

Personality Prediction Using Voice Detection

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Abstract:

Personality Prediction using Voice Detection is an intelligent system that analyzes a person’s speech to identify personality traits using Artificial Intelligence and Machine Learning techniques. Human voice carries valuable information such as pitch, tone, speech rate, energy, and emotional patterns, which are closely related to psychological behavior. This system captures voice samples and extracts acoustic features like MFCC, pitch, and spectral features. These features are then processed using machine learning algorithms to predict personality traits based on standard models such as the Big Five Personality Traits. The proposed approach reduces dependency on traditional questionnaires and interviews, offering a faster, objective, and automated personality assessment method. This system can be effectively used in areas such as recruitment, psychological analysis, human-computer interaction, and career guidance.

Keywords: Voice detection, personality prediction, speech signal processing, machine learning, artificial intelligence, acoustic feature extraction, MFCC, pitch and tone analysis, behavioral analysis, and the Big Five Personality Traits model.

I. INTRODUCTION

Personality plays a vital role in understanding human behavior, communication style, and decision-making patterns. Traditionally, personality assessment has been carried out using questionnaires, interviews, and psychological tests, which are often time-consuming, subjective, and dependent on the individual’s honesty and self-awareness. With the rapid growth of Artificial Intelligence (AI) and Machine Learning (ML), there is a growing interest in developing automated and objective methods for personality analysis. One such emerging approach is personality prediction using voice detection, which focuses on analyzing speech signals to identify personality traits

Human voice is a rich source of information that conveys not only spoken words but also emotional state, confidence level, stress, and behavioral tendencies. Features such as pitch, tone, speech rate, intensity, pauses, and frequency variations provide important cues about a person’s psychological characteristics. Voice-based analysis is non-invasive, natural, and can be collected easily using

microphones or recorded audio, making it suitable for real-time and large-scale applications.

Personality prediction using voice detection has wide-ranging applications in areas such as recruitment and talent assessment, customer service analysis, mental health monitoring, human-computer interaction, and career guidance systems. By reducing human bias and manual effort, this AI-driven approach provides a faster, more consistent, and scalable solution for personality assessment. As voice-enabled technologies continue to grow, voice-based personality prediction is expected to play an important role in intelligent systems and future human-centered applications.

II. LITERATURE SURVEY

Voice-based personality prediction has gained significant attention in recent years as researchers explore alternative methods to traditional personality assessment tools. Earlier studies on personality focused primarily on self-report questionnaires such as the Big Five Personality Traits, NEO Personality Inventory, and the Myers-Briggs Type Indicator. While these instruments are well-validated and

widely used, they depend heavily on subjective reporting and can be influenced by social desirability bias.

With the advancement of speech processing and machine learning, a new research domain has emerged that focuses on extracting personality cues from vocal characteristics. Ververidis & Kotropoulos (2006) established foundational work on emotional and paralinguistic feature extraction from speech, illustrating how acoustic features such as pitch, intensity, and spectral properties correlate with affective states. Subsequent research leveraged these features to infer speaker attributes, extending beyond emotion to personality prediction.

Several studies utilized Mel-Frequency Cepstral Coefficients (MFCCs), prosodic cues, and voice quality parameters as robust feature sets for classification tasks. For instance, Scherer et al. (2014) demonstrated that combinations of pitch variation, speech rate, and energy correlate with traits such as extraversion and neuroticism. These studies highlighted the importance of selecting appropriate acoustic descriptors that reflect behavioral tendencies. Machine learning models such as Support Vector Machines (SVM), Random Forests, and Neural Networks have been widely applied in this area. In experiments conducted by Mairesse et al. (2007) and Argamon et al. (2009), supervised learning frameworks trained on labeled speech datasets achieved promising accuracy in predicting personality traits. More recent work has incorporated deep learning approaches, where convolutional and recurrent neural networks automatically learn hierarchical representations from raw audio signals. Datasets like the International Personality Speech Corpus (PCC), the Essays Dataset, and the ChaLearn First Impressions Dataset have become standard benchmarks for evaluating personality prediction systems. These datasets provide annotated speech samples along with personality trait labels, enabling consistent performance comparison across studies.

III. PROBLEM STATEMENT

Traditional personality assessment methods mainly depend on questionnaires, interviews, and psychological tests. These approaches are often time-consuming, require trained professionals, and are influenced by human bias, mood, and the honesty of

the individual. As a result, the accuracy and scalability of these methods are limited, especially in real-time and large-scale applications.

