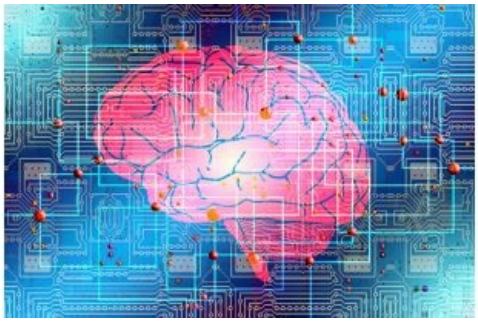
Will Artificial Intelligence Die Another Silent Death?



Artificial intelligence (AI) was first presented as a potential solution for object recognition some 50 years ago, but died a silent death along its winding road, writes Mathias Lemmens in his latest column. Now, big geodata is driving the need for automated mapping and reviving the interest in AI. But will the optimistic promises of deep learning come true this time?

Never before in history have humans generated such gigantic volumes of geodata as we do today. The production of images and point clouds using a wide variety of geodata acquisition technologies is just one side of the coin; on the flip side is the extraction of meaningful information which is useful for a specific geo-related purpose. Information extraction is a skilled, labour-intensive and tedious task which is mainly executed by specialists. To diminish manual involvement, many researchers are working on developing automated mapping methods.

The drive for automation has resulted in the revival of a research area which was first presented some 50 years ago as the Holy Grail for automatic object recognition from images, but eventually died a silent death along its winding road. It was called ‘artificial intelligence’ (AI). Just two of the catchy AI-related terms that have found their way into today’s vocabulary are ‘machine learning’ and ‘deep learning’. The sheer number of papers written in recent years on the application of AI in geomatics tasks shows that many believe deep learning based on convolution neural networks (CNNs) is the definitive solution for automating mapping. Other popular methods are random forest and support vector machines.

A CNN is not a magic box of tricks, but rather software built on a sequence of 2D differential filters, such as the Laplace operator, and 2D integrating filters to construct a hierarchy of image pyramids by aggregating small neighbourhoods, e.g. windows of 3x3 or 5x5 pixels, in a process called pooling. This makes the approach sensitive to noise and texture. Many claim that this approach gives promising results, although the researchers also admit that there are several challenges to overcome due to the complexity of Earth-related scenes, such as the presence of shadows and occlusions. In other words, there are still mountainous problems to be resolved. A generally accepted research method is to collect a huge amount of prototypes, of which 80% are used as training samples and 20% for validation. Indeed, deep learning requires a huge amount of prototypes. But hopefully the optimistic promises will become reality and artificial intelligence will not die another silent death.