AN ADHERENCE OF VOICE RECOGNITION TECHNOLOGY FOR CONTENT MINING DURING COVID-19 EPIDEMIC

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Abstract

The COVID-19 pandemic has brought innovative inventions like voice recognition technology to the public. During the lockdown, smart speaker sales surged beyond all previous records, and COVID-19 completely altered our way of life. A component of speech recognition is voice technology. Now that speech technology can combine native languages like Gujarati, Hindi, Bengali, and Marathi, it can reach clients in rural areas and increase the acceptance of this technology worldwide. COVID-19 has accelerated the use of speech technology as a safe and hygienic replacement for in-person communications and exchanges. Frontline workers are the most vital participants in the battle against the eruption and in ensuring our shield during this fortunate period. Widespread adoption might result in lower operating costs and time savings, enabling physicians to see more patients and focus on delivering high-quality treatment. Voice-assisted technology will assist banks in providing gratifying customer service and enhancing biometric security. By 2024, Digital voice assistant shipments will exceed the human population and approach 8.4 billion units. The aim of this paper focuses on an acceptance of voice recognition technology during COVID-19 global health crisis which aids the indigent by mining the content in web and providing to the demanding and valuable sectors, including banking, healthcare, e-commerce, transportation, and marketing.

Keyword- Voice recognition system, evolution, COVID-19, usage, barrier.

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INTRODUCTION

According to Google, India is the second quickest nation to adopt voice-activated technology, just behind the US. More than three-quarters (76%) of the users are familiar with the speech and voice recognition technology. As a result, Hindi is the second-most commonly used language on Google Assistant, behind the English language (Jaworski, 2021).

Humans may recognize a speaker by hearing their voice on the phone or other digital device, as well as in person. Automatic speaker recognition (ASR), a voice biometric authentication technology, has been developed to take advantage of this innate human competency. Utilizing voice recognition software, businesses may enhance communications and convert them into manageable, searchable data. Technology like artificial intelligence or biometric voice identification is offered by more sophisticated solutions. Speech recognition algorithms are used in voice recognition software to translate spoken words into text. People with impairments, in-car systems, the military, as well as enterprises that need to convert audio and video files into text or use dictation, can all use it.

When voice technology was first introduced with the launch of Siri more than a decade ago, few people could have anticipated how this novel feature would become such a driver for innovation. Voice recognition is the ability of a device to receive and interpret verbal direction.(Group, 2022).

Digital media is expected to lead the rebound in advertising spending in India this year with a 23.2% growth, and audio advertising is slated to increase by 17%. This might not paint the full picture at first but it's important to take into account. That's because India is expected to be the ninth-largest market in global ad spends in 2021, a sixth-largest contributor to incremental ad spends in 2021, and second-fastest growth market in the top 10(The Audio and Voice Revolution in India, 2022)

Speech recognition is a cross-disciplinary field that uses the voice as its research subject. Voice recognition enables the capability of natural voice communication and enables the machine to convert speech signals into text or instructions through the identification and understanding process. The voice recognition is steadily taking over as the primary man-machine interface technology in IT. The advent of communication will heavily rely on voice recognition. Every element of our existence now incorporates voice technology.

VOICE TECHNOLOGY EVOLUTION
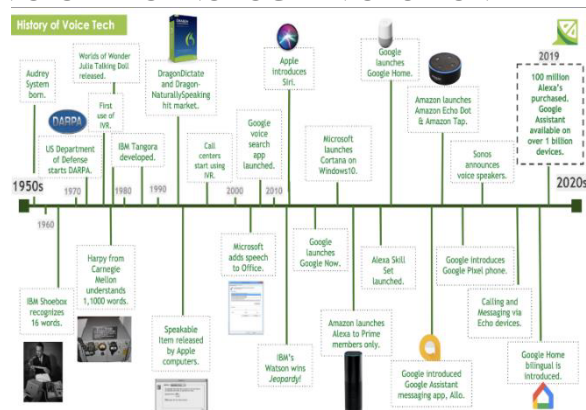
Source: (A History of Voice Technology, 2020)

CORONAVIRUS VS VOICE TECHNOLOGY IN ASIA

i. A Switch to Voice AI and Chatbots from Asian Service Centers

For nations like the India and the Philippines which supply a sizable share of the world's call centre services, the corona virus also has enforced a reckoning. Contact centers struggled to survive as severe lockdowns spread throughout both nations. They watched losses grow as former clients switched to employing chat bots and AI technologies while preparing their personnel to work from home.

