**Research Assessment #4**

**Date:** February 14, 2023

**Subject:** Mobile Application Object Detection using YOLO

**MLA/APA citation:**

Kocaturk, F., Aydin, M. T., Metin, O., Unal, H. S., Oz, D., Bayram, B., &amp; Bakirman, T. (2022). Vision-based provision of occupational safety control for electrical workers by detecting hard-hats and gloves with Yolo Architectures. International Symposium on Applied Geoinformatics 2021. https://doi.org/10.15659/isag2021.12579

**Assessment:**

In this paper, the importance of occupational safety for electrical workers and the need for adequate security measures to prevent accidents and injuries in the workplace are discussed. Although not completely the same, construction sites use similar safety gears that electrical workers would use, which makes this paper relevant regarding construction safety. Not surprisingly, the lack of safety measures can result in various potential damages as mentioned in the other assessment. Workers can be exposed to hazards such as impact, penetration, electrical shock, and burn. Kocaturk and her colleagues highlight the need for workers to wear hardhats and insulated gloves to help prevent these hazards. They also mention the importance of automating the process of checking for compliance. To achieve this need, vision-based provision is created using YOLO architecture.

There are inspectors at electrical work sites, similar to how construction sites have safety officers. However, both of these methods are limited in that the inspectors have to manually check and make sure workers are safe. By using artificial intelligence to detect what safety gear workers are missing and whether or not they are using them properly, proper safety gear usage could be enforced more often. This may not seem like much, however, the simple existence of proper safety gear usage can drastically change the consequences of accidents—often reducing it greatly if not neglecting it, thanks to the safety equipment.

To create the method to automatically detect hardhats and gloves, the authors examined two different methods for checking compliance—sensor-based and vision-based. Sensor-based methods involve the use of pressure sensors mounted inside the hardhat, which can be expensive and may not be reliable in hot and humid weather. Vision-based methods, on the other hand, involve the use of computer vision and machine learning algorithms to detect hardhats and gloves in images or videos, making it a cheaper option.

Next, to use the vision-based inputs, an archetype of artificial intelligence was needed, so the authors compared different types of them. After comparing different archetypes, the authors focused on the use of the YOLO (You Only Look Once) architecture for object detection for its, although less accurate, faster results. Next, four different versions of the YOLO (v3, v4, v4x-Mish, and v4-Tiny) were tested and compared using the results of the experiments held. The experiments were conducted on a dataset of images containing workers wearing hardhats and gloves, where the results show which YOLO version is the most effective at detecting these objects with high accuracy.

The paper concludes that vision-based methods, particularly those based on the YOLO architecture, can provide an effective and efficient solution for automating the process of checking compliance with safety regulations. This can help improve the safety of workers in the electrical industry and prevent accidents and injuries in the workplace. Although in construction sites, gloves may not be as crucial in their importance as in the electrical industry, they are important to prevent slips or smaller injuries, and hardhats are very important equipment to protect workers from serious injuries. By creating and implementing an application that is both fast and accurate in detecting whether or not workers have the proper equipment on or not, safety can be increased greatly. Using new technology such as artificial intelligence vision technology, people’s lives can be saved.