BURG-TÖEPLITZ APPROACH FOR VOICE-SIGNAL FEATURE SELECTION AND EXTRACTION

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This work presents new applications of Töeplitz matrix eigenvalues approach in image description, feature extraction and recognition [1]. It discusses the possibility of treating the speech signal graphically in order to extract the essential image features as a basic step in successful data mining applications in the biometric techniques. The considered object here is the human-voice signal. The suggested frequency spectral estimation and Töeplitz-based approach, built on the linear predictive coding principle, has proved the possibility of selecting signal features from the power spectral plot and entering Töeplitz matrix in a manner similar to its application on images of written texts, signature, palm-print, face geometry or fingerprints. These topics have shown a success rate of about 98% in many cases. The extracted feature-carrying image comprises the elements of Töeplitz matrices to consecutively compute their minimal eigenvalues and introduce a set of feature vectors within a class of voices.

The basic idea of the work is derived from applying Töeplitz matrix minimal eigenvalues algorithm to Burg's model. This implies a graphical approach for feature extraction, selection and hence signal-image description confronting the conventional and traditional methods. Töeplitz matrix approach is employed to verify a variety of biometrics, including the recognition of hand and machine written texts, off and on-line signature, face, and voice. In all, it has proved a promising success rate. The same algorithm has also shown its possible application in hybrid systems where multiple forms of classifying and identifying tools are fused in one system. The image of a voice signal in any of its classical forms is rather complicated and usually does not convey exactly similar images of the same signals, even when spoken by the same person.

However, Burg`s model is very fruitful approach for investigation of voice-signal information protection. This fact concerns the possibility of looking at the voice-signal image in a manner similar to any other object image. This enabled extending Töeplitz matrix applications to cover speech signal description, as well.

References

1. Gray R.M. Töeplitz and Circulant Matrices: A Review. Technical Report, Stanford University Press, 2000.

OPTIMIZE THE SECURITY AND REDUCE THE FAILS DETECTION IN FINGERPRINT BIOMETRIC DEVICES BY USING THE HIERARCHICAL FINGERPRINT MATCHER METHOD

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The main factors responsible for the intra-class variations are: displacement, rotation, partial overlap, non-linear distortion, variable pressure, changing skin condition, noise, and feature extraction errors. Therefore, fingerprints from the same finger may sometimes look quite different whereas fingerprints from different fingers may appear quite similar .The aim of our work is to optimize and improve efficiency of fingerprint algorithms and make it much more secure and create new method to estimate the immunity level of fingerprint facilities of authentication which we call that Hierarchical fingerprint matcher.