Mohandas Pai, a tech investor in India and former executive at outsourcing groups Infosys, said to the FT: "Seeing as you're working from home and there's a lag in the service, we'll use more AI, more chatbots, more automation. That is permanent change; automation will hit that sector very deeply." (Hasbun, 2020).

ii. Voice AI is used by Asian governments for communication and contact tracing

Voice technology appeals to more than just the private sector. To better effectively contact and gather data about the virus's spread, governments around Asia are collaborating with voice AI service providers. When comparison to the 2 to 3 hours it would take a person to do it manually, the voice robot can make 200 calls in five minutes by gathering and verifying information such as name, health, and whereabouts through a series of questions.

iii. Voice Assistant Use Is Growing Across the Board, but Asia Has Particular Potential

No doubt, Asia is not the only region experiencing this growth in voice control adoption:

According to Voxly Digital, a British company that creates voice apps for Google Assistant and Amazon Alexa, individuals in Britain were still using voice automated systems more frequently while they were at home due to the coronavirus.

However, due to measures by various Asian governments to promote hands-free transactions as well as their young, tech-savvy populations, Asian countries are especially likely to see strong adoption of this technology.

iv. One other factor driving the rise in speech technology use among Asian consumers is

A voice assistant places orders for at-home barber kits and finds the most recent information about illnesses in the area for households from India to Japan. For instance, a majority of Asia and London are now more likely to be at home. Even though lockdowns have been removed, nations like Taiwan and Korea are keeping historical coronavirus breakouts in mind (like MERS and SARS), and they are aware that the safest way to be safe is to stay at home. These families now use Alexa to play podcasts as they prepare three meals every day at home (like place an order from one of several delivery services in Asia).

v. Making Use of Voice Recognition in the Warehouse Sector

Customers expect openness in their purchasing experiences, therefore businesses must offer prompt, effective services that include up-to-date information on the status of orders. When your employees are utilizing antiquated technology, such as clipboards and spreadsheets, it is difficult to accomplish this. The use of speech technology is one method by which warehouses are reaching the maximum levels of transparency and efficiency. Everything that occurs in your warehouse can be supported by voice.

DEVELOPMENT OF VOICE TECHNOLOGY

Voice has advanced significantly since its early days, both in terms of adoption and technical sophistication. Businesses can use voice to innovate by utilizing any speech aspects already present in their operations thanks to the ability to give high-quality speech recognition. Customers want convenience at nearly any cost, and businesses are searching for more convenient ways to communicate with them while decreasing the cost of expanding their personnel. Automatic machine procedures, like ASR, can occasionally provide capabilities on par with those of people. It has the ability to provide word failure rates (WER) that are less than those produced by human transcribers when it pertains to transcribing.

Innovative methods of voice recognition use machine learning and AI that are getting more complex, which has improved the possibilities of speech technology. By utilising the most recent ASR technology, enterprises can significantly speed up transcribing at scale, with consistency, and 24/7 availability, however errors may still happen. This implies that more information can be transcription and human editing for the remaining few percent in the same amount of time. These productivity gains not only free up time but also cut costs, streamline procedures, and open up new workflows for goods and services that depend on heavy transcribing workloads.

Businesses employ voice technology for consumer devices using voice assistants to automated chores and assist, as well as for their own operations to increase efficiency, reduce costs, and provide better customer experiences. Corporations will need to keep putting an emphasis on digitization, digital transformation, and flexibility by investing in advanced technologies like voice. The world will emerge from the epidemic and market scenarios will provide greater chances to those who are dedicated and equipped for the future, ensuring they continue to improve efficiency and profitability.

INFLUENCE OF COVID-19

Indian voice tech startup Slang Labs has created a voice-enabled tool for tracking COVID-19 outbreaks in India by region. The digital dashboard collates crowd sourced information on where the novel corona virus has been diagnosed in the country to create a heat map that people can explore by voice in English and Hindi.(SCHWARTZ, 2020)

1. Telecoms and healthcare industries

The COVID-19 in 2020 has the greatest favorable effect these industries. Throughout the pandemic, the life sciences and healthcare sector has received considerable attention. Not only keeping up with basic advancements in healthcare, but also creating new vaccines and ventilators. Due to the growing number of calls in a world that is becoming more and more connected, the telecom industry is also considered as having benefited in 2020. We now almost exclusively rely on telecommunications to work and socialise as a result of the epidemic, so it's not surprising that this sector is expanding at such a quick clip.

