

**Original Article**

## **Use of Speech Recognition Technology in Social Work Counselling- An Analysis**

Anil Merga

Research scholar

Department of Sociology and Social work  
Kakatiya University

Prof. Thatikonda Ramesh

Professor

Department of Sociology  
Kakatiya University

### **Abstract:**

Counselling is a vital tool for addressing the psycho-social well-being of individuals, especially in our technologically advanced generation where people often neglect their health due to busy schedules. The rising prevalence of anxiety, fear, anger, stress, PTSD, and other psychological issues has become a growing concern, affecting students, married couples, farmers, and individuals experiencing love-related challenges. To address these issues, the government and non-government organizations are offering counselling services, but reaching the masses remains a challenge. One-to-one counselling in physical mode has proven to be more effective than other modes, allowing counsellors to analyze clients' facial expressions and voice modulation and motivate them to open up. However, unforeseeable circumstances such as the Covid-19 pandemic have made face-to-face interactions impossible. Therefore, e-counselling and telephonic counselling has emerged as useful mechanisms, albeit with limitations. Counsellors find it challenging to understand clients' emotions without being able to see their facial expressions or hear their voice modulation, making success rates lower. This paper emphasizes how social work counsellors can utilize speech recognition technologies to overcome these limitations and understand clients' emotions by decoding their voice modules.

**Key words:** Social work, Speech Technology, Emotions, Counselling and E-health and Counselling

### **Introduction:**

The Integration of Social Work Practice with the new technologies which are emerged in modern era is very essential to effectiveness in Social Work practice. We cannot compete with the other disciplines until and unless we update to New Technologies for the well-being of the Society. Coulshed Said 'If case management is to succeed as a strategy for organising and

coordinating services at the level of the individual client it has to concentrate on the particulars of interactions between helper and helped'. Counselling skills play a pivotal role in this. [1] Counselling is one of the

crucial and prominent tools which we will use in Social Work practice. It is an interaction for the sharing of information between two Individuals i.e., counsellor and counsee. But in 21<sup>st</sup> Century the Social Work practice is completely changed. The Covid-19 Outbreak pushed the social workers to implement new techniques to extend their services during this stage; Many professionals have been utilized Telephonic Counselling and e- counselling facilities to dealt with the client psycho- social well-being.

### **What is Social Work?**

The International Association of Schools of Social Work (IASSW) and the International Federation of Social Workers (IFSW) described Social Work as a profession which promotes social change, problem solving in human relationships and the empowerment and liberation of people to enhance wellbeing. Utilising theories of human behaviour and social systems, social work intervenes at the points where people interact with their environments. Principles of human rights and social justice are fundamental to social work. In 20<sup>th</sup> Century Social Work has emerged as profession which deals with the Psychological and Social well-being of the People. The Process of social work, interviewing, assessment, planning, interventions, and evaluations, take place in the context of meeting people, their worries and their life crises.

### **What is Speech Recognition Technology?**

Speech is an excellent medium for people to express their ideas, opinions, sentiments, and emotions. But in the modern day, peripheral devices are used, how we interact with computers. To make machines behave more like humans, we put a lot of effort into artificial intelligence. Today, we can use voice to communicate with machines in the same manner that we do with other people. Speaking with a device's interface using their voices is possible thanks to Automatic Speech Recognition (ASR) and Speech Recognition Technology, a branch of

Artificial Intelligence Technology and Pattern Recognition [2].

Transforming the spoken signal into a phoneme-like unit arrangement is the fundamental aim of speech recognition methods. ASR has been extensively investigated for the past three decades and underwent a significant change in the previous decade. There are currently many other types of apps accessible, including dictation, voice-activated programmers, automated phone calls, weather report data frameworks, travel data via IVRS systems, and Internet of Things (IoT) applications that don't require human interaction to communicate [3].

### **Working of ASR**

Automatic Speech Recognition (ASR) systems use raw speech signals as input during the training and testing phases of a pattern recognition issue.

