ABSTRACT

Explanatory note size: 136 pages, includes 40 illustrations, 4 tables, 2 appendices, 10 references.

Topicality.. The study addresses the problem of managing large archives of audio files in the modern music industry. It highlights the main features of existing tools, their advantages, and limitations, emphasizing the need for an innovative solution. The study identifies the necessity of implementing advanced methods for audio data classification using machine learning algorithms and spectral analysis.

The aim of the study. The primary goal is to improve the methods of managing and searching audio files by developing efficient software for their automatic classification.

Object of the study: methods and processes of audio data classification and management.

Subject of the study: machine learning algorithms, software architecture, and user interfaces for automating audio file operations.

To achieve this goal, the following objectives were formulated:

– analyze existing methods for searching and classifying audio data;

– collect two datasets for primary and advanced classification;

– train and test appropriate classification models;

– develop software for interacting with models and classified data, featuring an intuitive user interface;

– test the proposed solution on real datasets.

Scientific novelty. The scientific novelty of this work lies in improving the audio file classification process by combining entire spectrograms as audio features with discrete audio parameters. Additionally, the study presents an application that enables file searches by identified classes.

Practical significance. The research results were used to create software that significantly simplifies the management of audio archives, particularly for music producers and recording studios. This tool allows users to quickly locate required sounds, reducing working time and increasing the productivity of creative processes.

Connection with scientific programs, plans, and topics. The research was conducted within the Department of Computer Science and Software Engineering at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" under the theme "Methods of intelligent data analysis for enhancing the efficiency of processing large multimedia data volumes."

Approbation. The research findings were discussed at the VII All-Ukrainian Scientific and Practical Conference for Young Scientists and Students, "Software Engineering and Advanced Information Technologies" (SoftTech-2024) – Kyiv.

Publications. The scientific findings of the dissertation were published in:

1) Tiapukhin D. H., Polupan Y. V. "Software for Audio File Classification Using Spectral Analysis and Machine Learning" // Materials of the VII All-Ukrainian Scientific and Practical Conference for Young Scientists and Students "Software Engineering and Advanced Information Technologies" (SoftTech-2024) – Kyiv: NTUU "Igor Sikorsky KPI," November 20–22, 2024.

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