

A Method for Assisting Interpretation of Underground Buried Objects Using Detected Reflection Positions Detected in Deep Learning on GPR Data

*Shinichiro Iso¹

1. Fukada Geological Institute

Many attempts have been made to identify the presence and type of buried objects by applying machine learning methods to ground penetrating radar reflection data.

Machine Learning, especially Deep Learning, may be advantageous to data acquired in various environments and methods, such as GPR surveys, because there is no need to define the critical features for classifying the target data in advance. In addition, Machine Learning technology continues to evolve rapidly, and imaging provides a relatively simple Machine Learning environment for data acquisition method-independent frameworks.

The author also showed in 2018 that AlexNet Deep Learning Model could detect buried objects from subsurface radar reflectors. However, this only superimposed the deep-learning predicted anomalous points of reflection by the subsurface buried objects on the GPR cross-section.

As a reality, in the daily interpretation of buried objects, the GPR interpreter comprehensively judges the refractor location and the physical characteristics and shape of objects such as cavities and underground pipes.

The author explores how Deep Learning results, such as reflector locations, can help interpret GPR section images and the points of relative anomalies created from multiple GPR2D section images to classify underground buried objects. This method is expected to improve the reliability of interpretation and, at the same time, give a specific reason for judgment to the determination result of Deep Learning applications, which tends to be a black box.

Keywords: GPR, Machine Learning, Interpretation