

ABSTRACT

Explanatory note size – 111 pages, contains 4 illustrations, 23 tables, 4 applications, 33 references.

Topicality. Examines the problem of accurate detection of facial landmarks on images, considering the emotional context. It highlights the main features of existing solutions, their advantages, and disadvantages, and identifies the need to improve algorithms that enable real-time image processing with high accuracy.

The aim of the study. The main target is to develop effective methods and software for detecting facial landmarks considering emotional parameters, ensuring high processing speed and accuracy in real-time applications.

The object of research: face detection software.

The subject of research: machine learning algorithms for detecting faces and their landmarks on images in real time.

To achieve this goal, the **following tasks** were formulated:

- analyse existing methods and algorithms for detecting facial landmarks, including those that consider emotional context;
- develop a mathematical model and algorithms for detecting facial landmarks considering emotions;
- create a software prototype that implements the proposed methods and algorithms;
- investigate the efficiency of the proposed solutions on test datasets and compare them with existing approaches.

The scientific novelty of the results of the master's dissertation is proposing a method for detecting facial landmarks that considers emotions. This method provides higher accuracy and acceptable processing speed for real-time operation compared to existing approaches. The result was achieved by developing a modified method for processing and detecting facial landmarks that accounts for changes in their positions based on variations in a person's emotional expression.

The practical value of the obtained results is the fact that the developed methods can be integrated into applications for medical diagnostics, emotion recognition systems, educational, and entertainment programs. An API interface was also implemented, allowing for the seamless integration of the developed algorithms into external services. This system can be used in various industries, ranging from entertainment to healthcare and educational institutions.

Relationship with working with scientific programs, plans, topics. Work was performed at the Department of Informatics and Software Engineering of the National Technical University of Ukraine «Kyiv Polytechnic Institute. Igor Sikorsky».

Approbation. The scientific provisions of the dissertation were tested at the VII International Scientific and Practical Conference of Young Scientists and Students "Software Engineering and Advanced Information Technologies SoftTech-2024" – Kyiv.

Keywords: EMOTIONS, COMPUTER VISION, FACIAL LANDMARKS, MACHINE LEARNING, CASCADE CLASSIFIER, ENSEMBLE OF REGRESSION TREES, NEURAL NETWORK.