[3] Assistant Professor,Department of Information Technology, Sri Venkateswara College of Engineering, Chennai, Tamilnadu, India

2. EXISTING TECHNOLOGIES

1. Seeing AI- Fig (a) represents an iPhone app that uses Artificial intelligence to tell the visually impaired person what is around them. For example, if the phone is pointed at a park, the camera app, describing how the scene looks. Seeing AI is powered by Microsoft.
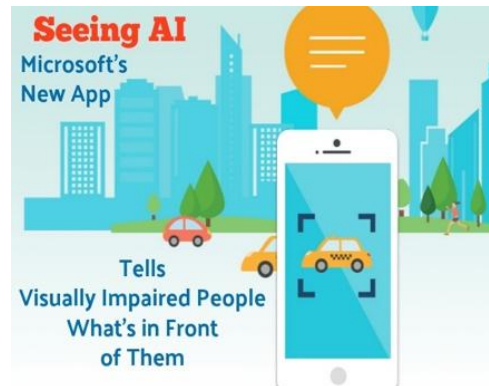

Fig (a)

2. Drishti- Drishti (Disambiguating Real Time Insights for Supporting Human with Intelligence) is powered by Accenture provides smartphone-based assistance using AI technologies such as image recognition, natural language processing and natural language generation capabilities to describe the environment to a visually impaired person.

3. AI Glass- Figure (b) combines glasses with stereo sound sensors and GPS technology attached to the tablet, which can give spoken directions and recognize currency, read signs, identify colors, and other things. It also employs machine learning to recognize different places and objects. Because it uses ultrasound, it canalso detect translucent obstacles, like glass doors.
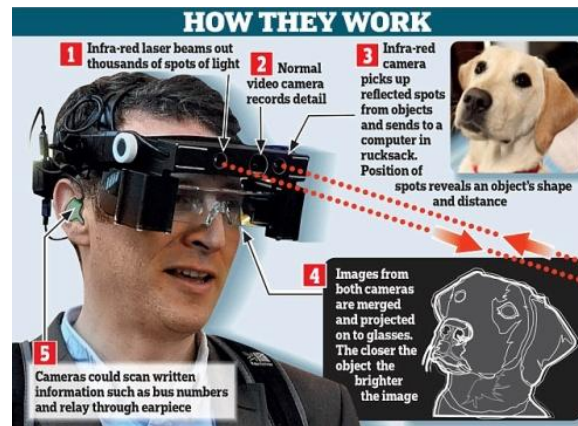

Fig (b)

4. FingerReader- Fig (c) developed by MIT Media Labs project is a wearable device, a very chunky ring that sits on the finger and is capable of detecting and interpreting 12-point printed text as the user scans his or her finger across it. It reads aloud in the real time. Small vibrations alert the wearer to any deviation off the line.

Fig (c)

5.   ARIANNA-ARIANNA (pAth Recognition for Indoor Assisted Navigation with Augmented perception) used in the indoor. Before it can be used, you must stick colored tape to the ground to mark out specific routes. Users of the app point their smartphone camera at the ground, and as they wave it back and forth there's a vibration when it finds the line as shown in fig (d). As an extra layer, its possible to fix the QR codes that give additional information, like telling the user there's a water fountain nearby, or a toilet.
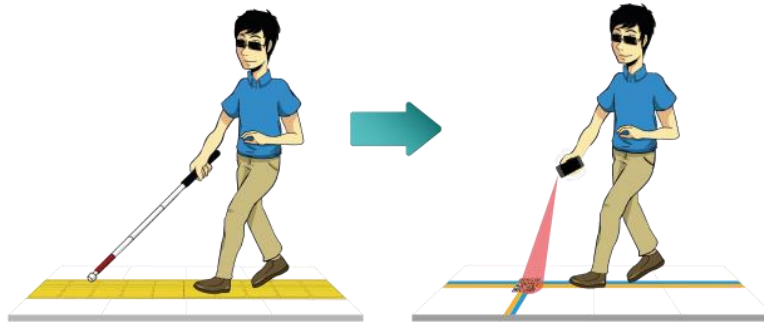

