USING COMPUTER VISION FOR AUTOMATIC UTILITY POLE TILT DETECTION USED IN THE POWER INDUSTRY

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Last years, unmanned aerial vehicle (UAV) technology, also known as drones, has been increasingly utilized in the power industry for the inspection of concrete utility poles. This technology has significantly improved efficiency, reduced labor intensity, inspection time, and maintenance costs. UAV technology can swiftly cover extensive power infrastructure, collecting invaluable data that can be used for numerous precision applications in the power industry, including the detection of rotating targets on concrete utility poles.

In recent years, the development of remote sensing technology has led to an increasing demand for object detection in images. Traditional object detection methods, which rely on vertical bounding boxes, have shown limitations in effectively separating targets in dense and large aspect ratio scenarios. As a result, rotated bounding box detection has emerged as a promising solution to these challenges.

Rotational object detection, the task of identifying and locating objects in an image that may be oriented in any direction, is a critical challenge in computer vision with numerous applications across various industries such as surveillance, autonomous vehicles, and robotics. The advent of deep learning, particularly Convolutional Neural Networks (CNNs), has significantly enhanced the accuracy and efficiency of rotational object detection systems.

This project is primarily designed for the assessment of damage to utility poles, including instances of collapse and tilting. It focuses on the identification of cement utility poles and iron towers under 10 kv. The data for this project is mainly sourced from online databases.

In the realm of infrastructure maintenance and safety, the integrity of utility poles and towers is paramount. These structures are essential for supporting the electrical lines that power our homes, businesses, and essential services. However, they are constantly exposed to environmental stressors such as extreme weather, natural disasters, and general wear and tear, which can compromise their stability and safety.

The data for this project is sourced from online databases, which include a wide range of images and information on utility poles and towers in various conditions. This comprehensive dataset enables the system to learn and improve its accuracy in identifying and assessing damage. The ultimate goal is to create a tool that can be used by utility companies and infrastructure maintenance teams to ensure the safety and reliability of the electrical supply network.

The software rolabelImg to mark have been used, requiring the whole pole to be marked in the frame. The entire dataset consists of more than 15,000 images.

In the modern era, automated object detection has become pivotal for numerous industries. This paper presents a comprehensive study of using YOLOv5m, a state-of-the-art object detection algorithm, for rotational object detection, specifically focusing on concrete poles and iron towers. We delve into the intricacies of training the model, ensuring accuracy and precision, and discuss the practical implications of our research.