Grupo Red Eléctrica

Red Eléctrica, Elewit and Overstory use machine learning to digitize the vegetation map under electricity power lines

- They have jointly developed a technological solution that enables them to digitally and automatically identify the type of vegetation growing in 'safety lanes' under high-voltage power lines throughout Spain.
- The designed solution makes use of machine learning potential to automatically and quickly identify a total of 37 vegetation species groups.

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Red Eléctrica, Elewit -the Red Eléctrica Group's technology platform- and the Dutch start-up Overstory have developed a pioneering project through which they have digitized 100% of the vegetation map found along the entire high-voltage power line corridor in Spain. Thanks to this innovation project, Red Eléctrica, in its role as transmission agent for the Spanish electricity system, now digitally and automatically identifies 37 different groups of vegetation species, enabling it to manage its assets more efficiently and safely.

The transmission grid contains more than 44,400 km of line circuits in Spain - some of which run through forested areas - which Red Eléctrica comprehensively maintains. As part of this maintenance, it also controls and manages the existing vegetation under the power lines in order to prevent vegetation from growing and reaching the conductor cables. To this end, Red Eléctrica monitors these species and controls their growth in order to minimise risks to assets and ecosystems. However, as stated by Manuel López Cormenzana, the company's Facilities Maintenance Manager: "until now, the identification of species was performed manually; therefore, the challenge was to automate this process and digitize it to make it simpler, faster and more efficient".

In light of this, in 2020 Red Eléctrica, Elewit and Overstory came together in this project, in which Tragsatec has also taken part. Specifically, they created an innovative technological solution that made the most of the potential offered by machine learning. "This new tool enables us to reinforce power line maintenance tasks, thereby increasing their safety and reliability, and also to reduce the risk of forest fires, which undoubtedly protects our biodiversity and our natural assets," he adds.

Algorithms at the service of vegetation

Until now, species identification was realized by means of manual photo-interpretation techniques based on information provided by the National Aerial Orography Plan (PNOA), from which a vegetation map was created and subsequently used to generate a felling and pruning plan to control its development.

Now, "through this innovation project we have developed a machine learning model that digitizes and completes Red Eléctrica's vegetation map", explains Silvia Bruno, director of Elewit. To do so, it takes inputs from a larger number of sources: satellite images, three-dimensional data captured with LIDAR (Laser Imaging Detection and Ranging) technology together with information obtained

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through inspections carried out on foot by Red Eléctrica technicians, which is added to the PNOA information.

All this information is merged through automatic learning algorithms, thus enabling the rapid identification of the type of species present in each section of each power line. Specifically, this new technology makes it possible to differentiate between 37 different groups of vegetation in small, 5m x 5m areas, and in a short period of time.

"Thanks to this new technology, we now only need hours as opposed to the weeks it used to take the previous manual process", explains Elena Nogueroles, head of Red Eléctrica's Lines Maintenance Department. And she adds, "this way we can quickly and automatically find out what vegetation is growing under the power lines, information that we then complete with algorithms that generate vegetation management plans under the most efficient lines".

This year-long project began with a pilot phase in the province of Zamora and was subsequently rolled out nationwide. Its success has enabled Red Eléctrica to incorporate this innovation into its maintenance strategy, the aim of which is to ensure that the grid facilities are always in optimal conditions in terms of availability and reliability.