Date	16September2022
TeamID	PNT2022TMID03665
ProjectName	Project-Real-TimeCommunicationSystemPowered byAI forSpeciallyAbled

1. BasedRealTimeCommunicationforPhysicallyandSpeechDisabledPeople(OngChinAnn, MarleneValeriu Lu–2019)

Communication is a social process of exchanging information from one entity to another in verbalandnon-verbalform.Itdefinesourexistenceanditisanimportantinstrumentthatconnects peopletogether. It comes naturally as a raw skill embedded in most people at birth and we acquired theways of communication through cognitive learning. Communication is the basis, which drives theprocess of development in all the fields (Manohar, 2008) and it is the very core of our civilisation.The ability to communicate allows us to express emotion, feelings, convey our thoughts and ideasas well as to relate our experiences. It plays an important role in the dis-semination of informationand sharing of knowledge especially in the academic arena. Research has found that human startedto learn how to communicate with each other since they are born not only through spoken andwritten languages but also body gesture, posture, facial expression and eye contacts (Busso, et al.,2004;Cohen, Grag &Huang,2000).

Communication skill might come as a natural ability in majority of people. However, there aresome people inflicted with some form of physical defects which affect their ability tocommunicate. One of the more severe disabilities is known as “cerebral palsy”, a congenitaldisorder at birth which causes abnormality in their Motor system. It affects their musclemovement and coordination, learning and Speech abilities. Their malfunctioned motor systemcausesanuncontrollableandinvoluntarymovement.Theyareunabletocontroltheiroralfacialmu scles,thusaffectstheir abilityto performfacialexpressionappropriately.

From the limitation of the existing tools reviewed (Novita, 2006; Macsolvers, 2009; Standup, 2006;Universiteit van Amsterdam, 2008; Crestwood, 2009; Sci-enceDaily, 2008), there is still a pressingneedformoreeffectiveandefficienttools toalleviatethis problem.Onethepossiblemethodsaretoimplement a facial expres-sion recognition system to predict or determine the emotional state of adisabled person through his expression projected on his face. biometrics information system can beemployed as a means to detect and classify the physiological aspect of a person in real time. Francoand Treves (2001) further support the notion that facial expression can be used for human computerinteraction and usability enhancement.

Based on the problem statements deliberated above, we propose an improved real-timecommunication system using machine learning and computer vision. The aim is to create acommunicationchannelbetweenthespeciallyabledandthesociety,sotheycanexpresstherefeelings, thoughts and understand other people’s feelings and thoughts through real timecommunicationand facialexpressions.

2. Systematicreviewofcomputervisionsemanticanalysisinmedical(AntonioVictorAlencarLundgren,Byron Leite Dantas Bezzerra–2021)

Medical diagnosing techniques have fascinated us for a long time. It has been common for us touse them in our daily life and implement these technologies. Machine learning and especiallycomputer vision contribute a lot in medical science, which make different difficult tasks easy fordoctors and more tolerable for patients. They are widely useful in early detection of disease, andhenceareavaluable toolto savehumanlife.Cardiographic techniquesarea mustforoldageandinfant safety.

Theseinclude:

- **Retinoscopy-**
  Theyalthoughprimitiveinapproachareamustonceinalifetimeandretinoscopy have made yet successful to measure activities of rod and cone receptorsin our eyes. Retina has three distinct areas for colors - erythrolabe, chlorolabe andcyanolabe…which are analogical to pixel fixation and identification algorithms onmachinelearning.

- **Tumor detection -** Cancer is spreading in the world affecting billions of lives both intermsoflifeandmoney…machinelearning diagnosing systemsapplytheiridentification systems to further develop accurate detection in terms of size, location,quality of such tissues which are suspected to become malignant uncontrolled group offast dividingcells.

- **CT scan - CT scan –** A very common term for cancer patients which useselectromagnetic radiations under manually operated controlled computer visiongratingswhicharesoaccuratethatitcanmeasureapigmentcalledc-125inblood.

