Classification of Echo Signals Based on Deep Learning

Authors : Aisulu Tileukulova, Zhexebay Dauren

Abstract : Radar plays an important role because it is widely used in civil and military fields. Target detection is one of the most important radar applications. The accuracy of detecting inconspicuous aerial objects in radar facilities is lower against the background of noise. Convolutional neural networks can be used to improve the recognition of this type of aerial object. The purpose of this work is to develop an algorithm for recognizing aerial objects using convolutional neural networks, as well as training a neural network. In this paper, the structure of a convolutional neural network (CNN) consists of different types of layers: 8 convolutional layers and 3 layers of a fully connected perceptron. ReLU is used as an activation function in convolutional layers, while the last layer uses softmax. It is necessary to form a data set for training a neural network in order to detect a target. We built a Confusion Matrix of the CNN model to measure the effectiveness of our model. The results showed that the accuracy when testing the model was 95.7%. Classification of echo signals using CNN shows high accuracy and significantly speeds up the process of predicting the target.

Keywords : radar, neural network, convolutional neural network, echo signals

Conference Title : ICRISE 2022 : International Conference on Research and Innovation in Science and Engineering
Conference Location : Rome, Italy
Conference Dates : April 07-08, 2022