Environmental footprints and intelligent analysis for the rail infrastructure sector

Short description (what need was solved?)

Building railway infrastructure is a very hard problem to address due to the complexity of the actual building process ---since a very high number of equipment and personnel are involved--- as well as the many interdependent factors. Leading goals are economic cost, on the one hand, and environmental impact on the order hand. Vías y Construcciones, S.A. was interested in an intelligent tool that could compute an optimized working plan to minimize water and carbon footprints, and costs of railway infrastructure construction related projects.

What service(s) provided?

A consortium, with the leading role of the UGR group in the intelligent systems tasks, built the requested tool, throughout the LIFE-HUELLAS project (http://life-huellas.eu/), funded by the European Commission. Vías y Construcciones was provided with an effective railway infrastructure building decision making tool that computes optimized work plans that strived to minimize simultaneously economic costs and water and CO_2 footprints. The tool's user interface is web based, thus it is multiplatform. This tool can automatically schedule the computing resources necessary for optimization algorithm runs according to the level of granularity and complexity of the public work to accomplish. After the run, the user is provided with a selected set of solutions form the Pareto front, from which the most convenient one can be selected. The tool will decode the solution into a detailed work plan stating what operations should be performing at the corresponding time. The tool is based on Machine Learning and Multi-Objective Evolutionary Algorithms.

Relationship with digitization

Railways is a priority transportation mode for EU. This topic has received top attention from the European Commission, and important efforts have been made to fund initiatives towards its construction and improvement. The benefits of the accomplished projects go directly to railway administrators, as well as building and maintenance companies, and indirectly to the whole European population. Public works have traditionally been old-fashioned engineering processes with respect to ICT issues. By digitizing the building process from conception to building planning the process is highly optimized allowing for an effective reduction in economical costs and most importantly towards a smaller environmental impact.

Customer, details

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