Figure 1 depicts the process of ASR in action.

- The method begins by recording human voice using a microphone or another type of input device.
- It generates a waveform signal of the speaker's vocal utterances, which may be contaminated by noise due to the speaker's surroundings and may also contain additional pauses when the speaker is speaking.
- These kinds of noises must be removed in order to get more accurate results. The wave signal is then filtered after this stage.
- The resulting filter wave signal is then split into phonemes, which are the fundamental units of language.
- ASR will use statistical probability analysis to find the next likely phoneme. It will thereafter be able to infer words and phrases from phonemes.
- As a result, ASR can understand human language and react to it more effectively.

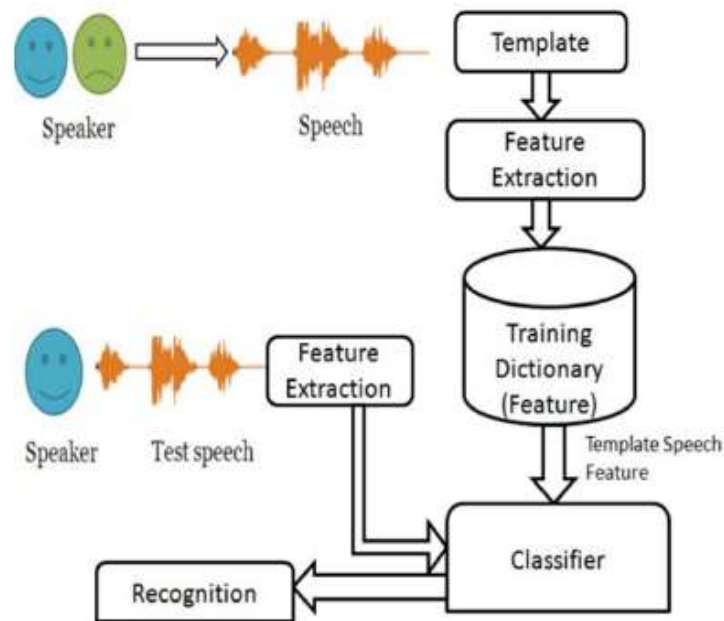


Figure 1: Automatic Speech Recognition (ASR) system

### Domains of ASR

Automatic Speech Recognition (ASR) system domains are mainly:

- a. Speech Recognition
  - b. Speaker Identification
  - c. Language Identification
  - d. Speaker Verification
- a. **Speech Recognition:** The method of identifying words or speech from human sound waves is known as speech recognition. The foundation of speech recognition is speech. It is a crucial area for research in both pattern recognition and voice signal processing.
  - b. **Speaker Identification:** Without knowing the specifics of speaker information, it recognizes the Speaker from the speech utterance [4].
  - c. **Language Identification:** Finding the language of speech used by an unidentified speaker without knowing the language's specifics is difficult. [5].
  - d. **Speaker Verification:** It is the method of confirming a user's identification using voice features.

### Sub-Domains of ASR

In ASR, the Sub-Domain areas are included like,

- a. Dialect Identification
- b. Emotion Recognition

- a. **Dialect Identification:** Language identification has a sub domain called dialect identification that is used to identify the speech patterns of a particular language used by an unidentified speaker. A dialect of a certain language is a variety of that language that is used by people to communicate in their daily lives in a particular area or location. Despite speaking the same language, dialects [6] differ from accents, grammar, and pronunciation.
- b. **Emotion Recognition:** It is a part of ASR that is used to identify the speaker's emotions with the minimum amount of speech, regardless of Speaker. Speakers in a discourse mostly convey their opinions or ideas through non-verbal indicators like emotions include happy, anger, sad, neutral and anxiety.

### Speech Emotion Recognition (SER) Model

SER is used to identify the emotions of any spoken languages from an unknown speaker. The emotional reaction of each individual varies based on the circumstance. One of the most difficult tasks is figuring out how someone is feeling in response to a genuine event. Knowing when another person is feeling anything enhances a person's

interpersonal and social interactions. A person's emotional state of mind can be revealed through speech and its symbol.