Fig (d)

3. EMOTIONAL INTELLIGENCE

Emotional Intelligence is the ability to identify and manage your own emotions and the emotions of the others. It is generally said to include three skills, emotional awareness, the ability to harness emotions and apply them to task like thinking and problem solving, and ability to manage emotions, which includes regulating your own emotions and cheering up and calming down other people. The outline for today's artificial intelligence, neural network, and machine learning technology is the human brain, simply because it is the most effective tool for solving problems that we know. The big part of the puzzle is missing out, that is, empathy. What empathy means is that, it is an understanding the feeling of other human or sometimes even animals. So far the understanding of feeling and the considerations of other people into account in solutions we make seemed to be limited while implementing to the AI. Some of the issues are discussed. Only 7 per cent in the actual choice of words you are saying, so if you think about it like that, in the existing sentiment analysis market which looks at keywords and works out which specific words are used in twitter, you are capturing 7 per cent of how humans communicate emotion and the rest is basically lost in cyberspace.elKaliouby says "Emotional intelligence is how you understand yourself and the people around you, and it is just as important as cognitive or rational intelligence, to how we make decisions".

Privacy is a very big issue, because emotions are obviously very personal data and you can easily see how it could manipulate people, for example, to manipulate voters. Bias is another issue, it can be built into the data, there are algorithms that detect not just your emotions but your age, gender, ethnicity. Therefore, we should be thoughtful and careful about how we use the data. Components of emotional intelligence:

Self-awareness. A person has a healthy sense of emotional intelligence self-awareness if they understand their own strengths and weaknesses, as well as how their actions affect others. A person with emotional self-awareness is usually receptive to, and able to learn from, constructive criticism more than one who doesn't have emotional self-awareness.

Self-regulation. A person with a high emotional intelligence has the ability to exercise restraint and control when expressing their emotions.

Motivation. People with high emotional intelligence are self-motivated, resilient and driven by an inner ambition rather than being influenced by outside forces, such as money or prestige.

Empathy. An empathetic person has compassion and is able to connect with other people on an emotional level, helping them respond genuinely to other people's concerns.

Social skills. People who are emotionally intelligent are able to build trust with other people, and are able to quickly gain respect from the people they meet.

4. PROPOSED SYSTEM

As the blind people are more vulnerable to the attackers than the sighted people, an assistant is required when they want to go outdoor, as we have discussed earlier it seems quite challenging to take an animal assistance as there is a high chance of the animal to be harm also. So it is better to use technology as it can protect the user and does not get hurt.When people display a facial expression of emotion, we make judgments not only about their affective state, but also about their behavioural tendencies and traits. For example, when people display happy faces we perceive them as having traits associated with high affiliation and high dominance. When they display angry faces we perceive them as having traits associated with low affiliation and high dominance.

Facial expressions of sadness and fear elicit impressions of traits associated with moderate affiliation and low dominance. The prototype is inbuilt with a camera, microphone and a speaker. It is a small device which can fit into the user's shirt. When the user is walking down the street, the device detects each and every person who crosses nearby. Depending on the facial expression the device will be able to detect if the nearby person is about to attack or not. How the device is able to

identify the attacker is that, data of different facial expressions will be stored in the device, according to the matching expression the device will be able to detect who is innocent and who is not.

Some of the AI technologies used are image matching, image recognition, voice recognition, voice output, speech recognition, face recognition. Can AI read exact the features and distinguish an attacker and non-attacker? Well, the device may not be able to give 100 per cent accuracy however the registered features in the system may match much up to most of the people like discussed in [1]. They are few characteristics that can distinguish from a neutral face to the aggressive face. People with neutral. How the test be carried out by assembling some people who can express their emotions very well. After they have been assembled, test may be conducted. So when the person frowns and expresses few gestures then he may be assumed as an attacker. And the necessary will be given to blind person.

