

Real-Time AI-Based Support System for Identifying Emotional Distress in Family Members of Substance Addicts

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Abstract. Families of individuals with substance addiction often experience significant emotional distress yet call-centre operators may lack the necessary mental health training to provide adequate support. This study proposes an AI-driven real-time support system that utilizes sentiment analysis and emotion recognition to identify distress in callers and provide immediate alerts and response guidance to operators. To ensure compliance with **GDPR** regulations, the system incorporates explicit consent and transparency measures. By enhancing emotional support, reducing operator burden and improving overall service efficiency, this approach aims to create a more responsive and ethical call-centre support system. Future research will focus on refining AI accuracy and expanding its applications within mental health services.

INTRODUCTION

Substance addicts Also, public health crisis that affects not only individuals but also their families, who often experience emotional distress, including anxiety, frustration and hopelessness. Many seek support through call-centres, yet these services often struggle to provide adequate emotional assistance due to a lack of specialized mental health training among operators. Also, they deal with on average 50-100 calls per day. So, its become more difficult to be efficient through out the day. Previous research has highlighted the importance of emotional support in addiction recovery and the role of AI in mental health interventions, yet limited studies have explored real-time AI-assisted emotional recognition in call-centre settings.

LITERATURE REVIEW

The application of AI in mental health support has gained significant attention in recent years, particularly in environments where immediate emotional assistance is crucial, such as call-centres supporting families of individuals with substance addiction. AI-driven systems, particularly those utilizing sentiment analysis and emotion recognition, have shown promise in enhancing the ability to detect emotional distress in real-time. These technologies are being employed in healthcare settings to assist with virtual consultations, symptom tracking, and providing 24/7 emotional support (News Medical, 2023).

However, existing AI systems face several limitations that must be addressed. Research indicates that while AI can detect distress signals and offer emotional responses, it still lacks the human empathy required for handling complex mental health cases (News Medical, 2023). Additionally, many AI systems in healthcare, including virtual assistants, fail to ensure robust data privacy and security, creating concerns about the protection of sensitive user

data (PMC, 2021). Furthermore, challenges remain regarding user trust and adoption, as many individuals remain hesitant to fully engage with AI-driven support, especially in emotionally sensitive situations (News Medical, 2023).

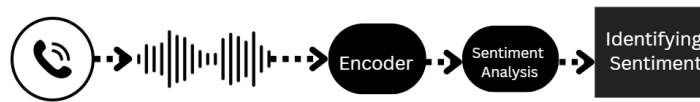


Fig 1. AI-Driven Sentiment Analysis Pipeline for Call Centre Support

GAP AREA	EXISTING AI SYSTEM	PROPOSED SYSTEM
Emotional Detection	Basic sentiment analysis	Advanced emotion recognition in real-time.
Human Empathy	Limited ability to provide compassionate support.	Incorporation of empathetic responses and compassionate guidance
Real-World Applicability	Often viewed as supplementary tools rather than primary support systems.	AI system integrated into real-time support for call-centre operators

Table 1. Comparison of Gaps in Existing AI Systems and Proposed Solutions

RESEARCH METHODOLOGY

This study follows a structured approach to developing an AI-driven support system for call centres. First, an audio dataset of call-centre conversations is collected, ensuring GDPR compliance and ethical data handling. The audio is then converted into text data using Automatic Speech Recognition (ASR) and pre-processed for clarity. Next, machine learning models (CNNs, RNNs,

or Transformers) analyze acoustic and linguistic features to detect emotional distress in real time. Finally, the AI system is integrated into the call-centre environment, providing real-time alerts and guidance to operators, enhancing their ability to support distressed callers while maintaining privacy and security.

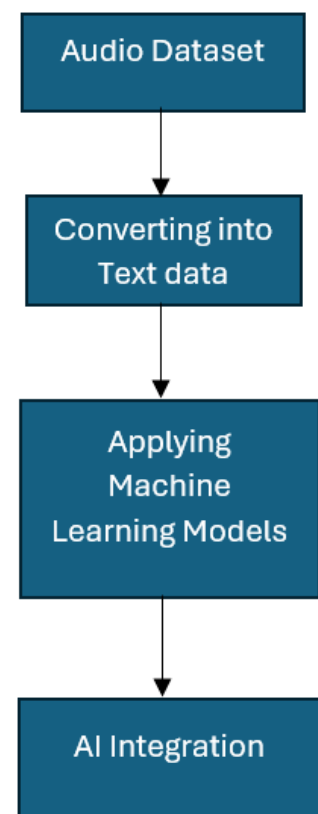


Fig 2. AI-Driven Emotional Distress Detection Pipeline

CONCLUSIONS

This study presents an AI-driven system that enhances call-centre support by identifying emotional distress in real time. Utilizing speech emotion recognition and machine learning, the system assists operators in responding more effectively while ensuring GDPR compliance. This approach strengthens mental health support services for families of individuals with substance addiction.

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