Figure 2 displays a summary of the structural elements of the SER System. Three phases make up the majority of the SER system. Speech Emotion Database, Classification Model Phase, and Feature Extraction Phase. SER is now employed in a number of applications to quickly determine a

speaker's emotional state. It is used in automated systems where the caller is not required to take part in a tele-call reception, such as electronic health care and e-market systems. Since a (SER) system can be incredibly useful in a number of contexts, it must be in place and able to serve the demands of rural communities. The Telugu SER system is used in this situation.

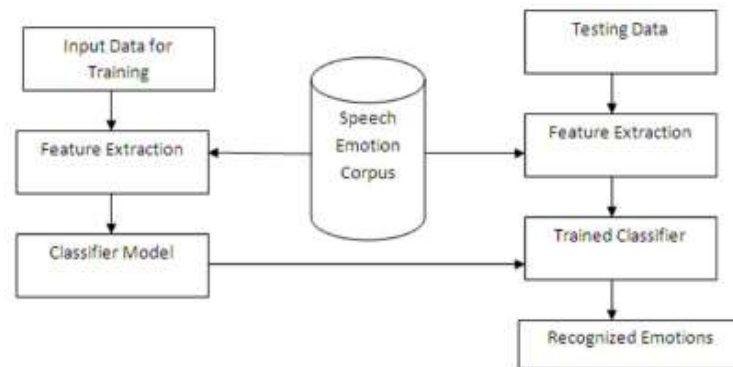


Figure 2: Speech Emotion Recognition (SER) Model

#### Applications of Speech Emotion Recognition (SER)

1. An upgrade was made to the automatic voice recognition system.
2. Increasing the applications of the human-computer interface and improving it.
3. The psychological traits of speakers are investigated in the Health area without any diagnosis.
4. Emotion Recognition Systems may be used in on-board car driving systems to maintain a driver's alertness while driving by using information about the driver's mental state. This lessens the likelihood of various incidents that occur when a driver is under stress.
5. Call centers may be useful for analyzing how customer service representatives engage with clients and for recruiting client-facing personnel.
6. Interactive movies, narratives, and online tutoring programmers would be more useful if they could adjust to the emotional states of listeners or learners.
7. When diagnosing various diseases, doctors may listen to a patient's speech to gauge their emotions and feelings.
8. Criminal investigative organizations might benefit from emotional analysis of criminals through telephone interactions.
9. If robot and humanoid partners can exhibit and comprehend emotions comparable to humans, communication with them will be more engaging and lifelike.

#### Literature Survey:

In this Survey the things occurred in Counseling Process are explained in detail from the scratch.

#### Distress:

In population surveys, public health evaluations, epidemiological research, relevant clinical trials, and other significant intervention studies, psychological distress is frequently used as a proxy for the population's mental health and is frequently used as an indicator. The scientific works emphasise the relevance of psychological discomfort to the indistinguishable clusters of symptoms that

include behavioural issues, functional limitations, personality features, and general anxiety and depression problems.

A general phrase for unpleasant feelings or emotions that affect our level of functioning is psychological discomfort. It is a mental disorder that hinders day-to-day functioning and can lead to an unreasonable perception of the world, other people, and oneself. Psychological distress manifests or manifests as many symptoms of mental diseases, such as sadness, anxiety, distraction, depression, and other symptoms.

According to Mirowsky and Ross (2002) [7], psychological distress is also understood to be the state of emotional distress that is well-described by depressive symptoms like feelings of hopelessness, protracted sadness, and loss of interest in life, as well as anxiety symptoms like restlessness or tension. According to Kleinman (1991), these experiences can also develop correlations with bodily symptoms like chronic headaches, sleeplessness, etc. that are likely to vary between cultures.

