



NEURAL NETWORKS FOR IMAGE RECOGNITION



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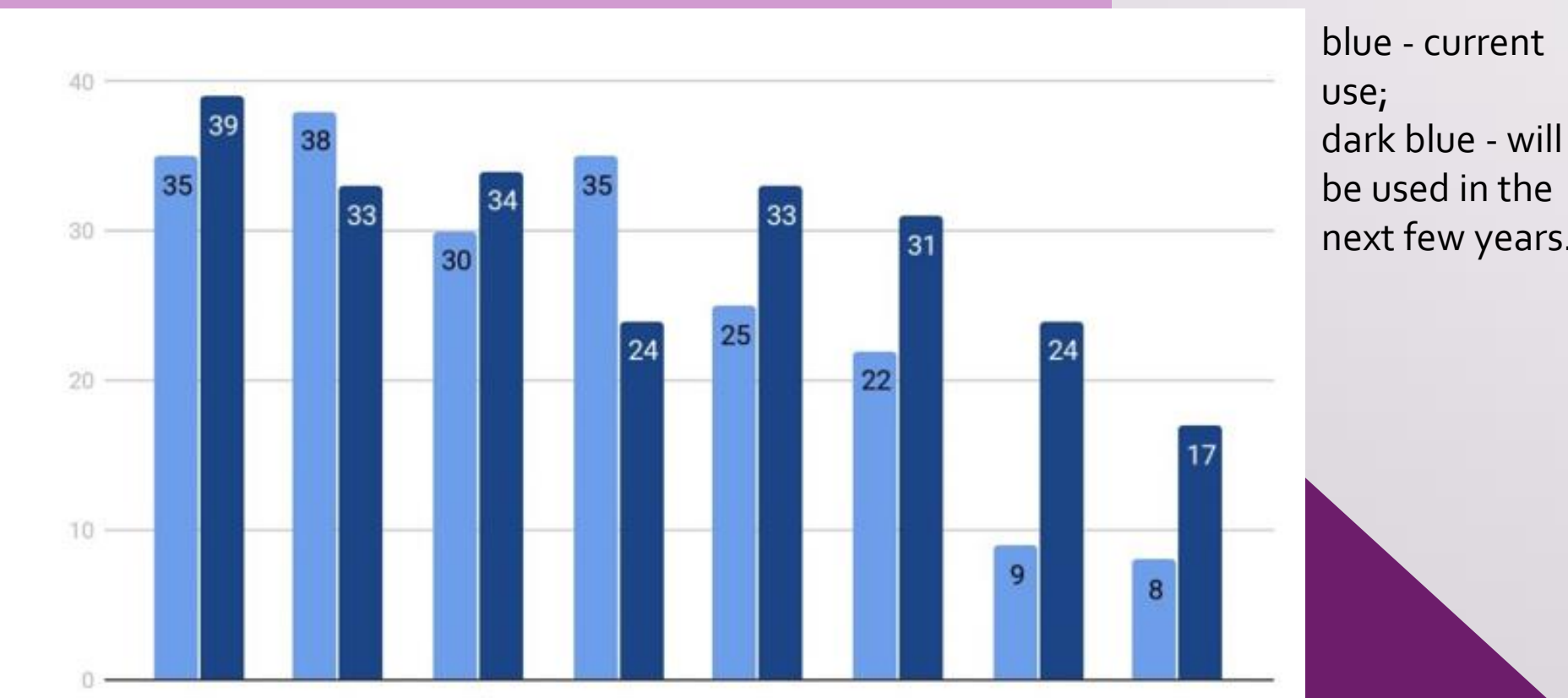
Abstract

A neural network (also an artificial neural network, ANN, NN) is a mathematical model, as well as its software or hardware implementation, built on the principle of the organization and functioning of biological neural networks - networks of nerve cells of a living organism. There are regular NN and convolutional ones. A fully connected neural network is often called common. We will consider convolutional NN. The convolutional neural network has a special architecture that allows it to recognize patterns as efficiently as possible.

Introduction

It depends on the data used for training how correctly NN will perform the tasks assigned to it. Someone's life may depend on the correctness of the work, since NN are used in various fields of activity and perform different tasks of everyday life, social, professional and government, in particular, ensuring safety. Perhaps the most popular task of neural networks is visual pattern recognition.

Table 1. NN technologies in Russian companies, %



1. Predictive analysis;
2. Virtual assistants;
3. Analysis of images;
4. Machine learning;
5. Processing requests in natural language;
6. Face recognition;
7. Self-driving mechanisms;
8. Robotics.

Methods and materials

The basis of all architectures for video surveillance is analysis, the first phase of which will be image (object) recognition. The artificial intelligence then uses machine learning to recognize the actions and classify them. In order to recognize an image, the neural network must first be trained on the data. This is very similar to the neural connections in the human brain - we have certain knowledge, we see an object, analyze it and identify it. Neural networks are demanding on the size and quality of the dataset on which it will be trained. The dataset can be downloaded from open sources or assembled by yourself. In practice, it means that up to a certain limit, the more hidden layers there are in the neural network, the more accurately the image will be recognized.



Results and discussion

When training, it is important to teach the network to determine not only a sufficient number and values of features to give good accuracy in new images, but also not to over fit, that is, not to "adjust" unnecessarily to the training set from images. After completing the correct training, the NN should be able to identify images (of the same classes) with which it did not deal in the learning process. It is important to take into account that the initial data for the neural network must be unambiguous and consistent, so that situations will not arise when the neural network gives out high probabilities of belonging of one object to several classes.

Conclusion

Neural networks can find a wide variety of applications, not only for image and text recognition, but also in many other areas. NN are learnable so that they can be optimized and maximized in functionality. The study of NN is one of the most promising areas at the present time, since in the future they will be applied almost everywhere, in various fields of science and technology, since they can significantly facilitate work and sometimes even make a person safe.

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