

Voice Based Human Disease Analysis

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ABSTRACT

The analysis of the human voice has arisen as an essential vicinity of observe for its diverse programs in scientific as well as engineering sciences. Voice analysis essentially offers with extraction of a few parameters from voice sign for processing of voice in proper applicability by using suitable strategies. This paper explores and compares diverse things like input database, parameters, functions extraction strategies, methodology and category strategies utilized by the researchers inside the trouble of figuring out the voice pathology. This paper states the certain common medical conditions which have an effect on voice styles of sufferers in proof to leading research studies that had proven the voice alterations as analysis symptom in respective scientific situations.

Keywords

Classification, Identification, Feature extraction, Voice pathology, Voice analysis.

1. INTRODUCTION

In recent years, a full-size interest has been given to the area of voice pathology identity and monitoring. In the voice pathology treatment, sufferers should often visit the medical doctor for his or her voice remedy. But the sufferers are expecting a long term to consult; they're spending a variety of cash to find the pathology due to the fact the experts should locate the problems inside the vocal folds the use of a few endoscopic instruments most effective. Totally it's far a costly as well as a time-consuming manner. Hence such things made the sufferers experience pain. This situation paves the way for the studies in finding an automatic tool to identify the voice pathology. The basic cause of this automated device is to assist the patients for figuring out the pathological problems for his or her in addition development. Basically, the voice pathology may additionally cause because of the faults in the speech organs, Autism, intellectual infection, Hearing Impairment, Paralysis or more than one disability.

Clinically there is a extensive range of pointers and techniques to locate the voice pathology and also those techniques are subjective and invasive. But it isn't always the case for the automated device for the voice pathology. Most of the researches had been achieved based totally at the three methodologies specifically, 1.Acoustics, 2.Parametric & Non-Parametric and 3.Statistical techniques. The Acoustics capabilities become aware of the pathology primarily based at the functioning and condition of numerous speech organs. The principal parameters used within the Acoustic evaluation have been Fundamental Frequency, Jitter, Shimmer, Harmonic to Noise Ratio and Intensity. In parametric & Nonparametric technique [1,2,3], the parametric strategies had been primarily based at the analysis of speech signals and identifying the glottal indicators and the Non-parametric techniques have

been based on the Time-Frequency, Magnitude Spectrum, and Amplitude Modulation.

Finally, the Statistical Methodology applies category techniques to separate the regular and pathology signal the use of sample popularity strategies. Thus Statistical techniques enforce the Artificial Intelligence concept to become aware of and predict the normal and pathology voice. This paper suggests the literature overview in segment [2]. Voice evaluation techniques with distinctive have a look at on the database, parameters, capabilities, technique and results for the related works completed by means of the researchers in the field of Voice Pathology detection in phase [3]. Finally, the conclusion in mentioned inside the section [4] and plan for future work is discussed in segment [5].

2. LITERATURE REVIEW

The Acoustic Parameter assessment relies upon on the essential frequency, on my own is fairly tough in locating the Voice pathology, but within the case of [4-7], the combination of Feature extraction strategies like Fundamental frequency, Jitter, Shimmer, Harmonic to Noise Ratio, Intensity, makes the assessment quite clean to evaluate between normal and pathology voice. In [8] the Acoustic Features MFCC have been used along side the GMM Classifier to train the HMM to categories the everyday and pathology. An automated detection of speech pathology turned into advanced based on HMM approach in [9], which emphasize the detection of pathologies that affect the speech the usage of fricative, Prolongation, vowels and nasal. The language used for this research is "polish" language. In [10], Multilayer community methodology is utilized in finding the voice sickness classification. The wavelet strength coefficients were given as input for the Multilayer Neural Network. The database used for this research work was accrued from the Tunisia National Hospital. This methodology gives 100% bring about classifying the Normal voice and Pathology voice. The class methodology applied for classifying voice pathology in [11] are GMM and SVM. The databases compressed and stored in MP3 layout had been used to come across the pathology that gift within the human voice. A Cross-validation approach changed into applied in [12], which offers an improved overall performance even as classifying the regular and pathological voice. The Database used in this paintings was Massachusetts Eye & Ear Infirmary Database. The overall performance of the gadget changed into evaluated with the aid of the use of the measurements DET and ROC Curves.

3. VOICE ANALYSIS TECHNIQUES

In this section, some related works in the field of Voice pathology Identification and Classification were discussed based on their process, database, methodology, and results.

3.1 Multiband Approach

In this subsection, the research work "Detection of Voice Pathology using Fractal Dimension in a Multiresolution

Analysis of Normal and Disordered Speech Signals” done by Zulfiqar Ali, IrraivanElamvazuthi, Mansour Alsulaiman, Ghulam Muhammad were studied and analyzed. Voice analysis done via Frequency Domain, MEEI Database is used. Adductor, Vocal Nodules, Keratosis, Vocal Fold Polyp, and Paralysis Disease was considered. No. of Samples: 173 pathological & 53 Normal. Feature Extraction using KATZ (4) + MDVP (22). Classification done by Support Vector Machine and Accuracy is 96.56% [1].