### **Characteristics of Psychological Distress**

Distress, according to Phillips and Watson (2009), is a diagnostic criterion for psychiatric disorders like posttraumatic stress disorder that are characterised by impairments in a person's daily life. It also serves as a marker for the severity of symptoms in other disorders like generalised anxiety disorder. Therefore, psychological discomfort is only considered to be a medical concern when it coexists with other symptoms that meet the diagnostic standards for a psychiatric disorder. Alternatively, in accordance with the stress-distress model, psychological distress is thought to be a transient event that is consistent with the normalcy of an emotional response to an existing stressor.

According to Silva et al. (2010) [8], market deregulation and globalisation both influence how the financial sector is reformed and how work is organised in industrialised and developing nations. They emphasised that the International Labor Organization had also stated that this modernization had resulted in the development of a few concerns for the workers in the financial services industry,

including growing time pressure, excessive work demands, role conflict, ergonomic inadequacies, difficult customer relations, and an increase in reported cases of stress and violence.

Prospective studies have demonstrated that factors such as high work or family demands, a lack of control over personal or professional circumstances, a lack of social support, an imbalance between effort and reward, organisational injustice or irrelevant favouritism, job insecurity, unfavourable work events, bullying or harassment, and job insecurity all play a role in contributing to common mental health issues like anxiety and depression.

### **Depression and Anxiety as co-variants of Psychological Distress**

According to the World Health Organization (2017), depression is a major contributor to disability and poor health globally. More than 300 million individuals now are estimated to be suffering from depression, according to the most recent estimates, which shows an increase of more than 17% between 2005 and 2015. The WHO cites the lack of support for those with mental illnesses as well as the stigma's anguish as reasons why people are hesitant to seek treatment for leading healthy and fruitful lives.

The Anxiety and Depression Association of America (2010) listed specific symptoms and signs of depression, including feelings of worthlessness, hopelessness, and helplessness; loss of interest in daily activities or life in general; changes in appetite or weight; abrupt changes in sleep patterns; irritability or anger; fatigue; low mood; sadness; and acts of thoughtlessness and recklessness.

### **Suicide: The End Result of Psychological Distress**

The World Health Organization's Global Health Observatory (2015) estimated 7,88,000 suicide deaths worldwide, which represents an annual age-homogeneous suicide rate of 10 per one lakh people. The WHO research from 2017 emphasises that suicide is a global occurrence and that 78 percent of international suicides take place in lower- or middle-income countries. They

declare that suicide is a serious public health issue that can be prevented with timely, empirically supported, and affordable interventions. Depression, burnout, and psychological distress are the mental health issues. Researchers and practitioners are also interested in how workplace morality and psychosocial working conditions relate to health-related behaviours.

### **Role of Counselling Interventions in Psychological Distress**

As daily life becomes more complicated, so are the issues & problems that necessitate professional assistance. Horizontally, the breadth of psychological distress is expanding to include the social backdrop, issues of professional reputation, a wide range of societal trends, and economic development. Counselling now includes issues with people's academic, professional, social, familial, professional, moral, temperamental, physical, and even material challenges. It covers a lot of ground. The main goal of counselling is to support people in becoming self-directed and in successfully and efficiently adjusting to the demands of a better and more fulfilling life.

According to Lieberman et. al's [9] evaluation of online support groups for Parkinson's sufferers, members showed enhanced quality of life as a result of the support.

According to Razuri et al[10] 's evaluation of a web-based trauma-informed parent training programme, the intervention did lessen behavioural issues and trauma symptoms in kids with traumatic pasts.

In their evaluation of an online parenting programme, Russell et al. [11] found that parents' self-concepts had improved and that they used fewer harsh parenting techniques.

De Vecchi et al.[12] conducted a comprehensive analysis of publications from the literature to determine the research ramifications and evaluate the usage of digital storytelling in mental health.

