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D.3.2: Predictor for a circular economy inspired asset management

Document Identification			
Status	Final	**Due Date**	Wednesday, 14 July 2021
Version	1.2	**Submission Date**	14/07/2021
Related WP	WP3	**Document Reference**	D.3.2
Related Deliverable(s)	D1.3, D5.2 (Piraeus LL Scoping Document)	**Dissemination Level**	CO
Lead Participant	NEC	**Document Type:**	R
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 768994. The content of this document reflects only the authors' view and the European Commission is not responsible for any use that may be made of the information it contains.

Executive Summary

This document describes the final technical specifications of the developed predictor in the Piraeus Living Lab. It consists of overview, benefits and market analysis for predictive maintenance. It also contains description of innovative technology along with details of developed software. This deliverable is result of T3.2.

In Section 2, presents the difference between preventive and predictive maintenance along with the benefits and market analysis for predictive maintenance. Conclusions from market analysis are:

- The global predictive maintenance (PdM) market is valued growing at a CAGR of 25-30% during 2020-2025 period.
- To the best of our knowledge, none of the above PdM solutions (from Bosch, SAP, Huwaei, IBM and SAP) relies on advanced machine learning algorithms specifically designed to handle imbalanced datasets.

In Section 3, we present The Matrix of users' requirements collected in the deliverable D1.3 *"Ports needs and Requirements"* for the Predictor of Piraeus LL updating the status of development of each feature included in each version of the innovation.

In Section 4, presents the developed innovative technology for predicting future failures in various parts of trucks. We developed meta-learning technology for machine learning ensembles DAMVI for imbalanced classification. Specifically, after learning base classifiers, the algorithm i) increases the weights of positive examples (minority class) which are "hard" to classify with uniformly weighted base classifiers; and ii) learns weights over base classifiers by optimizing the PAC-Bayesian C-Bound that considers the accuracy and diversity between the classifiers.

The System requirements for the correct functioning of Predictor are compiled in Section 5.

Section 6 presents the data requirements for predictor for correct functioning along with software and hardware requirements for installation of predictor. This section also contains the user manual for the developed software explaining every step of using the application.

Finally, Section 7 summarizes the main conclusions of the Predictor implementation at the Piraeus Living Lab.