2. Media and entertainment industry

COVID-19 has had a tremendous positive impact on this industry. Since the start of 2020, there has been a noticeable increase in demand for social networks, online videos, and over-the-top (OTT) streaming services, and this is only anticipated to continue throughout 2021 and beyond.

Voice is enabling access even for users in India who cannot afford a Smartphone. Voice technology works even on a simple Jio feature phone running KaiOS. Priced between Rs 700 to Rs 1400 price range, these phones are used by 100 million people.

Highly developed economy like the US, where there are over 100 million households with multiple voice assistants, embedded into different appliances and surfaces. We can control everything right from the porch lights to door cameras to the thermostat, using voice. But here, we Indians are using voice for an entirely different set of activities, relying on it to play devotional music, learn English, track orders on Swiggy and even play antakshari via Gaana Antakshari. Just say 'Ok Google, play Gaana Antakshari' and see what happens. (ET CONTRIBUTORS,2020)

The pandemic has changed human behavior in multiple ways. Contactless transactions have increased resulting in the rising demand for speech technologies. Despite issues with accuracy and discomfort when using voice technology in public, 77% of users intend to use it more frequently in the coming years. "2020 brought more changes than anyone anticipated and as a result, expedited progress in tech and innovation. (Coopers, 2022).

Voice-activated assistants and other touch-less technology, such as those that help limit or eliminate touch points, can help boost safety as the COVID-19 epidemic spreads. Voice recognition has been rapidly gaining popularity as smart phones become more and more prevalent. Voice, in particular the growing inclination to converse with digital gadgets, is practically transforming how people engage with technology. Digital voice assistants are becoming more and more popular, which is also being fueled by the rising global sales of voice assistants like Amazon Echo and Google Home. There is a built-in voice recognition assistant in every smart speaker. Globally, some industries, such as travel, high-end retail, and hospitality, have been significantly harmed. On the other side, as we have had to modify and adjust our methods of operation and lifestyle to deal with the prolonged pandemic, we have seen a significant positive effect on other industries.

IMPORTANT FACTORS FOR INDIA'S VOICE TECHNOLOGY

India is positioned to grow into a significant market for speech technology as a result of the country's widespread use of smart phones and the internet, according to a joint report even by Mobile Marketing Association (MMA) as well as the multimedia company Isobar. Voice search requests are growing at a rate of 270% per year in India.

Due to its size and demographics, India will soon have the largest voice-first digital market in the world as a result of Smartphone growth. After the epidemic, people started engaging in more contactless interactions, which increased the demand for voice technology in terms of both popularity and speed. Customers may eventually be

able to interact with self-checkout kiosks, vehicles, ATMs, cashiers, elevators, and any other points of contact wherever voice is currently employed by speaking.
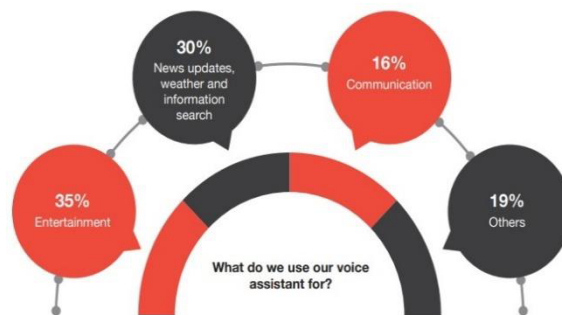
Source: (Evolution of Voice Technology, 2020)

Reliance and Google teamed up to introduce the $50 Jio Phone Next in July 2021. Voice technology has started to play a crucial part in accelerating the growth of assisted commerce, with 82% of smart phone users using speech-activated technologies. India is rapidly going digital, and in recent years, customer use of smart devices including set-top devices, video streaming gadgets, as well as smart speakers has already been steadily rising. A rising number of businesses are turning to cloud-based solutions to increase productivity and improve security features. The population's thirst for smart phones and the expansion of the network have created a huge market opportunity for Indian smartphone manufacturers. Upwards of 100 million low-cost feature phones were sold by Reliance in 2017 when the Jio Phone was introduced. The gadget has several features, like voice assistants and LTE, and is only about $20.

It's important to note that the use of speech technology is influencing how Indians use their cell phones. Voice has integrated into daily life in a fundamental manner that goes beyond efficiency and smart home technology, paving the way for the further spread of audio content.