### **What is Counselling?**

Counselling is a skill that professionals employ to alter their clients' psychological conditions. Simply put, it is an effort made in collaboration between the

client and the counsellor to address the client's psychological problems. Counseling is "the skillful and ethical use of connection to facilitate self-knowledge, emotional acceptance and progress, and the optimal development of personal resources," according to the British Association of Counselling.

### **Counselling Skills:**

- Paying attention, being engaged, and accepting things without judgement;
- reiterating what was said, summarising it, and double-checking;
- the capacity to ask a variety of inquiries, little encouragement, and query options;
- Linking, immediate understanding, and empathy;
- challenging, confrontational, and defence-building;
- Goal-setting, problem-solving, and strategies for concentration;
- understanding of one's own and others' body language;
- avoiding judgmental and judgmental answers;
- Sense of boundaries, organising methods, and the capacity to speak challenging things in a constructive way;
- The capacity to provide feedback; methods for diffusing, preventing, and controlling hostility;

### **Reviews of Literature on E- Counselling or Telephonic Counselling:**

Processes Used by Online Counsellors and Practitioners in E-Counselling Few structures have been identified in e-counselling from a collection of various literatures, especially when it comes to debate on the counselling process. E-application counselling's of the process is just as crucial as face-to-face counselling's. Online counsellors can conduct each session with a specific objective in mind, such as developing

rapport, identifying issues, and developing an intervention plan, thanks to a structured approach. Counsellors can conduct sessions more successfully and with greater direction by adhering to a step-by-step method, preventing the superfluous and pointless conduct of sessions. The 5-step procedure described in [13] Salleh et al. (2015), which will also be reviewed in this article, is one of the counselling processes that have been documented and are known to be employed by online practitioners. For specific purposes or functions, such as online group counselling or online therapy employing the Cognitive Behavioral Therapy (CBT) method and process to create therapeutic alliance and skills, other counselling processes have been identified for use in online sessions. The five-step Cyber-counselling method described by Amla Salleh et al. (2015) contained five (5) primary themes and the subthemes that followed them, as illustrated. The study's participants, who are counsellors, and the counselling process, which entails the formation of an initial virtual contact, structuring, growth of a text relationship, text reinforcement, and process termination (p. 556)

In a study by Holmes & Kozlowski (2016), it was shown that the eight (8) steps of the counselling process were used for sessions [14] held in online group counselling. "(1) introduction, welcome, and individual goal setting; (2) further goal setting and becoming aware of decision-making process; (3) staying motivated to complete tasks; (4) understanding distractions and challenges with accomplishing goals; (5) understanding personality type; (6) connecting personality type with goal accomplishment; (7) understanding choices and how they are made; and (8) termination" are the steps in this process. (2016), p. 67,

Holmes & Kozlowski.

The three-step online counselling approach established by [15] Gilata and Rosenaub (2011) in their study has fewer steps and is shorter than the traditional five-step process. This counselling procedure is primarily utilised for counselling over the phone or for similar modalities like synchronous and asynchronous chat and email. The processes entail establishing a connection with the caller, controlling the conversation, and applying assisting techniques (p. 335).

The two steps proposed by Mallen et al. Williams et al. (2009) [16] introduced the more general steps of the online counselling process, which Mallen et al. (2011) also mentioned in their study. There are two main types of processes involved in the process: rapport-building processes and task-oriented processes, with rapport-building activities being prioritised more—possibly to make up for the absence of verbal and nonverbal cues—than task-oriented processes.

The three phases described by Amichai-Hamburger et al. [17] The use of CBT in face-to-face counselling as integrated into online therapy is then discussed in a study by Amichai-Hamburger et al. (2014). The three main phases of the process are the (1) start phase, (2) middle phase, and (3) termination phase. In the first phase, the therapist evaluates the client's clinical situation, including motivation and expectations for treatment, and sets the terms of the treatment agreement. In the intermediate phase, the client learns about and deals with their harmful thoughts, emotions, behaviours, and interpersonal interactions. Finally, the clients learn new skills and techniques for avoiding relapses throughout the CBT online therapy termination phase.