Image Recognition It is the ability of a software to identify objects, place, person, writing and actions in an image. Computers use technologies in combination of camera and artificial intelligence software to achieve image recognition. The image recognition can be helpful to recognize the nearby persons face.

Image Matching

Image Matching is a technique used to match the feature of the object seen through the camera and the registered image in the system. For example, if the camera in the device recognizes the persons face or features, the system checks the available features to determine if he is the attacker or an innocent person.

Voice Recognition/Voice Matching

It is a ability of the system to determine recognize the tone of the voice. The device inputs the given voice and then it matches its voice with the modulation of the speaker if the speaker is rude or normal. This lets the system to know how the speaker is speaking. And the system warns the user that the speaker is rude. Big data is used to store huge amount of image and voice output and voice recognitions. It is often characterized by 3V's, the extreme volume of data, the wide variety of data types and the velocity at which the data must be processed. Although big data doesn't quite equate to any specific volume of data, the term is often used to describe terabytes, petabytes and even Exabytes of data. Integration the deep learning, emotional intelligence and machine learning techniques it is possible to acquire a system that can distinguish the emotions of every person from other. There's research showing that if you're smiling and waving or shrugging your shoulders, that's 55% of the value of what you're saying – and then another 38% is in your tone of voice.

5. SYSTEM MODULE

The detailed information about the system is given below and is represented in fig (e):
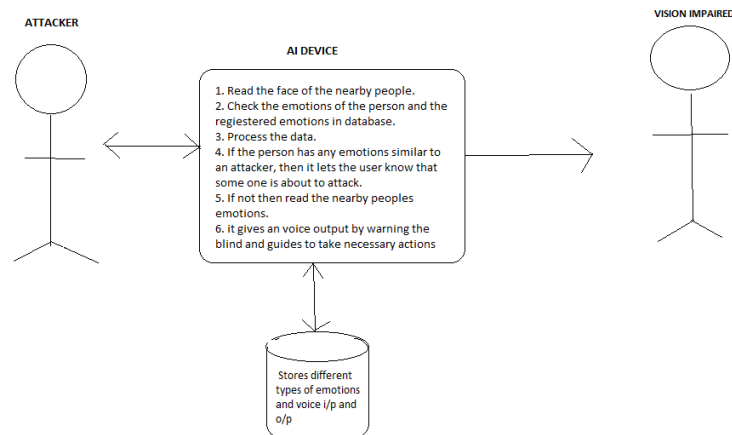

Fig (e)

The device reads all the features of the face and the body nearby. If the recognized persons features of both the face and body are similar to the registered features of an attacker, then the nearby person is the attacker, if not, then the person is an innocent. When the system has detected that the nearby person is an attacker, it warns the user saying that he is in front of the attacker and gives the necessary instructions to avoid the chaos.If the attacker has chosen to go away from the spot then the system will guide the user and recognize the obstacles and tell the user to go in certain directions. The machine reads the body language, facial expression and speech using the camera and the microphone. A test can be conducted by monitoring few expressions of the people throughout the day and the data can be imparted in the machine and if there are any new expressions or body language then the machine can take in the data and learn.

6. INTERRELATED WORKS

6.1.Criminal Identification.

One of the Chinese organizations had done a research on recognizing the criminals from the innocent ones using Artificial intelligence systems. The photos were taken from the Chinese database to identify the criminals. The results from the test are

jaw-dropping. Only about 6 per cent of the innocents were recognized as criminals, i,e, the system was a failure. However, 83 per cent of the criminals were successfully recognized as criminals. The technique that had been used was face recognition based on deep learning. The test was carried out with three characteristics to distinguish the criminal from the others. First, the angle between the tip of the nose and corner of the mouth around 19.6 per cent is smaller for criminals. Secondly, upper lips curvature is 23.4 per cent larger for criminals. Finally, distance between inner corner of the eyes was an average of 5.6 per cent narrower. When the photo was taken from the people the expressions are supposed to neutral, however it was shown from the results and statics that most of the innocent people have a slight smile in their face than the criminals. However, AI managed to find the hidden emotions in those photos. Minor details that the humans miss out.