ADOPTION OF VOICE TECHNOLOGY

Wider adoption of voice technology is critical to bridge the digital divide in India. From integrating voice tech in businesses to improving and enhancing customer experiences, voice technology is becoming a major contributor to bringing digital transformation in the country. A unanimous opinion on these lines was shared by industry stalwarts at a conference titled Voice for Bharat, 2022, organized by Internet and Mobile Association of India (IAMAI) today at Sahara Star, Mumbai.(PR, 2022)

Voice technology is increasingly important to the technology stack and business strategies of many companies. It enables a wide range of additional features that can only be achieved by turning

speech into text. The early majority and early adopters' phases of the technology adoption lifecycle are where voice technology now occupies space. The simplest form of communication is voice, and in 2021, we expect there to be a significant shift as far as how businesses communicate.

Positive impact as a result of covid-19
a. *Web conferencing*
The greatest benefit from COVID-19 will have been felt by transcribing of Web Conferencing. The issue of subtitles and transcription has often come up as web conferencing technologies are embraced worldwide to accommodate remote workers. The finest and, in some circumstances, the only method of communication today is web conferencing. Smart companies saw that the availability of the these web conferences was a significant potential. To make sure that everyone could access and understand chats, subtitles had to be required. Think of transcripts as automatic meeting notes. Transcripts quickly become just as crucial as a way for firms to record, store, and evaluate discussions as they take place.

b. *Analytics & customer experience*
COVID-19 has had a strong positive influence on Customer Experience & Analytics. Consumer experience has been recognized as a crucial problem within customer support since the epidemic was declared a global emergency. Customers are not just dealing with more phone-related concerns, they're much more vulnerable than before and need to be handled delicately on a case-by-case basis.

c. *Adoption of voice technology into business automation workflows*
Voice technology adoption to workflows for business automation recognize that many companies and use scenarios had large holes in their speech technology strategy when the outbreak hit. COVID-19 has had a tremendous impact. Businesses in these sectors, like web conferencing, have seen considerable development as a result of widespread adoption after weighing the benefits of integrating speech technology into their processes against the risks of not doing so.

d. *Demand on collaboration tools*
Collaboration tool demand will rise through 2021 and beyond. A new standard for living and working has been established for the year 2020. Businesses have learned that many tasks may be completed at home without the need for pricey office leases or commuting. Whether it be a hybrid residence approach to working or complete remote working, this new method of doing things has become the norm, and many firms have declared that they won't go back to how they did things before the pandemic

arrived. As a result, companies will depend increasingly upon collaboration tools to maintain their productivity and efficiency. In a short amount of time, India has become a significant innovation centre and a major market for speech technologies. Voice technologies have already been changing the way we communicate, conduct business, and live. Voice recognition technology has been widely adopted during the previous two years, particularly in the healthcare, finance, media, and retail sectors. The number of voice shoppers in India is predicted to reach a whopping 168 million by the end of this year, according to WATConsult, Dentsu India's digital agency. Voice-search queries in India are growing at 270% per year, according to MMA and Isobar Report published last year. Increase in use of voice searches, virtual assistants and conversational AI is compelling businesses to take a relook at the way they interact with customers. Brands are therefore focusing on 'conversation-first' strategies to analyze and improve customer experience in the digital-only era. (BI INDIA TECH BUREAU, 2022)

BARRIERS TO ADOPTING VOICE TECHNOLOGY
Entry barriers are frequently to blame for organizations adopting new technology slowly. For many years, it has been a widespread misconception that voice technology is not sufficiently advanced to be adopted as a crucial component of a process and technological stack. The output for the most widely spoken languages around the world, including English, French, Spanish, and German, is now extremely reliable in terms of word mistake rate because to advancements in voice technology over the past few years. At this point, additional difficulties and considerations have an impact on the adoption rate.

i. *Accuracy*
The main obstacle to speech technology adoption in their industry is accuracy. These days, accuracy, often known as word error rate, refers to more than just word output accuracy (WER). Since the majority of the world's languages have a relatively low WER, the degree of precision is affected by a variety of additional elements on a specific instance basis. These elements are frequently specific to a use scenario or the requirements of a business.

ii. *Data security and privacy*
One of the biggest obstacles(barrier) to the adoption of speech technology, according to some, is data security and privacy. We think the market's mistrust may have increased dramatically as a result of the media's characterization of IT companies as "data-hungry." It might also be the

result of more regular talks moving online and everyone overnight adopting remote employment.

