REVIEW
of the native supervisor on the dissertation "The methodology for reducing the impact of the human factor on flight safety" of Raziyam Kurvanzhanovna submitted for the degree of Doctor of Philosophy in the specialty 6D071400 Aviation Engineering and Technology

The current level of development of intelligent and infocommunication technologies opens up new opportunities and prospects for modernizations of digital information processing, including the identification and recognition of speech signals.

Numerous analyses show that the causes of aviation accidents and their preconditions are divided into three main classes: associated with equipment failures, with the influence of environmental factors and caused by the "fault" of human factor (HF) of aviation personnel. The latter accounted for 60-90 per cent of total accidents.

Psychophysiological factors, which are practically difficult to assess on the spot, are imposed on each decision, which is made by aviation personnel: type of nervous system, emotional stability, operative memory and thinking, coordination of movements, speed and quickness in actions, stability of psychomotor and sensory components of activity in extreme conditions etc.

Raziyam K. Anayatova offers an original solution to reduce HF impact based on intellectual processing of speech signals with automatic evaluation of psycho-emotional state of personnel using a scale of seven archetypal classes in her dissertation: joy, fear, anger, sadness, disgust, surprise and neutral state (calmness). The peculiarity of initial information application is aviation English, characterized by the limited phrases and strict rules on the vocabulary, regulated by the ICAO Guidelines, as well as spoken speech, characterized with a variety of used utterances.

There is no doubt about the novelty of the scientific provisions described in the thesis:

- A comprehensive approach to enhancing flight safety (FS) based on intelligent automatic emotion recognition by speech signal;

- the preprocessing process of speech signals at the stage of extracting informative attributes for automatic classification of human emotional state;

- method of using informative signs and the form of their representation for the construction of the model of multiclass classifier of speech signals in the task of emotion recognition on the speech signal.

- A mathematical model of a multi-class classifier for determining the emotional state of a speaker from his speech signal based on synthesized deep convolutional neural networks trained on various types of informative signs.

The following scientific results are of practical significance for designers of intelligent systems:

- methodology for assessing the effectiveness of intelligent pattern recognition based on machine learning algorithms;

- methodology of designing tools for synthesis of deep convolutional neural networks, computer and mathematical modeling, the use of which allows to determine the psycho-emotional state of the aviation personnel on the speech signal for seven archetypal classes.

To increase the reliability of the obtained classification results and the possibility of their interpretation is confirmed by intelligent analysis with the application of a scalable training base of the studied objects features, which increases the significance of the thesis research.

Of a great interest is the possibility of applying the results obtained in the study for the construction of automatic systems for the aviation industry, which in the future shows the possibility of using the developed technologies to determine the level of stress and fatigue, recognition of depressive states, prevention of fatigue.

The results of the research were reflected in scientific publications in top-rated journals, including Scopus, in the proceedings of international conferences.

Evaluating positively the degree of reliability and scientific novelty of the research, it should be pointed out that the thesis is characterized by good language and style of presentation and leaves a favorable impression as a comprehensive scientific research. The results obtained by the author are reliable, summary and conclusions are valid.

The presented dissertation is at a high level and recommended for defense, and its author Raziyam K. Anayatova is worthy of awarding the Doctor of Philosophy degree.

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