3. A survey on Facial Emotion Recognition Techniques (Felipe Zago Canal, Tobias RossiMuller,Gustavo GinoScotton–2022)

Facial expressions recognition is an ability to recognize people by their facial characteristic anddifferentiate it with one another. Human is born with the ability to recognize other people easily byidentifying their facial features such as shape, appearance, skin texture and skin complexion. Otherthan that, humans also have the ability to express, interpret and differentiate facial expressions. Theregular recur-ring ones are happiness, anger, disgust, fear, surprise and sad (Ekman & Friesen,1978). The six facial emotions stated above are important and play a major role in expressingemotionas well as recognising facial expression (Busso, et al, 2004).

In reallife, inter personal human interaction areperformednot only using speechor spokenlanguage, but also nonverbal cues for example hand gesture, body gesture, facial expression andtone of the voice. All these cues are sometimes being used for expressing feeling and give feedback(Busso, et al, 2004; Cohen, et Al., 2000). We can see how human interact with each other usingnon-verbal cues every day. For example a child cries in front of his mother because he is not happyor dissatisfied with something. Other people might interpret it differentlythinking that the childmightbeinpain.

Facial expression interaction is relevant mainly for community social life, teacher and studentinteraction,credibilityindifferencecontexts,medicineandsoon.Besides,facialexpressionrecognition is useful for designing new interactive devices which offers the possibility of new waysfor human computer interaction - HCI (Franco & Treves, 2001). Cohen, et al. (2000) conductedsurvey on their users and noticed that they have been through traditionally HCI consists of thekeyboard,mouse,joystick,trackballs, data gloves andtouchscreenmonitors.

FacialExpression RecognitionSystem (FER) has beena topicfor research sinceEkmanandFriesen (1978) who pioneered this research and worked from the psychology perspective. In thepast 20 years, many researchers have tried to adopt their idea and make improvement, innovationand modification on facial expression recognition by introducing different techniques, mainlyconcentrated on the improvement in term of accuracy, efficiency, mobility, and speed (Kotsia &Pitas, 2007). With all the enhancements on techniques for facial detection and recognition, thedevelopment of the facial expression recognition has also improved (Zhan & Zhou, 2007). Themost active researches in computer vision and pattern recognition is face recognition in forensicidentification, access control, user interface design (Wang, Plataniotis & Venetsanopoulos, 2005),emotion analysis, interactive video, indexing and retrieval of image and video database, imageunderstanding and synthetic faceanimation (Zhan &Zhou,2007).

Human can interpret and generate major facial expressions but a computer is not built with anyfacial recognition ability unless through the use of some software. It is even more complicated forthe computer to interpret irregular facial expression, especially from those suffering from cerebralpalsy. Due to their disorder, they do not have the ability to reflect their emotions like a normaltypical person. Thus, a more natural and naive method has to be employed for the system to workbyamanuallabellingoftheimagecaptured withtheemotionof theuser.

4. MachineLearningbasedtechniquesindataanalysis(LavanyaVemulapalli,Dr. P.Chandra Sekhar–2018)

A lot more applications available for us in play store, app store, amazon, etc., which aredependent machine learning. There are significant number of organizations and startups whichturntowardsoptimummachinelearning,andhaveprovedthatinvestinginmachinelearningistheb estin today'sworld.

GoogleStreetView-Itisapervasivecityimagerydatasetsapplication.

It is an application from which we can virtually explore streets of cities. It uses a densegeosamplingtooltoshowsthestreetsofcities.Streetsarecapturedthroughafleetofvehiclesequippe d with aspecialized camera.

After collection of photos, they are digitally processed and combined together and looks like asingle image. From files reported for privacy, Google pixelated faces of pedestrian and licenseplate which is captured. Web mapping technologies have been embraced by discipline such asgeography, archeology and ecology, but also by several social scientific disciplines. Researchersworking in the discipline of geography, archeology, and ecology quickly incorporated webbasedmapping technologies into their research designs. There are various applications of google streetview in research field, although the number still remains limited. It is also used for betterestimationoffishcatching,estimationofforestrybiomassinIndia,estimationofareaofdifferentregi onsor lakes,etc.

Google also helps in the criminological studies that have implemented in the google maps andstreets view in their research design. Public and some law enforcement agencies and offenders arefamiliarwiththepowerofonlinemappingtechnologythrough theirday-to-daylifeandwork.Thesocial sciences have also embraced web-mapping technologies. But to google maps still remainlimited in social science.We can see google maps and its street view can be used in various fields.It can be used in mapping or developing or maintaining cities' streets. We can use Google's streetviewto makean infrastructure of building or apartment, park, bridges,water

reservoir,etc.GooglemapsandGooglestreetviewcanbeusedinsomeresearchfieldofdetecting thepopulation orurbanizationin some areasor throughout theglobe.

