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| **Title:** | Surface Damage Detection of Line Insulators Using Deep Learning Algorithms to Avoid Insulation Failure | | |
| **Author(s) Name:** | N. Goswami, M. R. Habib, A. H. Shatil and K. F. Ahmed | | |
| **Contact Email(s):** | abu.shatil@aiub.edu | | |
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| **Abstract:** |  |
| The power system's reliability dramatically depends on the high voltage line insulators. However, the surface of these insulators is frequently damaged because of the outdoor environment, which includes complicated landforms and unpredictable weather. Damage to the insulator's surface can lead to short circuits, permanent damage to the transmission line, and even blackouts. To deliver quality service, it is essential to keep track of the condition of these insulators. As traditional fault-detection systems have become more time- and labor-intensive, a YOLOv4-based detection approach is proposed here to achieve fast and precise damage detection and classification of line insulators. YOLOv4 is a Deep Learning (DL) algorithm model that operates on the darknet framework. The research findings show that 97.711% is the maximum average, depending on detecting YOLOv4 for insulators. Insulator damage has a maximum AP value of 98.17%, and discolored Insulator has a maximum AP value of 97.07%. When the system is trained on the insulator data set, the overall m-AP (mean Average Precision) value is 97.65%. The detecting speed in virtual environments for YOLOv4s is 43 FPS, and it has a greater detection rate. | |