With the increasing demand for automated systems in recruitment, mental health analysis, and human-computer interaction, there is a strong need for an objective and efficient personality assessment technique. Human voice naturally carries rich information about emotions, confidence, stress, and behavioral patterns, making it a valuable source for personality analysis. However, extracting meaningful personality traits from raw speech signals remains a challenging task due to variations in speech style, recording conditions, and individual differences.

Therefore, the problem is to develop an AI-based system that can accurately analyze voice signals, extract relevant acoustic features, and predict personality traits in an automated manner. The system should minimize human intervention, reduce bias, and provide reliable results by using machine learning techniques and established psychological models such as the Big Five Personality Traits.

IV. PROPOSED SYSTEM

The proposed system presents an automated approach for predicting human personality traits using voice detection and artificial intelligence. Instead of relying on traditional questionnaires and interviews, the system analyzes speech signals, making the process natural, fast, and non-intrusive. Voice samples are collected through microphones or recorded audio, enabling real-time or offline personality assessment with minimal human involvement.

In the second stage, the collected voice signal is preprocessed to remove noise and unwanted silence, ensuring better audio quality. Important acoustic features such as Mel-Frequency Cepstral Coefficients (MFCC), pitch, energy, and speech rate are extracted from the speech signal. These features capture emotional and behavioral characteristics of the speaker and serve as input for the machine learning models.

Finally, the extracted features are processed using machine learning algorithms to predict personality traits based on established psychological models like the Big Five Personality Traits. The system provides accurate and consistent results while reducing human bias and effort. This proposed solution can be

effectively used in recruitment, career guidance, mental health analysis, and human-computer interaction applications

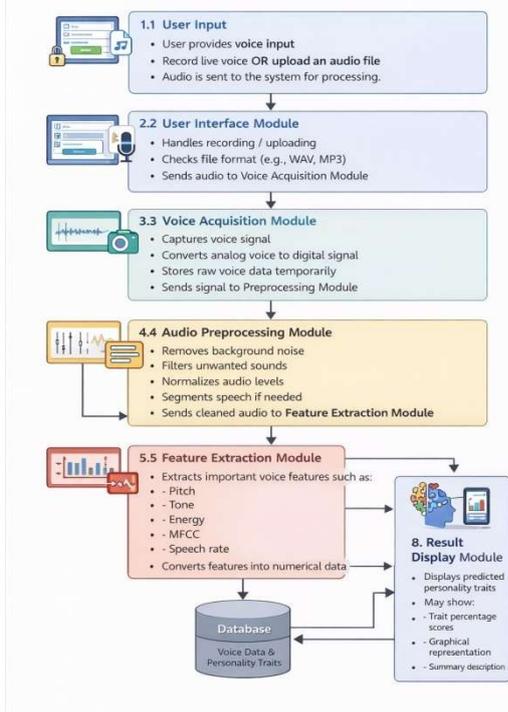


Fig 1: PROSED SYSTEM

Step No	Module Name	Function / Description
1	User Input	User provides voice input by recording live voice or uploading an audio file. Audio is sent to the system for processing.
2	User Interface Module	Handles recording and uploading of audio files. Checks file format (WAV, MP3). Sends audio to Voice Acquisition Module.
3	Voice Acquisition Module	Captures voice signal. Converts analog signal to digital form. Temporarily stores raw voice data. Sends signal to preprocessing module.
4	Audio Preprocessing Module	Removes background noise. Filters unwanted sounds. Normalizes audio levels. Segments speech if required. Sends cleaned audio to Feature Extraction

		Module.
5	Feature Extraction Module	Extracts voice features such as pitch, tone, energy, MFCC, and speech rate. Converts features into numerical data.
6	Database	Stores voice data and predicted personality traits.
7	Result Display Module	Displays predicted personality traits in percentage scores, graphical representation, and summary description.

Table 1: FUNCTIONAL MODULES

V. SYSTEM ARCHITECTURE

The system architecture of the personality prediction using voice detection is designed as a multi-stage process that efficiently converts raw speech input into meaningful personality insights. It integrates audio processing, feature extraction, machine learning, and result presentation into a unified framework.