## Counselling Process:

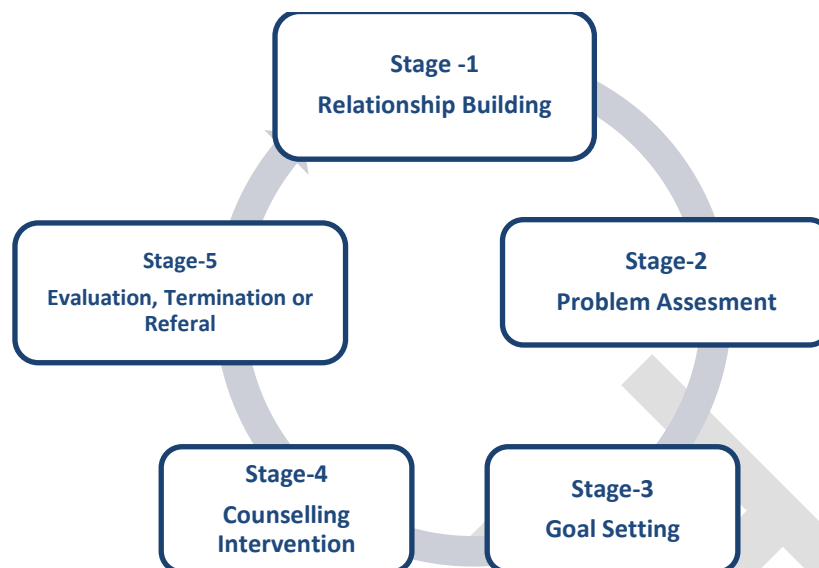


Figure 3: Counselling Process

### 1st Stage: Initial Disclosure - Relationship Building

Building a relationship with clients is the first step, which focuses on getting them interested in issues that directly affect them. The first interview is critical because the client will infer information about the counsellor and the counselling scenario based on the counsellor's verbal and nonverbal cues. Can the counsellor relate to the client on an emotional level? The client's perception of the counselor's sincerity

### 2nd stage: In-depth Exploration - Problem Assessment

A second process, namely problem assessment, is happening when the counsellor and the client are forming a relationship. In this step, information on the client's life situation and motivations for seeking counselling is gathered and categorised.

### 3rd stage: Commitment to action - Goal Setting

Goal-setting is crucial to the effectiveness of counselling. It entails committing to a set of guidelines, a path of action, or a result.

### Step 4: Counselling Intervention

Depending on the theoretical positions a counsellor has, there are several perspectives on what a good counsellor should accomplish with clients. By emphasising the relationship, the person-centered approach, for instance, advises that

the counsellor get involved rather than intervene. The behavioural approach seeks to start processes that assist clients in changing their behaviour.

### Step 5: Evaluation, Termination or Referral For the beginning counsellor

Since they are more focused on starting the counselling process, it is difficult to consider ending the procedure. However, a satisfactory conclusion is the goal of all counselling. The client must be informed that the counselling process must end, and it must be terminated sensitively.

### Social Work Counselling during Covid-19 Lockdown:

Telehealth improves patient and physician convenience while lowering COVID-19 exposure risk for all parties. Telehealth does have several drawbacks, the most notable of which being that it does not provide physical examinations or laboratory tests. The potential for telemedicine to widen health disparities is less evident, though.

Patients must overcome three overlapping obstacles to use telehealth: a lack of technology, a lack of digital knowledge, and steady internet access. The digital divide, which disproportionately affects older persons of colour and those with poor socioeconomic position, is made up of all these obstacles. At a time when doctors are closing their outpatient offices and only providing care



from their homes, utilising computers or smart phones to connect with their patients through video or phone calls, these challenges seem even more daunting. Along with the digital gap, evidence is also increasingly showing that COVID-19 puts older people and communities of colour at higher risk for health issues.