iii. Deployment

Voice technology, or any technology for that matter, needs to be easy to deploy and integrate. Adoption of voice recognition technology is hampered by the complexity of its deployment and integration. Interoperability needs to be simple and secure, whether a company needs to deploy locally or in the cloud. The process of adopting voice technologies can be time-saving as well as costly without the proper assistance or documentation. To avoid this adoption hurdle, it is crucial for technology companies to make product deployments and interconnections as frictionless as feasible.

iv. Language coverage

Language coverage has been mentioned as one of the main entry barriers. There are gaps in the language coverage of several of the top voice technology companies. The majority of providers offer English coverage, but when multinational corporations wish to use voice technologies, the lack of language support becomes an obstacle to acceptance. The output quality is a crucial question to examine when providers provide multiple languages. Businesses will be better able to integrate voice technologies into their workflows with the creation of a large variety of precise languages. Along with language coverage, users also cited difficulties in identifying accents or dialects as a barrier.

v. Business benefits:

The expense of deploying such devices was another major concern mentioned by several responders. If upgrading existing legacy systems is necessary for the implementation of such systems, the setup and installation costs may be very high. In such situations, the advantages won't be enough to offset the significant upfront costs. Voice bots' under use and haphazard implementation can also prolong the payoff period.

vi. Lack of Trust:

Although voice recognition technology is undoubtedly useful and convenient, it also has privacy and security responsibilities that should not be ignored. A biometric method known as voice recognition enables the detection of a distinctive human characteristic. However, as voice solutions have become more widely used, people and companies have begun to trust them. This is demonstrated by the increased use of speech in many contexts.

vii. User Experience Quality:

Users cannot have "real-life" conversations with these systems since it is still difficult for voice technology to understand how words relate to one another in context. Although they are now in use, first-generation voice-based systems have been able to provide consumers more benefits, notably in the processing of repetitive tasks. Companies have not yet fully adopted voice technology to handle complicated systems. Voice-enabled systems require constant upkeep and optimization utilizing tools like machine learning. These systems are able to comprehend natural language with more accuracy and communicate far more intelligently as technology develops.

LEVERAGING VOICE TECHNOLOGY:

1. In Banks:

Banks can implement this technology in the front and back end to reduce customer service costs, free branch staff and utilize them for other important work. Voice-driven technology will help the banks to provide satisfying customer service. As the technology can understand the conversational accents, dialects, intonation, linguistics this will help the banks to ensure that customer queries are handled quickly and effectively.(*The Growth of Voice-Based Technology in The Banking Industry, 2022*)

• Leverage of Voice Technology by Banks as following:

a. *Voice-based Account Servicing:* Customers can check their bank account, transaction history, etc. by speaking to their banks. Some of the assisting technology includes Siri, Google Assistant, and Alexa.

b. *Voice-Activated Transactions:* Banks have introduced voice-activated features to assist clients in completing financial transactions by speaking to voice-enabled devices.

Benefits of voice technology for banking:

o **Banking Streamlining:** By simply asking their phones to make a deposit or withdrawal, bank customers will benefit from voice-based technologies.

o **Biometric Security:** Banks can utilise voice-based technologies to add an additional layer of biometric security protection.

o **Enhanced Accessibility:** Voice-based technologies will aid banks in more rapid and coordinated communication. By enabling customers to use banking services around-the-clock, this will enable banks to offer better services.

2. In Healthcare

Today, medical centers are using Alexa for data transmission to patients' homes. And doctors are using it for surgical note taking and record keeping.

In other applications, patients interact with voice technology to access information about common symptoms and prescription medicine dosages. All of these applications eliminate the need for manual searches, saving precious time and ensuring that the relevant data does not get lost in a sea of metadata. It also makes it more practical and accessible for patients to participate in their own healthcare.

3. In markets :

Globally, and over 500 million people have been using Google Assistant each pay period, with Hindi being by far the second most commonly voiced language after English. The most popular voice technology medium in India is mobile phones. According to Google research, India is the country that adopts speech technology the second fastest after the United States, but this comes with a new difficulty. In addition to English, the nation has 22 additional official languages, 121 total official languages, and 270 native languages. With the popularity of speech technologies, many Indian users now want to use other languages besides English to control technology. (Gellrich, 2022)

Voice technology is rapidly prevalent in Indian society. From entertainment to querying about daily horoscopes, from asking about the following train schedule to building a resume for a job, the dominance of voice assistance is prominent everywhere. For example, Gaana, India's largest music streaming app, wanted to expand to rural Indian users. The brand added voice search capabilities to its app to break the literacy barrier among new Internet users, and within a year, 24% of its users used voice to play their favorite songs. Another example could be Dhiyo, an AI-powered voice platform for job seekers, allowing workers to create CVs by simply speaking into their smart phones. Reverie Technologies has developed an Indian voice suite called Gopal to help businesses connect with non-English customers in 12 Indian languages. (Gellrich, 2022).