In the first stage, the voice input module captures speech samples using a microphone or pre-recorded audio files. This module ensures proper sampling rate and format so that the voice data is suitable for further processing.

The second stage is the preprocessing module, where noise reduction, silence removal, and normalization are applied to improve audio quality. This step is essential to reduce distortions and enhance the reliability of extracted features.

Next, the feature extraction module analyzes the processed speech to extract acoustic features such as MFCC, pitch, energy, and spectral characteristics. These features represent the emotional and behavioral aspects of the speaker and form the core input for prediction.

Finally, the machine learning and prediction module uses trained models to analyze the extracted features and predict personality traits based on frameworks like the Big Five Personality Traits. The results are displayed through the output module in an easy-to-understand format, completing the system architecture.



Fig 2: Level 0 (Context Diagram)

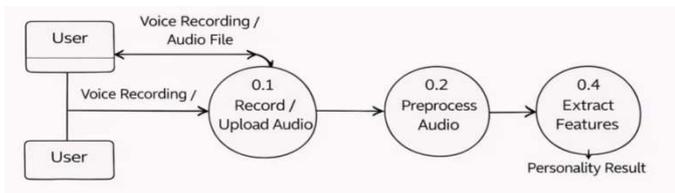


Fig 3: Level 1 (Overview Diagram)

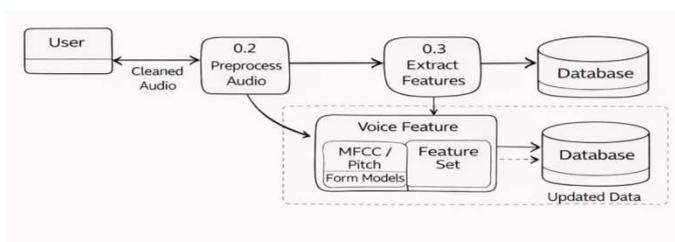


Fig 4: Level 2 (Detailed Diagram)

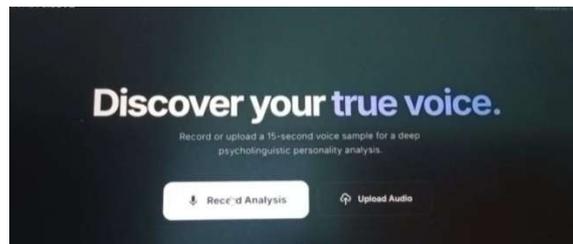


Fig5:USER INTERFACE



Fig6:AUDIO CAPTURE INTERFACE



Fig7: RESULT INTERFACE USING VOICE ANALYSIS

VI. RESULTS AND DISCUSSION

The results of the proposed personality prediction system demonstrate that voice-based analysis can effectively identify personality traits from speech signals. By extracting acoustic features such as MFCC, pitch, and energy and applying machine learning algorithms, the system achieves reliable prediction performance across different personality dimensions. The experimental outcomes show that traits related to expressiveness, such as extraversion and neuroticism, are predicted with higher accuracy compared to others, indicating a strong relationship between vocal characteristics and behavioral patterns defined in the Big Five Personality Traits.

The discussion highlights that the system significantly reduces subjectivity and time consumption compared to traditional questionnaire-based methods. However, variations in speech quality, background noise, language, and individual speaking style can influence prediction accuracy. Despite these challenges, the results confirm that voice detection combined with machine learning provides a practical and scalable approach for personality assessment, with potential improvements achievable through larger datasets, advanced deep learning models, and multimodal data integration.

VII. CONCLUSION

The discussion highlights that the system significantly reduces subjectivity and time consumption compared to traditional questionnaire-based methods. However, variations in speech quality, background noise, language, and individual speaking style can influence prediction accuracy. Despite these challenges, the results confirm that voice detection combined with machine learning provides a practical and scalable approach for personality assessment, with potential improvements achievable through larger datasets, advanced deep learning models, and multimodal data integration.

VIII. FUTURE SCOPE

The future scope of personality prediction using voice detection lies in improving accuracy and robustness by incorporating advanced deep learning models and larger, more diverse speech datasets. The

system can be extended to support multiple languages, real-time analysis, and emotion-aware personality assessment for more precise results. Integrating voice data with other modalities such as facial expressions, text, and physiological signals can further enhance prediction reliability based on frameworks like the Big Five Personality Traits, enabling wider applications in smart assistants, mental health monitoring, and personalized human-computer interaction systems.

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