基于改进 Mask R-CNN 的绝缘子目标识别方法

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摘　要：为了提高绝缘子目标检测精度，缩短网络训练时间，提出基于卷积神经网络的 InsuNet 绝缘子目标识别方法.InsuNet 网络采用 56 层卷积层作为主干网络，在特征提取网络的每个池化层后附加一层开运算，以过滤掉目标特征周围的干扰，增强算法鲁棒性.图像经主干网络传向区域提议网络提取感兴趣区域和主干网络前向传播的特征图共享给感兴趣区域对齐层固定特征尺寸，而后掩膜分支和目标分类、边界框回归分支并行输出 ROI 目标的掩膜、类别和回归框.结果表明，与 Mask R-CNN 模型对比，本方法在识别各种类型绝缘子时精确率达到 94.7%，单张图像处理时间约为 0.18 s，缩短了约 40 ms.

关键词：卷积神经网络；目标识别；开运算；绝缘子

The method of insulator target identification based on improved Mask R-CNN

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Abstract： In order to improve the accuracy of insulator target detection and shorten the model training time， the InsuNet insulator target identification method based on convolutional neural network is proposed. The InsuNet network used 56 convolutional layers of the backbone network. After each pooling layer of the feature extraction network，a layer of opening operation is added to filter out the interference features around the target features and enhance the robustness of the algorithm. The output feature image through the backbone network was fed into two branches， one was the RPN (region proposal networks)， the other was ROIAlign (region of interest align) processing. The first branch output the regions of interest， then the second one aligned each insulator area and produced class of the whole insulator area and the background area and bounding boxes of each insulator regions. The experimental results show that compared with the Mask R-CNN model， the accuracy of this method is 94.7% when identifying various types of insulators，and the single image processing time is about 0.18 s， which is shortened by about 40 ms.

Key words： convolutional neural network; target identification; opening operation; insulator

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