#### Barriers To Telehealth:

- Digital Technology
- Literacy
- Coverage

#### Interface between Social Work Practice and Speech Recognition Technology:

1. Speech
2. Emotions
3. Dialect
4. Non- Recognized language
5. Age
6. Gender

#### Current Study:

The speech signal and language patterns

of the interaction contain the information encoding the session quality because counselling sessions are mostly spoken language interventions. As a result, in recent years, the fields of speech and natural language processing (NLP) have seen remarkable technological developments.

In the current study, we present and evaluate a platform (Fig. 4) that can process a raw recording of a counselling session and quickly deliver performance-based feedback in line with abilities and behaviours displayed both at the utterance and session levels. We concentrate on interactions between one counsellor and one client (dyadic counselling), and the quality evaluation is based on counselor-related criteria. Machine Learning algorithms that examine the language data found in the session's automatically generated transcriptions anticipate the behavioural codes

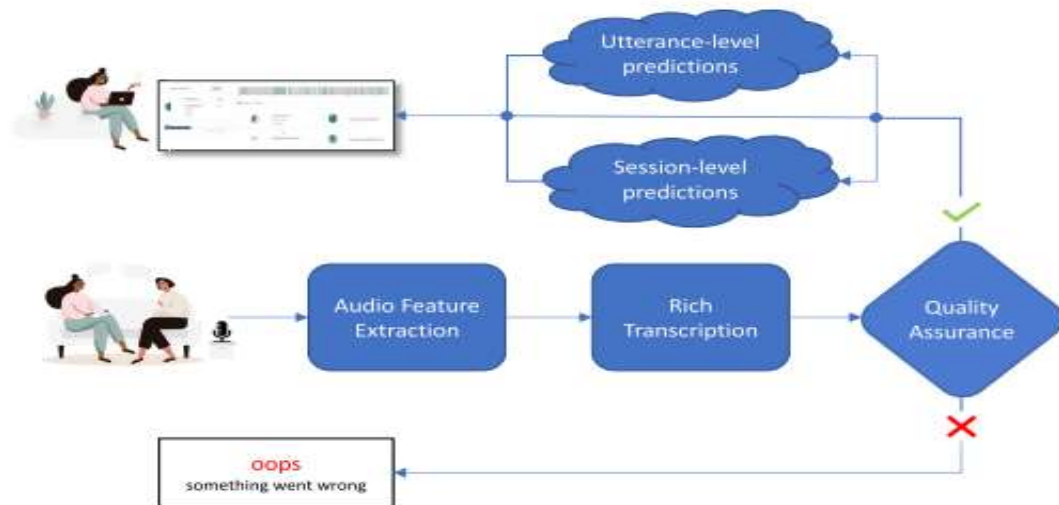


Figure 4 a). Overview of the system used to assess the quality of a Counselling session and provide feedback to the Counsellor.

