Oil Tank Detection Based on High Resolution SAR Image and Deep Learning Model

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Oil tanks serve as crucial strategic facilities for energy storage within a nation. Continuous monitoring of the quantity, types, and capacities of oil tanks holds immense significance in assessing the distribution and utilization of energy storage within a given region. However, in certain areas where dispatching man power poses a challenge, promptly obtaining and consistently updating information on the status of oil tank usage becomes exceedingly difficult. Consequently, the task of acquiring timely and continuous information regarding the construction of oil tanks in these areas, often limited by a scarcity of personnel or even an inability to physically deploy individuals, presents a formidable challenge. Satellite imagery emerges as a convenient and effective method for monitoring oil tanks, particularly in areas that are logistically challenging for manpower to access. Given the inherent artificial structure of oil tanks, they exhibit discernible cylindrical characteristics in optical and thermal infrared images, rendering detection techniques relatively mature. Traditional monitoring approaches for artificial structures involve algorithmic extraction via image segmentation techniques that encompass shape, color, and texture analyses. Nevertheless, optical images possess the drawback of being ineffective during cloud cover or nighttime conditions. In contrast, high-resolution Synthetic Aperture Radar (SAR) images, as an alternative to traditional earth observation, can capture images during nighttime and can penetrate clouds or smog, enabling 24-hour and all-weather surveillance. Moreover, SAR imaging has the added advantage of bypassing optical camouflage, thus playing a pivotal role in oil tank monitoring. The objective of this study is to develop a program that utilizes high-resolution SAR images and deep learning models to detect large oil tanks. By employing this program, it becomes possible to track the number, locations, and changes of oil tanks effectively.

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