

## Application of Deep Learning in Colorization of LiDAR-Derived Intensity Images

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**Abstract :** Most aerial LiDAR systems have accompanying aerial cameras in order to capture not only the terrain of the surveyed area but also its true-color appearance. However, the presence of atmospheric clouds, poor lighting conditions, and aerial camera problems during an aerial survey may cause absence of aerial photographs. These leave areas having terrain information but lacking aerial photographs. Intensity images can be derived from LiDAR data but they are only grayscale images. A deep learning model is developed to create a complex function in a form of a deep neural network relating the pixel values of LiDAR-derived intensity images and true-color images. This complex function can then be used to predict the true-color images of a certain area using intensity images from LiDAR data. The predicted true-color images do not necessarily need to be accurate compared to the real world. They are only intended to look realistic so that they can be used as base maps.

**Keywords :** aerial LiDAR, colorization, deep learning, intensity images

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