

# 基于分组残差结构的轻量级卷积神经网络设计

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**摘 要:** 针对传统深度卷积神经网络参数数量过多, 很难在移动设备上应用的问题, 提出基于分组残差结构的轻量级卷积神经网络架构 GResNets. 利用三个卷积层的瓶颈结构将上层输出特征图分为数量相等的四组, 根据组内的瓶颈模块加入恒等映射的方式和组外相邻模块是否加入残差学习, 设计了三种轻量级卷积神经网络架构. 试验阶段, 在 Caltech-256, Food-101 和 GTSRB 图像分类数据集上评测了三种网络架构的性能. 实验结果表明, 与传统深度卷积神经网络相比, GResNets 能在网络参数较少的情况下, 具有同样、甚至更优越的分类性能, 适合在移动设备上应用.

**关键词:** 卷积神经网络; 分组; 残差; 分类性能; 轻量

## Design of lightweight convolution neural network

### based on group residual structure

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**Abstract:** In order to solve the problem that the parameters of traditional deep convolution neural network are too large to be used in mobile devices, a lightweight convolution neural network architecture GResNets based on group residual structure is proposed. Using the bottleneck structure with three convolution layers, the output feature maps of the previous layer are divided into four equal groups. Three lightweight convolution neural network architectures are designed according to the way of adding identical mapping to the bottleneck module in the group and whether or not the adjacent module outside the group joins residual learning. In the experimental stage, the performance of the three network architectures was evaluated on three image recognition datasets, Caltech-256, Food-101 and GTSRB. The experimental results show that GResNets has the same or even better classification performance than traditional deep convolution neural networks under the condition of fewer network parameters, and is suitable for mobile devices.

**Key words:** convolution neural network; group; residual; classification performance; lightweight

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