Uber-Uberisoneoftheexamples ofusingmachine learning.Itusesanalgorithmwhichprovidesestimatedtimeandreal-time locationonmap,whichisveryusefulandhelpful forbothdriversand riders. The company is also dealing with fraudulent behavior like face detection and invalidstolencreditcards.

Google Keyboard - Almost all android handset uses google keyboard. Gboard uses the neuralspatialmodeltodeterminethepixelstouchedonthescreenandmakingrelevantwordsandemojiin handwriting mode. It predicts the next word by matching the currently typed word with itsdictionaryset,whichhelpsuser to typefastand accurate.

Snapchat - Snapchat uses machine learning to identify or face detection technology for applyingfilters on it. One may wonder about how Snapchat filter works? It first detects a face. Then locatefacial features, and then create a mesh of 3D mask (pyramidal shape) over face. Snapchat not onlyapply filters but also a list of things they are doing like, language detection for very short texts,names entity recognition and disambiguation using multimodal NER (sound, text, etc.),normalizingtextmisspellings(phonetic,orthographic,semanticrepresentations),emotionanalysis (from emoji to actual pictures), speech, music recognition (keyword spotting), personalized neuralconversational models. We can use this technology for detection of culprit's face if he or /shemade somefacialchanges.

Virtual Voice Assistant - The world moves in the path of automation. People want their lives easyand comfortable like this hand free service provided by voice assistants. There are lots of virtualassistants available like google assistant, Apple's Siri, Cortana by Microsoft, Alexa by Amazon,Samsung's S voice, etc. As there more advances in machine learning voice assistants becomemoreemotionallyattachedtohumanbeings.Voiceassistantsremindusontimesothatwedonots kip some important stuff. Voice assistants along with computer vision can do many things thatwe even can't expect. It can do almost 70% of our daily work, from morning tea to eveningsupper.

Evernote - Evernote uses machine learning which automatically identifies the document file fromdevice storageand appliesfilteronit,suchthatit appearsclearandtidy.

5. SurveyonMachineLearningAlgorithm's(

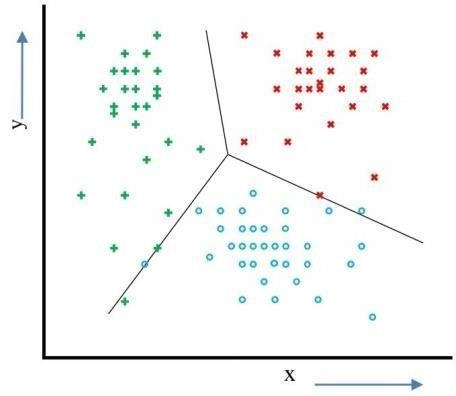
RekhaNagar,Dr.YudhvirSingh–2022)

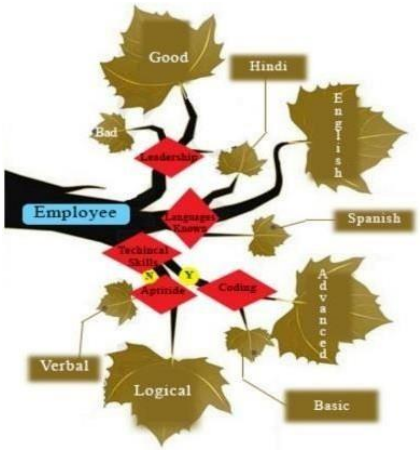
Thesubfieldofartificialintelligence,machinelearninghasgainedmuchpopularityinlastfew coupleofyears.Manytechgiantsusemachinelearningalgorithms,likeNetflix'salgorithmstomake movie prediction from your previous watched movies. In this section, we would like topresentsome of thefamous algorithmswhichusefrequently.

Theyare:

- **Naïve-Bayes'algorithm-**Thisisthealgorithmmostlyusedinmachinesandhardware.It simply applies Bayes' theorem along with strong independence assumptions. Let's takeanexample,to markan emailasspam,usedforface detection software,etc.
- **K-means clustering algorithm -** This is a type of unsupervised learning which hasvarious uses including business and management. This algorithm also lets us know profitateachstageoftheproduct.ItisalsoreferredasLloyd'salgorithm.Thisalgorithmisalsouse dingroupingoffeatures intodifferentlabels.

