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Combing Text Mining and Survival Analysis for Asset Health Management Using Maintenance Log

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Abstract

There have been considerable advances in sensing instrumentation, hardware, signal processing algorithms, and internet technology infrastructure that have eventually paved the way for the long-envisioned concept of smart factories under the purview of Industry 4.0. To leverage the available system data, factories across the globe are embracing Predictive Maintenance in the era of Industry 4.0. In the current study, the objective is to understand failures by mining asset maintenance log. Towards this end, first, a text mining-based approach has been suggested to identify different failures, followed by a survival analysis based approach to predict the failure sequence and patterns. The developed algorithm has been tested on maintenance logs of centrifugal casting machines.

Keywords
Industry 4.0, Predictive Maintenance, Survival Analysis, Text Mining

Biographies

Akhilesh Kumar is currently working as an Assistant Professor in the Department of Industrial & Systems Engineering at Indian Institute of Technology, Kharagpur. Previously, he worked as a Solution Architect in Consulting Team at JDA Software**,** Bangalore. He received his B.Tech degree in Manufacturing Engineering from National Institute of Foundry and Forge Technology (India) and Ph.D. degree in Industrial Engineering from Wayne State University (U.S.A.) in the year 2005 and 2011, respectively. He has authored several technical papers. His publications appeared in such journals as International Journal of Production Economics, European Journal of Operational Research, Expert System with Applications, IEEE. Currently, he is working on a consultancy project with Shell on Conditioned Based Maintenance. He is also team lead for IoT in predictive maintenance project with Department of Heavy Industry and Tata Sons. He was part of collaborative research team in US with Ford Motor Company **and** Delphi Automotive LLP. He also appeared on Marquis Who's Who in America in 2011 and in World in 2017.

Yarra Sai Deepak is currently pursuing Bachelor of Technology in the Department of Industrial & Systems Engineering at Indian Institute of Technology, Kharagpur. He is currently working under Dr. Kumar on the application of survival analysis, Text mining and Deep Learning techniques in finding out the survival probability of the machines from the Machine Maintenance log data. He has also worked on finding out the most optimal path to travel on uneven terrain with the help of Google-SketchUp, Wizard.

Bharat Bhushan is working as a Chief Digital Officer & General Manager- IT and Projects at Tata Metaliks Limited, a Tata Group Company. He brings in more than 20 years of experience in the space of Digital transformation and IT enablement projects. Having previously been associated with digital transformation projects in firms like EY, Hatch, Vedanta, and TCE, he has extensive knowledge of Cloud Computing, IoT, Artificial Intelligence and Process Automation. Bharat has also authored a book on 'Data Driven Techniques for Advances Process Monitoring' and has worked around the globe including in countries like UK, USA and Australia. He is a gold Medalist from Indian

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institute of Science, Bangalore, India & Indian Institute of Management, Ranchi, India and has completed his PhD in Advanced Data Analytics from University of Sydney, Australia.

Mohit Kale is currently working as General Manager, Maintenance in Tata Metaliks Ltd. He has more than 26 yrs. of experience in maintaining steel plant equipment's in various capacity. He has work for companies such as ISMT, Jindal and Tata etc. He has extensive experiences in preventive, predictive and productive maintenance. He is working on several improvement projects related to Mechanization, Automation as well Digitalization such as Robotics, IIOT and data analytics.

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