CONCLUSION

Voice technology is widely used in many different contexts by people of all ages. It doesn't need a specific gadget to do intricate tasks and produce exceptional user experiences. With the integration of native languages like Hindi, Marathi, Tamil, Bengali, and Gujarati, speech technology can now reach rural clients and increase the global acceptance of voice technology. With its emphasis on vernacular languages, voice technology keeps India connected since it allows individuals to use it in the language of their choice. As the developer ecosystem expands, voice design specialists will become increasingly relevant and essential in certain changeable voice journeys. Adoption of

voice technologies will be sped up and consumer stickiness will increase with the proper voice layout and voice user experience (VUX).

REFERENCES

1. The audio and voice revolution in India. (2022, February 10). Trinityaudio. https://www.trinityaudio.ai/the-audio-and-voice-revolution-in-india

2. (2022). The Rise and Impact of Voice Technology. https://www.advancedmobilegroup.com/. https://www.advancedmobilegroup.com/blog/the-rise-and-impact-of-voice-technology

3. SPEECHMATICS. (2021). Trends and Predictions for Voice Technology in 2021. January.

4. Hasbun, S. M. (2020). The Coronavirus vs Voice Technology in Asia. https://towardsdatascience.com. https://towardsdatascience.com/the-coronavirus-vs-voice-technology-in-asia-78860d7893ae

5. SCHWARTZ, E. H. (2020). Track Coronavirus Outbreaks by Voice on a New Digital Dashboard. voicebot.ai. https://voicebot.ai/2020/04/15/track-coronavirus-outbreaks-by-voice-on-a-new-digital-dashboard/

6. ET CONTRIBUTORS (2020, September 13). Indian consumers are using voice technology to get things done. Brands are you listening? The Economic Times. https://economictimes.indiatimes.com//small-biz/marketing-branding/branding/indian-consumers-are-using-voice-technology-to-get-things-done-brands-are-you-listening/articleshow/78072966.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

7. PR, A. (2022, May 17). Adoption of Voice Technology crucial to bridge digital divide: IAMAI. The Print. https://theprint.in/ani-press-releases/adoption-of-voice-technology-crucial-to-bridge-digital-divide-iamai/959796/

8. BI INDIA TECH BUREAU (2022, July 7). Voice tech is evolving rapidly. Here are the top trends in voice tech to watch for. BUSINESS INSIDER INDIA.https://www.businessinsider.in/tech/enterprise/voice-tech-is-evolving-rapidly-here-are-the-top-trends-in-voice-tech-to-watch-for/articleshow/92727686.cms

9. (2022). The Growth of Voice-Based Technology in The Banking Industry. nelito solutions that perform. https://www.nelito.com/blog/the-growth-of-voice-based-technology-in-the-banking-industry.html

10. E. (2021, September 22). Voice AI technology allows doctors to focus more on patient care. ETHealthworld.com from the Economic Times.

11. (Gellrich, 2022)Gellrich, E. (2022). Voice Technology Revolution in India. ATB. https://www.alltechbuzz.net/voice-technology-revolution-in-india/

12. Evolution of voice technology. (2022). May.

13. Al-madani, A. M. (2019). Project Report On AI Speech Recognition System DR . G . Y . PATHRIKAR COLLEGE OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY , AURANGABAD Project Report On AI Speech Recognition System Submitted by Ali Mansour Almadani Guided by Mr . Ashish Bhalerao Assis. April 2018. https://doi.org/10.13140/RG.2.2.31037.20965

14. Ault, S. V., Perez, R. J., Kimble, C. A., & Wang, J. (2018). On speech recognition algorithms. International Journal of Machine Learning and Computing, 8(6), 518–523. https://doi.org/10.18178/ijmlc.2018.8.6.739

15. Bilal Zorić, A. (2020). Benefits of Educational Data Mining. Journal of International Business Research and Marketing, 6(1), 12–16. https://doi.org/10.18775/jibrm.1849-8558.2015.61.3002

16. Dash, T. K., Mishra, S., Panda, G., & Satapathy, S. C. (2021). Detection of COVID-19 from speech signal using bio-inspired based cepstral features. Pattern Recognition, 117, 107999. https://doi.org/10.1016/j.patcog.2021.107999

17. Deshpande, G., & Schuller, B. W. (2020). Audio, Speech, Language, & Signal Processing for COVID-19: A Comprehensive Overview. http://arxiv.org/abs/2011.14445

18. Despotovic, V., & Ismael, M. (2020). Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19 . The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information website . Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories , such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source . These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active. Detection of COVID-19 from voice , cough and breathing patterns : Dataset and preliminary results. January.

