# 摘 要

随着互联网技术的进步，信息呈指数级爆炸式增长，文本搜索已经不能满足人们的搜索需要。相对于文本提供的信息，图片具有天然的直观优势。图像识别技术在许多领域，特别是电商平台中发挥着重要作用,服饰分类技术可应用于服饰商务网站，实现服饰自动分类，从而节省人工标注所消耗的时间和人力;可以将其应用于手机等终端，实时识别服饰的品类，提高速度和服饰检索的准确率;还可以为服饰大数据分析和潮流趋势预测提供基础等。服饰图像分类技术是非常值得研究且有意义的工作。

卷积神经网络是一种深度前馈人工神经网络，很适合大型图像处理，因此，本文选择卷积神经网络作为服饰图像分类的模型。经过卷积运算、池运算、非线性激活函数映射等一系列操作，逐层提取和提取原始数据（RGB图像数据）的特征信息，这一过程称为前馈运算。卷积神经网络的最后一层形成目标任务（分类或回归等）作为一种目标函数，由反向传播算法计算真值和预测值之间的差，以从由步骤的最后一个步骤前进优化的反馈参数，以优化网络参数。参数更新后，再进行前馈操作，直到网络模型收敛，从而达到模型训练的目的。

本文在研究国内外深度学习理论成果与工程应用的基础上，结合TensorFlow深度学习框架，构建图像识别和图像检索模型。首先，深入的研究了卷积神经网络和图像识别的研究现状及技术难点，其次，总结了基于内容的图像检索算法应用现状。本文通过结合迁移学习的方法，通过替换掉了Inception-v3模型的最后一层全连接层，用瓶颈层的输出来训练一个新的全连接层处理服饰的分类问题。测试结果表明，本文设计的卷积神经网络模型可以有效地实现服饰图像分类。

**关键词**：卷积神经网络 服饰图像分类 迁移学习

# Abstract

With the advancement of Internet technology, information has exploded exponentially, and text search has failed to meet people's search needs. Pictures have a natural, intuitive advantage over the information provided by the text. Image recognition technology plays an important role in many fields, especially in e-commerce platforms. Clothing classification technology can be applied to clothing business websites to achieve automatic clothing classification, thereby saving time and manpower consumed by manual labeling; it can be applied to mobile phones Wait for the terminal to identify the category of clothing in real time, improve the speed and accuracy of clothing retrieval; it can also provide a basis for clothing big data analysis and trend prediction. Clothing image classification technology is very worthy of research and meaningful work.

Convolutional neural network is a kind of deep feedforward artificial neural network, which is very suitable for large-scale image processing. Therefore, this paper chooses convolutional neural network as the model of clothing image classification. After a series of operations such as convolution operation, pool operation, and non-linear activation function mapping, the feature information of the original data (RGB image data) is extracted and extracted layer by layer. This process is called feedforward operation. The last layer of the convolutional neural network forms the target task (classification or regression, etc.) as an objective function. The difference between the true value and the predicted value is calculated by the back-propagation algorithm to advance the optimization from the last step of the step. Feedback parameters to optimize network parameters. After the parameters are updated, the feedforward operation is performed until the network model converges, thereby achieving the purpose of model training.

Based on the research results and engineering applications of deep learning at home and abroad, this paper combines the TensorFlow deep learning framework to build image recognition and image retrieval models. First, the current research status and technical difficulties of convolutional neural networks and image recognition are studied in depth. Second, the current application status of content-based image retrieval algorithms is summarized. This paper combines transfer learning with the method of replacing the last fully connected layer of the Inception-v3 model, and uses the output of the bottleneck layer to train a new fully connected layer to handle clothing classification problems. The test results show that the convolutional neural network model designed in this paper can effectively implement clothing image classification.

**Keywords**: Convolutional Neural Network;Clothing Image Classification;

Transfer Learning