Leading technology company Intetics is speeding up the asset management process for rail organisations

Automating the inventory process

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With the exponential increase in the amount of data collected by advanced monitoring devices such as wireless sensor networks, Light Detection and Ranging (LiDARs), and high-resolution video cameras, some organisations in the railway industry are struggling because they are still using manual resources for data processing. That data is usually gathered during the regular inspection and assessment of the state of individual objects and their components.

Providing a platform to overcome this, leading global technology company Intetics Inc, has developed machine learning (ML)-based solutions for automated feature extraction and further tolerant measurements analysis; a sound way to speed up asset management process. Moreover, it is helping stakeholders receive reliable information about the status of railway assets faster and more accurately. It is also reducing the costs of services due to the automation of post-processing work.

How it works

The developed ML solution has already been used to detect a big European railway company's infrastructure issues and automate its inventory processes, saving 30 per cent costs.

Intetics' ML solution automatically detects railway-related objects with 90 per cent accuracy, which is a high value compared to its peers. By automating the inventory process, the client can decrease human work and save 25 per cent on admin and salary costs. Moreover, they can save 30 per cent on development costs thanks to the talented company engineers in the related domain.

Other benefits include making the railway infrastructure inventory less dependent on weather or light conditions. Once again, the solution decreases the risk of accidents on the railway, protecting human health. The list of defined features enables the client to detect railway failures in a timely manner, allowing technicians to take appropriate measurements, and allocate the necessary resources for railway infrastructure maintenance.

Taking an example of the recently developed solution, Intetics applied two techniques for data processing; images taken from an unmanned aerial vehicle (UAV) multispectral sensor and Trimble MX9 data (point clouds & 3D images).

Looking at the methods mentioned above in more detail, Intetics developed an automated point cloud recognition solution based on the OpenGL engine and PyTorch deep learning, having analyzed the data from several recording devices besides two LiDARs, namely a 360-camera, IMU, and GPS sensors.

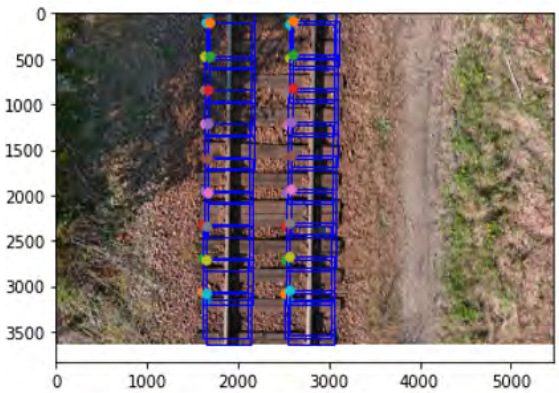
The deep learning solution is based on the recognition of images gathered from virtual cameras in the 3D engine.

> ***The developed ML solution automatically detects railway-related objects with 90 percent accuracy***

The organization decided not to use models working with point cloud data but instead to find every point reprojection from a virtual camera to identify the images. By this multi-views-based approach, it could quickly identify objects around and then use the Open3D engine to extract more complex features from the 3D model if required.

The other two models function in a single pipeline (meaning they work sequentially), using the data taken from a drone. The first model is used for segmentation (to find the contours) of rails and sleepers. The company use the results of the first model to find the assumption, then apply the second model.

The second model serves to detect small railway objects used to connect rails and sleepers. The main idea is to find all the objects in this area and check if there are the correct number of object types within a specific area. The solution provides relevant information if it has an incorrect number of detected objects. This helps for automating the check-up process.



Pieces of the image used for detection

Detection expanded to the full image

With this solution, the client automated the asset management process, saved costs, and reduced manual labor and human-related errors. They also significantly improved the detection of objects under various light/weather conditions, thereby improving the accuracy of the model. From a business viewpoint, the company is minimizing accidents which is thereby protecting the health of passengers and staff and reducing financial and reputational risks.

The future

Intetics prides itself on providing clients operating in railway-related businesses with high-quality standards, with its customized ML-based solutions helping organizations gain a competitive advantage over market players who do not automate the process at such a scale. This is achieved by speeding up the inspection process and optimizing the costs of services due to the automation of post-processing work. And, of course, they can receive reliable information about the status of railway infrastructure assets faster, more often, and more accurately.

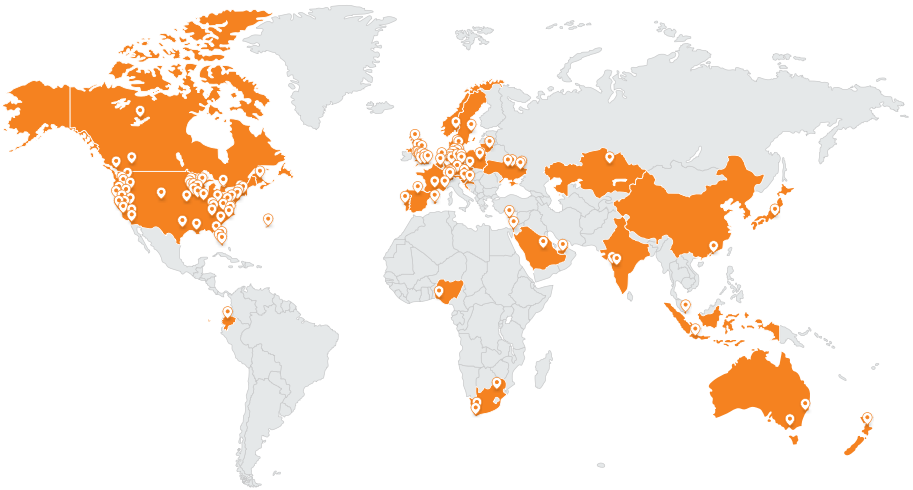
> ***At Intetics, our outcomes do not just meet clients' expectations, they have been exceeding them for a quarter of a century***

Looking to the future and the company is developing presence on the market and continuing to provide flexibility and profitability, unlike some other products and Software as a Service (SaaS) solutions. Current solutions on the market are often trained to work with only one data type (e.g., only LiDAR point cloud or photo imagery). In practice, however, different data types can be used.

For example, railway tracks are surveyed once a year using LiDAR or LiDAR + photo. At the same time, companies can install Internet of Things (IoT) sensors in critical places for real-time analysis of the status of an asset. Therefore, combining this data can result in higher quality and more regularity in asset state analysis. Additionally, Intetics' customized development approach helps to maintain a seamless integration with existing clients' systems.

Intetics Inc. is a leading global technology company providing custom software application development, distributed professional teams, software product quality assessment, and "all-things-digital" solutions built with SMAC, RPA, AI/ML, IoT, blockchain, and GIS/UAV/LBS technologies.

Intetics serves Clients all over the world



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Intetics' core strength is the design of software products in conditions of incomplete specifications. We have extensive industry expertise in Education, Healthcare, Logistics, Life Sciences, Finance, Insurance, Communications, and custom ERP, CRM, Intelligent Automation and Geospatial solutions.

Our advanced software engineering background and outstanding quality management platform, along with an unparalleled methodology for talent recruitment, team building and talent retention, guarantee that our clients receive exceptional results for their projects. At Intetics, our outcomes do not just meet clients' expectations, they have been exceeding them for a quarter of a century.

Intetics operates from 11 offices in 6 countries including Naples, Raleigh, Dusseldorf, London, Minsk, Krakow, Kyiv, Kharkiv, Odesa.

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