19. Duty, I., & Extravaganza, F. (n.d.). Contents 13 3. 244–281.

20. Elavarasi, S., & Suseendran, G. (2020). Automatic Robot Processing Using Speech Recognition System. Advances in Intelligent Systems and Computing, 1042(October 2019), 185–195. https://doi.org/10.1007/978-981-32-9949-8_14

21. El-Dairi, M., & House, R. J. (2019). Optic nerve hypoplasia. In Handbook of Pediatric Retinal OCT and the Eye-Brain Connection (pp. 285–287). https://doi.org/10.1016/B978-0-323-60984-5.00062-7

22. Errattahi, R., Hannani, A. El, & Ouahmane, H. (2018). Automatic speech recognition errors detection and correction: A review. Procedia Computer Science, 128, 32–37. https://doi.org/10.1016/j.procs.2018.03.005

23. Fredrick Norberg, Z. Y. (2018). The implementation of Voice Command in Smart Homes.

24. Giatsoglou, M., Chatzakou, D., Gkatziaki, V., Vakali, A., & Anthopoulos, L. (2016). CityPulse: A Platform Prototype for Smart City Social Data Mining. Journal of the Knowledge Economy, 7(2), 344–372. https://doi.org/10.1007/s13132-016-0370-z

25. Hansen, G. C., Falkenbach, K. H., & Yaghmai, I. (1988). Voice recognition system. Radiology, 169(2), 580. https://doi.org/10.1148/radiology.169.2.3175016

26. Hsu, J. (2002). Data mining trends and developments: The key data mining technologies and applications for the 21st century. Proceedings of the 19th Annual Information Systems …. http://www.csse.monash.edu.au/~mgaber/DATA MINING TRENDS AND DEVELOPMENTS The Key Data Mining Technologies and Applications for 21 century.pdf

27. Indian Ministry of Mines (MoM). (2011). Sustainable Development Framework (SDF) for Indian Mining Sector Sustainable Development

Framework (SDF) for Indian Mining. Final report. November, 115.

28. Joshuva, A., Priyadharsini, S., Aravinth, S., Jayaraman, P., Balachandar, K., & Meganathan, D. (2020). A review on recent trends and development in speech recognition system. Journal of Advanced Research in Dynamical and Control Systems, 12(1 Special Issue), 521–528. https://doi.org/10.5373/JARDCS/V12SP1/20201099

29. Kabir, M. M., Mridha, M. F., Shin, J., Jahan, I., & Ohi, A. Q. (2021). A Survey of Speaker Recognition: Fundamental Theories, Recognition Methods and Opportunities. IEEE Access, 9, 79236–79263. https://doi.org/10.1109/ACCESS.2021.3084299

30. Koshtura, D., Andrunyk, V., & Shestakevych, T. (2021). Development of a speech-to-text program for people with haring impairments. CEUR Workshop Proceedings, 2917, 565–583.

31. Križaj, J., Gros, J. Ž., & Dobrišek, S. (2022). Validation of Speech Data for Training Automatic Speech Recognition Systems. European Signal Processing Conference, 2022-August, 1165–1169.

32. Kröger, J. L., Lutz, O. H. M., & Raschke, P. (2020). Privacy implications of voice and speech analysis – information disclosure by inference. In IFIP Advances in Information and Communication Technology: Vol. 576 LNCS (Issue March). Springer International Publishing. https://doi.org/10.1007/978-3-030-42504-3_16

33. Kröger, J. L., Lutz, O. H.-M., & Raschke, P. (2020). Privacy Implications of Voice and Speech Analysis – Information Disclosure by Inference BT - Privacy and Identity Management. Data for Better Living: AI and Privacy: 14th IFIP WG 9.2, 9.6/11.7, 11.6/SIG 9.2.2 International Summer School, Windisch, Switzer (Vol. 2). Springer International Publishing. https://doi.org/10.1007/978-3-030-42504-3

34. Kumar, T., Mahrishi, M., & Meena, G. (2022). A Comprehensive Review of Recent Automatic Speech Summarization and Keyword Identification Techniques. 111–126. https://doi.org/10.1007/978-3-030-85383-9_8