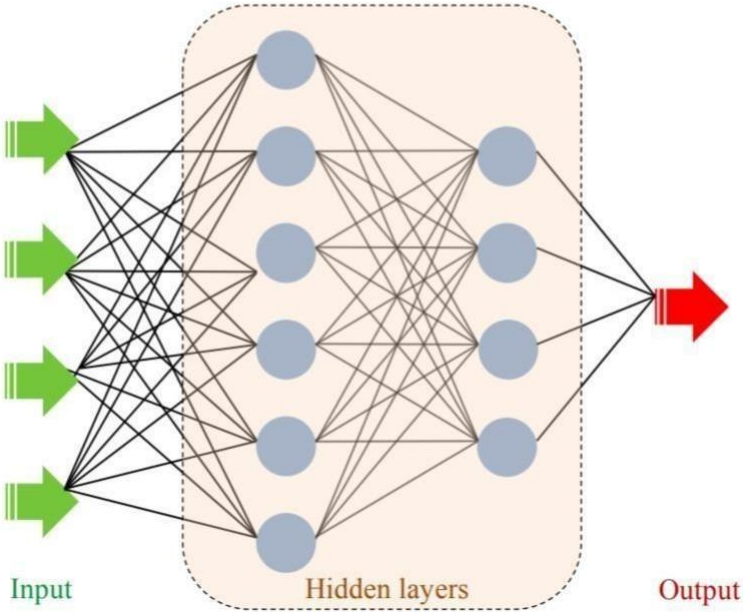
  DecisionTrees-Thesearetreesinwhichdecisionsaremadebythecomputerateachstagebased upon recurrencerelations.





- **NeuralNetwork-**Ourneurons inbodyplayamajorroleindeterminingthestepstoprocessasingletask.Similarly,artificial neuronsarethosewhichhelpthenervous

system of transistors in any sequential or combinational circuit to take up a decision andexecute it conditionally. This again depends on activity of the neurons. An artificialneuron is an actual piece of hardware machinery which helps the system to take up
adecisionbasedonthereceptors,assuchseveraloptoelectronicdeviceshavealreadybeendeveloped. This algorithm helps us to build any machine functioning exactly as humanreflex arcs.



Algorithms used in machines have several important implementations. We also haveregression of value as well as regression trees, which help us to do different useful kindof job. The algorithms are also useful in health care industries, for example, randomforest distribution algorithm, this algorithm is mostly derived from statistical studies…they are useful in calculating people densities and mass or chunk density. The mostimportantistheartificialneuralnetworksalgorithm.Thisalgorithmisrelatedtoartificialintelligence and neural networking. Though for mass application we must have machinelearning. Through computer vision these algorithm judge systems on basis of theirreactance to externalstimuli.

6. Survey on application of Artificial Intelligence in Cyber Security (Shidawa Baba Atiku,AchiUnimkeAaron, FatimaShittu –2020)

Cyber security refers to protecting your personal computer from malicious software. Machinelearninghasalotmanyalgorithms andsystemswhichprotectusersfromthreats.SuchasthePaypalapp which was developed in December 1998, uses machine learning algorithms to protect its usersfrom different threats and online spoofing. It uses three types of machine learning algorithms thatarelinear,neuralnetwork,and deep learning algorithm.

Theyare:

- **Waterhole -** It is like a pit surrounded by greenery. Hackers access other people'sinformation by using sites which are more accessible to the public more than anythingelse…. for example, networks in a coffee shop is accessed by so many users such thatthese users load their pc 's with whatsoever data is provided to them. Like this there aeso many sites to put on viruses and worms. Machine learning has algorithms that detectpath ofthesemalwareblocking themwith afirewallthereafter.
- **Webshell-** Thesearepieceofcodewhichisloadedintoaworkingdevicewhichprovokestheuserto misjudgeandthentakingadvantage,entryisgainedintothefull database.
- **Ransomware-**Similarto webshell,butheretheuserisvulnerablythreatenedexternallyby a group of software brokers who have corrupted the users' personal files. Suchscenarios can be totally avoided by using machine level language which was earlydetection.