

毕业设计说明书

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学　 院：计算机与信息工程学院

专业年级：2016级计算机与科学技术

题 目：基于深度学习的图像分类研究

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2020年5月

# 摘要

深度学习目前被广泛的应用到生活生产当中，对人们的生活方式和生产发展有着非常积极的作用。深度神经网络的发展还是在21世纪后才有了飞速的发展，这离不开硬件技术的成熟，极大提高了计算机计算能力，使得规模巨大，深层的神经网络训练成为了可能。而计算机视觉方向是被证明实践过运用深度卷积神经网络取得了非常成功的效果，应运而生了很多的新奇的产品，面部识别和自动驾驶都有着深度神经网络的痕迹。随着技术的发展，网络的规模和层数变得更深更大，训练难度也加剧，其中卷积神经网络因为有着非常高效的局部连接和参数共享的优势，得到了广泛的应用。

本毕业设计就卷积神经网络最流行的几种网络架构进行模拟研究，分析卷积神经网络各种衍生网络并且运用到计算机视觉方向——图像分类识别，评判形式包括了训练集性能比对，泛化性能比对，以及通过参加kaggle下CIFAR-10 - Object Recognition in Images竞赛评判。

经过实验比对分析，调整网络结构，采用正则化归一化等手段能够显著的影响模型在数据集中的表现，也能提高其泛化能力。

关键词：深度学习；图像分类；卷积神经网络；CIFAR-10；kaggle竞赛

**Title**  基于深度学习的图像分类研究

**Abstract:**

At present, deep learning is widely used in life and production, and it has a very positive effect on people's lifestyle and production development. The development of deep neural networks has only developed rapidly after the 21st century. This is inseparable from the maturity of hardware technology, Greatly improve computer computing power. It makes the scale huge and deep neural network training becomes possible. The direction of computer vision is proved to have achieved very successful results by using deep convolutional neural networks. Afterwards, a lot of novel products were produced. Similarly, facial recognition and autonomous driving have traces of deep neural networks. With the development of technology, the scale and layers of the network have become deeper and larger. The difficulty of training has also increased. Because of the advantages of very efficient local connection and parameter sharing, convolutional neural networks have been widely used.

This graduation project simulates the most popular network architectures of convolutional neural networks. Analyze various derivative networks of convolutional neural networks and apply them to the direction of computer vision, mainly image classification and recognition. The evaluation form includes comparison training set performance and generalization performance. There is also the CIFAR-10-Object Recognition in Images competition held on the kaggle platform.

Through experimental comparison and analysis, adjusting the network structure, and adopting means such as regularization and normalization can significantly affect the performance of the model in the data set, and can also improve its generalization ability.

**Keywords:** Deep learning; image classification; convolutional neural network; CIFAR-10;Kaggle;