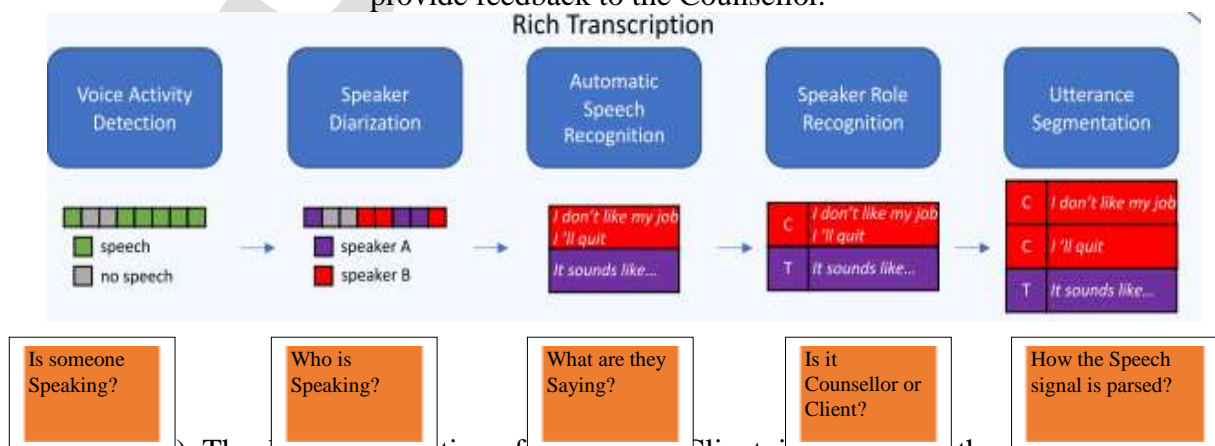


Figure 4b). The dyadic interaction of Counsellor-Client is transcribed through a pipeline

Fig. 4a shows how the overall architecture is constructed. The therapist starts recording the session once both parties have given their formal approval. The required acoustic features are retrieved from the raw speech signal after the digital recording is transferred directly to the processing pipeline. There are five primary processes in the system's rich audio transcription component (Fig. 4b): Voice Activity Detection (VAD), which detects speech segments over silence or background noise; Speaker Diarization, which groups speech segments into same-speaker groups (for example, speaker A and speaker B of a dyad); and Automatic Speech Recognition (ASR), which transcribes each speaker homogeneous segment's audio speech signal into words., (d) Speaker Role Recognition (SRR), in which each speaker group is given a role—in our case study, "therapist" or "client"—and (e) Utterance Segmentation, in which speaker turns are parsed into utterances, the fundamental building blocks of behavioural coding. The resultant transcription is utilised to estimate a range of behaviour codes that indicate target constructs associated to therapist behaviours and skills, both at the utterance and session levels.

Since the system was created with deployment in the actual world in mind, it was crucial to include particular confidence metrics that show how well the automatic transcribing performed. We can discover potential computational problems and evaluate if the input was a real counselling session or not by using quality controls (e.g., whether the counsellor pushed the recording button by mistake). The final report is not produced if particular quality standards are not reached, and feedback is not given for the relevant session. Instead, the counsellor sees an error message. The system wouldn't know which utterances correspond to the provider and which correspond to the client, for instance, in a situation where speaker segmentation fails because the recording is too noisy or the two speakers have very similar acoustic characteristics. As a result, the following prediction algorithms wouldn't be able to accurately capture counsellor-

related behaviours. It is essential for a system used in therapeutic settings to be able to avoid such situations.

## Conclusions:

Counselling, clinical psychologists, and other mental health providers have been using tele therapy to maintain care as a result of the physical distance practises required to reduce the incidence of COVID-19. This is a morally sound choice since it attempts to lessen the detrimental psychological effects of public health initiatives while also addressing the needs of our communities, country, and the rest of the world.

The pandemic is happening at a time when social isolation is at an all-time high due to Neoliberal practises and policies. People who are more likely to belong to the latter group, such as people of colour, immigrants, women, and other underprivileged communities and countries, have been particularly affected by the deep, ever-growing social inequalities between the rich and the poor that have been produced by this economic model and capitalist ideology. People are becoming even more isolated as a result of the quarantine and social isolation. The effects of these actions will also be felt more severely by individuals who were previously poor and susceptible to infection, as they are more likely to suffer from sadness and consider suicide.

For these reasons, therapists need to be ready to deal with their patients' feelings of isolation, potential anxieties of contracting an illness, and social dynamics that can make their mental health worse. However, ethical psychologists cannot do nothing. If we sincerely care about our clients' well-being and the welfare of society as a whole, we must also have the courage to speak up in favour of our clients and for significant social change that will lessen people's suffering. As we start to prepare to leave these social exclusionary practises, this includes promoting the use of teletherapy (as well as traditional therapy) and affordable services for people who cannot afford them. It also involves speaking out in favour of social measures that will deal with the socioeconomic effects of this epidemic and

ensure that the population's physical and psychological needs are met.

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