6.2. Affectiva

Artificial emotional intelligence or Emotion AI is also known as emotion recognition or emotion detection technology. In market research, this is commonly referred to as facial coding.Humans use a lot of non-verbal cues, such as facial expressions, gesture, body language and tone of voice, to communicate their emotions. Their vision is to develop Emotion AI that can detect emotion just the way humans do, from multiple channels. Their long term goal is to develop "Multimodal Emotion AI", that combines analysis of both face and speech as complementary signals to provide richer insight into the human expression of emotion. For several years now, Affectiva has been offering industry leading technology for the analysis of facial expressions of emotions. Most recently, Affectiva has added speech capabilities now available to select beta testers. Emotion detections from face and speech are discussed. Emotion detection for face – emotion AI measures unfiltered and unbiased facial expressions of emotion, using any optical sensor just a standard webcam. This technology first identifies a human face in real time or in an image or video. Computer vision algorithms identify key landmarks on the face, for example, the corners of your eyebrows, the tip of your nose, the corners of your mouth. Deep learning algorithms then analyze pixels in those regions to classify facial expressions. Combinations of these facial expressions are then mapped to emotions.

We can measure 7 emotion metrics: anger, contempt, disgust, fear, joy, sadness and surprise. In addition, we provide 20 facial expression metrics. We also provide emojis, gender, age, ethnicity and a number of other metrics. The speech capability analyzes not what is said, but how it is said, observing changes in speech paralinguistics, tone, loudness, tempo, and voice quality to distinguish speech events, emotions, and gender. The underlying low latency approach is key to enabling the development of real-time emotion-aware apps and devices. The speech based product is a cloud based that analyzes a pre-recorded audio segment, such as an MP3 file. The output file provides the analysis on speech events occurring in the audio segment every few hundred milliseconds and not just at the end of the entire utterance. An Emotion SDK that analyzes speech in real-time will be available in the near future.Affectiva's Emotion AI technology is already in use by 1,400 brands worldwide, including CBS, MARS and Kellogg's, many of whom use it to judge the emotional effect of adverts by asking viewers to switch on their cameras while video plays. The facial images are analysed with deep learning algorithms which accurately classify them according to the feelings of the viewer.Emotion-focused AI developer Affectiva became one of the few small businesses to be asked to join the Partnership on AI to Benefit People and Society. The interest of the "grand masters" of AI which make up the partnership – Google, Microsoft, Facebook, etc – in Affectiva's growing business is a sure sign that this overlooked aspect of AI is starting to get the attention it deserves.

6.3. Alexa

Alexa (named after the ancient library of Alexandria) is Amazon's voice-control system. It lets you speak your wishes to an Echo smart speaker and see them fulfilled—at least simple ones, like dimming your lights or playing music tracks. This guide covers how it all works, what it's capable of doing, privacy concerns you may have, and how to pick the right Echo for your home. What sets Alexa and Echo apart from first-generation voice assistants is responsiveness. There's no activation button to press. Simply say the trigger word (either "Alexa," "Echo," "Amazon," or "Computer") followed by what you want to happen, and it will usually be done—as long as you've set up everything properly and are using the correct command. Once you get used to the quirks, using Alexa feels much more natural and responsive than speaking to a phone-based voice assistant like Apple's Siri. As a result, you'll likely find yourself using your phone less frequently when you are at home.

7. CONCLUSION AND FUTURE ENHANCEMENTS

Artificial Intelligence has been enhancing the life of the vision impaired. The technology too is vastly growing day by day and improving the other aspects of life those who are in need of someone to take care of them such as disabled, autism, elderly, blind and other such people. To help such people, the machine needs to understand the feeling by itself and have empathy in order to solve the problem. However, Artificial intelligence experts and researchers are still trying to builda machine to achieve it. Definitely within few decades from now, machines will be able to understand the feeling of the humans and solve problem accordingly, at that time, diagnosis for psychological treatment and other such mentally chronic problems can be treated by the machine. The machines can be as an assistant to the doctors and could help them discover the problem sooner.

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