

A SURVEY ON BIOMETRIC VOICE RECOGNITION

DISSERTATION SYNOPSIS

SUBMITTED TO
BABU BANARASI DAS UNIVERSITY
LUCKNOW



IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

MASTER of COMPUTER APPLICATIONS

SUBMITTED BY
AVNEESH KUMAR SHARMA AND DHEERAJ GUPTA
ROLL NO. - 1230212033 AND 1230212035
MCA21

UNDER THE SUPERVISION OF
DR. ANSHU GUPTA
ASSOCIATE PROFESSOR

SCHOOL OF COMPUTER APPLICATIONS
BABU BANARASI DAS UNIVERSITY
BBD CITY, FAIZABAD ROAD, LUCKNOW (U.P.) - 226 028, INDIA

“A SURVEY ON BIOMETRIC VOICE RECOGNITION”

1.Introduction

Biometric voice recognition is a technology that identifies and verifies individuals based on their unique vocal characteristics. This form of authentication has gained prominence due to its nonintrusive nature and its use in various sectors, including security, customer service, and access control. Unlike traditional biometric methods like fingerprint or facial recognition, voice recognition analyzes specific features in a person's speech, such as pitch, tone, cadence, and pronunciation. These attributes remain consistent despite environmental changes, offering a reliable way of authenticating a user. Voice recognition can be particularly useful in remote and mobile applications, making it increasingly popular as a solution for secure, hands-free identification.

2.Motivation

The motivation to conduct research in biometric voice recognition stems from several key factors that underline its growing importance and potential impact on various industries:

- 1. Increasing Demand for Secure Authentication**
- 2.Growing Use in Hands-Free and Remote Applications**
- 2.Expanding Use Cases Across Industries**
- 3.Addressing Privacy and Ethical Concerns**
- 4.Improving Accessibility and Inclusivity**
- 5.Understanding and Overcoming Technical Challenges**

3.Brief Literature survey

Research in biometric voice recognition has gained significant traction over the past few decades due to its applications in security, authentication, and user interaction technologies. The following literature survey highlights key contributions from various research papers, summarizing advancements, challenges, and emerging trends in this field.

1. Voice Biometrics in Security Systems

Several studies have explored the use of voice biometrics in enhancing security protocols. A key paper by R. A. Rashid, N. H. Mahalin, M. A. Sarijari and A. A. Abdul Aziz, [4] titled An Overview of Security System using Biometric Technology: Design and Implementation of Voice Recognition System (VRS), focusing on the trade-offs between accuracy and system robustness.

Another paper by Markowitz [2], Voice Biometrics for Secure Authentication, outlines the integration of voice recognition in banking and financial services. The study emphasizes the importance of multifactor authentication, combining voice recognition with other biometric methods like fingerprint recognition to bolster security.

2.Machine Learning and Deep Learning in Voice Recognition

Recent research has been heavily focused on utilizing deep learning to enhance voice recognition systems. A paper by Snyder et al. [5], X-Vectors: Robust Speaker Embeddings for Deep Neural Networks, introduced the use of x-vectors in speaker verification tasks. This approach demonstrated improved performance over traditional i-vectors, especially in noisy and challenging environments.

3. Challenges in Noisy and Dynamic Environments

One of the core challenges identified in voice recognition research is the system's vulnerability to noisy and dynamic environments. The study by Sahidullah and Saha and Pal, M., [3], Design, Implementation, and Performance of GMM-based Voice Biometric System under Realistic Environmental Conditions, addressed this issue by proposing noise-robust feature extraction techniques. The paper highlighted how background noise, reverberation, and microphone

variability degrade performance and explored feature enhancement methods to mitigate these effects.

4.Voice Biometric Identity Authentication Model for IoT Devices

Several studies have explored the use of voice biometrics identity authentication for IoT devices. A key paper by Duraibi, Salahaldeen, [1] .

This research paper define following Keywords as Internet of Things, Authentication, Access Control , Bio-Metric, Voice Recognition , Security.

4.Problem Formulation

In this research paper the problem is how to do “Survey On Biometric Voice Recognition”.

5.Objective

Based on a literature review of various research papers on biometric voice recognition, the following key objectives have been identified, each addressing specific challenges and opportunities in the field:

1. Accuracy and Robustness in Varied Environments

2.Security Against Spoofing and Replay Attacks

3.Machine Learning and Deep Learning in Voice Recognition

Using Machine Learning and Deep Learning techniques will survey on biometric voice recognition,

4.Voice Biometric Identity Authentication Model for IoT Devices

Biometric voice recognition system using IoT techniques will be survey based on Authentication, Access Control , security.

6.Methodology/Planning Of Work

Biometric voice recognition research papers typically adopt a variety of methodologies to address the challenges and explore improvements in voice biometrics. These methodologies revolve around data collection, algorithm development, testing, and evaluation across diverse environments. The step of work for survey in biometric voice research is such type:

- Data Collection
- Feature Extraction
- Algorithm/Model Selection
- Training and Testing
- Security Consideration

7.Expected outcome

The expected outcome of this research paper on biometric voice recognition, based on a survey, is to provide a comprehensive understanding of current trends, challenges, and future directions in the field. Key outcomes include:

1. Technology Landscape Overview:

A detailed overview of the existing biometric voice recognition technologies, their accuracy, and real-world applications. The survey should highlight the most commonly used algorithms, tools, and frameworks.

2. Performance Metrics:

Insights into the performance benchmarks such as accuracy, false acceptance rate (FAR), false rejection rate (FRR), and system robustness against noise, variability in voice (e.g., age, emotion), and environmental factors.

3. Comparative Analysis:

A comparison between voice recognition and other biometric modalities (e.g., fingerprint, facial recognition) in terms of usability, cost, and effectiveness.

4. Future Trends:

Identification of future research areas, including advancements in artificial intelligence (AI) and machine learning (ML) that can enhance biometric voice recognition's accuracy and application scope.

8. References

- [1] j. H. a. H. Y. Snyder, "Research on Speaker Recognition Technology Based on Feature Model," 14 April 2022. [Online]. Available: <https://dl.acm.org/doi/abs/10.1145/3544109.3544169>.
- [2] J. Markowitz, "E-Banking security: voice biometrics is not enough as a single layer of defense.," April 2007. [Online]. Available: link.gale.com/apps/doc/A162103555/AONEu=anon~b1672af0&sid=googleScholar&xid=28883131.
- [3] M. ., P. D. ., S. M. a. S. G. Pal, "Robustness of Voice Conversion Techniques Under Mismatched Conditions," 22 Dec 2016. [Online]. Available: <https://arxiv.org/abs/1612.07523>.
- [4] R. A. M. N. H. S. M. A. & A. A. A. A. Rashid, "Security system using biometric technology : Design and implementation of Voice Recognition System(VRS).," 13 May 2008. [Online]. Available: <https://ieeexplore.ieee.org/abstract/document/4580735>.
- [5] S. Duraibi, "Voice Biometric Identity Authentication Model for IoT Devices," May 2020. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3667519.