CONTENTS AND ABSTRACTS

RADIO ENGINEERING, RADAR AND COMMUNICATION SYSTEMS

Key words: OFDM; energy efficiency; noise immunity; multi-criteria synthesis; PAPR; Tone Reservation.

The work aim is OFDM-signal two-criterion synthesis to increase communication radio systems (CRS) energy efficiency and stability to the action of the interference concentrated over a spectrum. The problem is relevant due to the spectral resource overload (which in turn leads to requirements for increasing noise immunity to minimize the effect of interfering factors) and PAPR high value (leading to low energy efficiency) in modern CRS based on OFDM-signals. Two-criterion signal synthesis was used to solve the problem. AWGN and bandpass interference are considered as an interfering effect. The gain in PAPR of the synthesized OFDM-signal compared to the known OFDM-signal at the Complementary Cumulative Distribution Function level (CCDF-level) of 10^{-3} is about 4 dB, and bit error rate (BER) probability at fixed value of E_b/N_0 = 14 dB decreases from 2.5E-2 to 1.3E-5 (signal-to-interference ratio = 9 dB).

Key words: two-sided Prony's method, two-dimensional Prony's method, system of Yule – Walker equations, weight vector, spectral parametric estimation, pseudo-inverse matrix, minimization of the mean square of the error.

A comparative analysis of the techniques for spectral estimation of multidimensional signals by Prony's method is carried out. The block diagram of the proposed technique is presented. The aim of this work is to increase spectral analysis accuracy of changes in the intensity of multifrequency signals by Prony's method. The qualitative indicators of two-sided Prony's method are compared with two-dimensional Prony's method. It has been confirmed that to analyze the spectrum of the signals under study, relative deviations ΔF of the estimate of dominant frequency are significantly (up to 3 times) reduced by using two-sided Prony's method compared to two-dimensional Prony's method. The efficiency is achieved by taking into account the fact that signal strength changes during the observation process.

Key words: speech signal, acoustic interference, adaptive codec, CELP, primary coding, speech quality.

An adaptive to acoustic interference algorithm for coding speech signals based on CELP codec for V.A. Kotelnikov and Khurgin-Yakovlev representation has been developed and studied. The aim is to develop and study the algorithm for adapting CELP codec to the effects of acoustic interference. This is achieved by choosing separate sets of CELP codec parameters, which, when exposed to various types of acoustic interference, provide higher quality of reconstructed speech at codec output.

MATHEMATIC AND SOFTWARECOMPUTER SYSTEMS AND COMPUTER NETWORKS

Key words: data, database, data structure, data cleansing, reengineering, subject area, attribute, profiling, data mining.

The aim of the work is to apply data cleansing algorithms focused on collecting data for data warehouses to solve the problem of database reengineering. The main tasks are the choice of a cleaning method, its modification for new purposes and its application in reengineering. The relevance of the research lies in the application of well-known methods to work with data in order to solve new problems. The article provides a classification of reengineering problems depending on the number of databases, analyzes various levels of the algorithm, and describes its main stages. The selection and modification of the cleaning algorithm for database reengineering is carried out, and the prospects for its use are assessed. An example of the algorithm operation is given. The result of the work is an algorithm that allows you to apply the data cleaning methods used in organization and operation of data warehouses to the tasks of database reengineering.

INTELLIGENT INFORMATION SYSTEMS AND TECHNOLOGIES

Key words: voice assistant, assessment of the level of trust in authority, natural language processing, feed forward neural networks, text sentiment analysis.

The technologies of voice assistants for public opinion research are considered. The aim of the work is to implement a mechanism for assessing the level of trust to the government using the results of voice assistants dialogue analysis based on natural language processing methods and simple multilayer fully connected feed forward neural networks. To complete the task of forming labeled training and test data set necessary for training a model to assess public opinion and the level of trust in government authorities, the skill of a virtual assistant from Yandex – Alice was developed. Also, Yandex.Alice's «Political Consultant» skill has been implemented for systematization and critical analysis of data on the level of public confidence in government bodies. To solve natural language processing problems, including the analysis of the sentiment of dialogues, ELMo model from DeepPavlov library, trained on the basis of RuSentiment, has been used. The output of the results to assess the sentiment of dialogues and the level of trust is presented in the form of analytical subsystem implemented in the form of Python scripts and Microsoft Power Bi report.

SYSTEM ANALYSIS, MANAGEMENT AND INFORMATION PROCESSING

PHYSICAL ELECTRONICS AND NANOELECTRONICS