35. Langer, S. G. (2002). Impact of speech recognition on radiologist productivity. Journal of Digital Imaging, 15(4), 203–209. https://doi.org/10.1007/s10278-002-0014-7

36. Mehta, P. S. (2002). oecd mining India.pdf. Conference on Foreign Direct Investmentand The Environment, 17.

37. Ministry of Mines. (2011). Final Draft of Sustainable Development Framework for the Mining Sector. Policy, 1–85.

38. Nakazawa, Y., Mori, T., & Yamaguchi, Y. (n.d.). Feature Articles : Media-processing Technologies for Artificial Intelligence to Support and Substitute Human Activities Speech Recognition Technologies for Creating Knowledge Resources from Communications. 53–58.

39. Paidi, A. N. (2012). Data Mining : Future Trends and Applications. International Journal of Modern Engineering Research, 2(6), 4657–4663.

40. Parente, R., Kock, N., & Sonsini, J. (2004). An analysis of the implementation and impact of speech-recognition technology in the healthcare sector. Perspectives in Health Information Management, 1, 5. http://www.ncbi.nlm.nih.gov/pubmed/18066385%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC2047322

41. Pathak, P. (2016). Speech Recognition Technology : Application & future Speech Recognition Technology : Applications & Future. January.

42. Pathak, P. (2016). Speech Recognition Technology : Application & future Speech Recognition Technology : Applications & Future. January.

43. Rahman, H. (2008). Prospects and scopes of data mining applications in society development activities. In Data Mining Applications for Empowering Knowledge Societies. https://doi.org/10.4018/978-1-59904-283-1.ch009

44. Rahman, H. (2008). Data mining applications for empowering knowledge societies. In Data Mining Applications for Empowering Knowledge Societies. https://doi.org/10.4018/978-1-59904-283-1

45. Russell, M., Brown, C., Skilling, A., Series, R., Wallace, J., Bonham, B., & Barker, P. (1996). Applications of automatic speech recognition to speech and language development in young children. International Conference on Spoken Language Processing, ICSLP, Proceedings, 1, 176–179. https://doi.org/10.21437/icslp.1996-45

46. Saha, A. K. (2017). Review of Design of Speech Recognition and Text Analytics based Digital Banking Customer Interface and Future Directions of Technology Adoption. http://arxiv.org/abs/1712.04640

47. Size, M. M., Analysis, T., By, R., Discovery, D., Use, B. E., & Forecasts, S. (2020). Report Coverage & Deliverables. Grand View Research, 2027, 1–7.

48. Sasvari, P. (2012). 1307.3911 (1). 5(1), 1–10.

49. Schuller, B. W., Schuller, D. M., Qian, K., Liu, J., Zheng, H., & Li, X. (2021). COVID-19 and Computer Audition: An Overview on What Speech & Sound Analysis Could Contribute in the SARS-CoV-2 Corona Crisis. Frontiers in Digital Health, 3(March). https://doi.org/10.3389/fdgth.2021.564906

50. Schuller, B. W., Schuller, D. M., Qian, K., Liu, J., Zheng, H., & Li, X. (2021). COVID-19 and Computer Audition: An Overview on What Speech & Sound Analysis Could Contribute in the SARS-CoV-2 Corona Crisis. Frontiers in Digital Health, 3(April). https://doi.org/10.3389/fdgth.2021.564906

51. Service, F. (2010). Voice-Activated Personal Data Recorder / Field Data Recorder (PDA / FDR) or Laptop Application. November.

52. Suen, H. Y., Hung, K. E., & Lin, C. L. (2019). TensorFlow-Based Automatic Personality Recognition Used in Asynchronous Video Interviews. IEEE Access, 7(05), 61018–61023. https://doi.org/10.1109/ACCESS.2019.290286 3

53. UNCTAD/TIR. (2021). And innovation 2021. https://unctad.org/system/files/official-document/tir2020_en.pdf

54. Wang, K. (2022). Application of Speech Recognition Interaction and Internet of Things in Data Mining. Journal of Computing Science and Engineering, 16(2), 88–96. https://doi.org/10.5626/JCSE.2022.16.2.88

55. Zhou, L., Shi, Y., Zhang, D., & Sears, A. (2006). Discovering cues to error detection in speech recognition output: A user-centered approach. Journal of Management Information Systems, 22(4), 237–270. https://doi.org/10.2753/MIS0742-1222220409

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