3.2 Multidimensional Approach

In this subsection, the research work “Automatic Assessment of Pathological Voice Quality Using Multidimensional Acoustic Analysis Based on the GRBAS Scale” done by Zhijian Wang, Ping Yu, Nan Yan, Lan Wang, Manwa L. Ng were studied and analyzed. Voice analysis done via Frequency Domain Database of Voice samples collected from People’s Liberation Army General Hospital. Vocal fold lesions, Vocal cord paralysis, Arytenoid granuloma, Pre-cancerous vocal cord lesions, Vocal cord carcinoma and Laryngectomies Disease were considered. No. of Samples: 320 pathological & 100 Normal (805 Samples). Feature Extraction using LDA. Classification done by Extreme Learning Machines and Accuracy is 80.58% [1].

3.3 Multiple Feature Analysis

In this subsection, the research work “Voice Data Mining for Laryngeal Pathology Assessment” finished by Daria Hemmerling, AndrzejSkalski, JanuszGajda were studied and analyzed. Domain: Voice samples of sustained vowels /a/, /i/ and /u/. Saarbruecken Voice Database is used. Hyper practical dysphonia, Vocal cord paresis Laryngitis, Leukoplakia Disease turned into considered. No. Of Samples: 705 pathological & 705 Normal. Feature Extraction the use of Principal Component Analysis. Classification performed with the aid of Random Forest and Accuracy is one 100% [1].

3.4 Band Wavelet Approach

In this subsection, the research work “Voice Disorder Signal Classification Using M-Band Wavelets and Support Vector Machine” completed by PouriaSaidi, FarshadAlmasganj had been studied and analyzed. Voice analysis finished via Domain: Voice & Speech Signals. 4337 samples database used from Kay Elemetrics Corporation. Vocal fold, paralysis, Vocal fold paresis, Nodules Polyps, Edema Disease became considered. No. Of Samples: 653 pathological & fifty seven Normal. Feature Extraction the usage of M-band wavelet decomposition. Classification completed by Support Vector Machine and Accuracy is 99.3% [1].

3.5 Clustering Approach

In this subsection, the research work “Fusion of voice sign statistics for detection of moderate laryngeal pathology” accomplished by means of Adas Gelzinis, Antanas Verikas, Evaldas Vaiciukynas, Marija Bacauskiene had been studied and analyzed. Voice analysis accomplished thru Domain: Voice samples of vowel sound /a/. Own Database is used. Laryngeal Disease considered. No. Of Samples: 689 pathological & 139 Normal. Feature Extraction the usage of Ad-hoc decomposition of the 26 awesome functions set. Classification executed by Random Forest and Accuracy is 98.2% [1].

3.6 Acoustic Voice Analysis

In this subsection, the research work “Towards developing a Voice Pathologies Detection System” achieved by M. El Emary, M. Fezari, F. Amara have been studied and analyzed. Voice analysis achieved through Domain: Speech Signal. Saarbruecken Voice Database is used. Spasmodic Dysphonia, Laryngeal Disease considered. No. Of Samples: 38 Pathological & sixty three Normal. Feature Extraction the use of Mel-Frequency Cepstral Coefficients. Classification performed through Gaussian mixture model and Accuracy is a 100% [1].

3.7 Acoustic Feature Analysis

In this subsection, the studies paintings “Classification of Normal and Pathological Voice Using SVM and RBFNN” achieved by means of V. Sellam, J. Jagadeesan have been studied and analyzed. Voice evaluation done thru Domain: Speech Signal Own Database is used. Vocal fold lesions, Vocal twine paralysis, Arytenoid granuloma, Pre-cancerous vocal cord lesions, Vocal twine carcinoma and Laryngectomies Disease considered. No. Of Samples: 10 Pathological & 10 Normal. Feature Extraction using Signal Energy Pitch Formant frequencies Mean Square Residual sign Reflection coefficients Jitter and Shimmer Classification accomplished by RBFNN and Accuracy is 91% [1].

CONCLUSION & FUTURE SCOPE

A Comparative Study is made through studying the works completed through the studies network within the field of Voice Pathology Identification. The contrast is carried out based totally on their Domain, Database, No. Of Samples taken for the test, Pathology Disease took for the studies, Feature Extraction Techniques, Methodology followed, Classification strategies adopted, the Workflow of the Research and the System Performance.

By studying the above works, it shows that each one the works are performed based on the Acoustic Feature Analysis and Classification strategies. Most of the research papers cited that the Acoustic capabilities play the main function in locating the pathology. Some studies papers, referred to above used the own database and with few samples the experiments have been carried out, if it's far the case there can be fluctuations gift inside the consequences.

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