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ambient conditions. The software also reveals when time-dependent premature failure is likely to occur. The software can generate great financial and safety benefits for all stakeholders. Furthermore, the AssessLIFE software aims to provide asset information for better financial and technical decision-making by managers, engineers, legal teams, insurance teams, fabricators, and inspectors.

Healthcare is an important part of every individual's life. Unfortunately, the rising prevalence of chronic diseases is putting a burden on the modern healthcare system. The internet of things (IoT) with 5G technology offers a number of advantages to the healthcare system, including remote monitoring, remote robotic surgery, and ambulances operating on dedicated network slices, all of which relieve pressure on the traditional healthcare system. 5G-IoT enables billions of healthcare equipment to communicate with one another. These devices will produce a huge amount of data that can be evaluated. In the healthcare industry, data analytics has a huge potential. In this chapter, the authors examine a brief history of machine learning as well as some fundamental knowledge of the methodologies. In addition, the author has provided a brief overview of several machine learning algorithms utilized in healthcare in the context of 5G-IoT. The future aspect of machine learning in a 5G-IoT smart healthcare system was also highlighted.

Risk management plays a vital role in tackling cyber threats within the cyber-physical system (CPS) for overall system resilience. It enables identifying critical assets, vulnerabilities, and threats and determining suitable proactive control measures to tackle the risks. However, due to the increased complexity of the CPS, cyber-attacks nowadays are more sophisticated and less predictable, which makes risk management task more challenging. This chapter proposes an integrated cyber security risk management (i-CSRM) framework for systematically identifying critical assets through the use of a decision support mechanism built on fuzzy set theory, predicting risk types through machine learning techniques, and assessing

the effectiveness of existing controls through the use of comprehensive assessment model (CAM) parameters.

Chapter 5

Orthogonal frequency division multiplexing (OFDM) is a multi-carrier transmission technique used to accomplish high data rate transmission in wireless communications. OFDM is one of the major players of multi-carrier communication systems in 5G networks due to its high spectral efficiency and is immune to multipath fading. However, the OFDM signal suffers from significant amplitude fluctuations resulting in a large peak-to-average power ratio (PAPR), which is one of the main downsides of OFDM systems. Therefore, limiting the PAPR in OFDM systems is a key issue, as decreasing PAPR results in lower power consumption and hence an extended battery life. Reducing PAPR without degrading power usage efficiency and bit error rate (BER) is a challenging issue in improving communication performance. This chapter discusses the use of compressive sensing for PAPR reduction in OFDM systems to deploy in energy-efficient 5G networks.

Chapter 6

In this study, firstly, a dataset of 10,476 annotated vulnerable ERC-20 standard token smart contracts (belonging to a set of 33 common smart contract vulnerabilities) has been collected from a publicly available repository. Secondly, using the SolMet smart contract metrics measurement tool, the object-oriented software attributes (i.e., metrics) from each smart contract's source code has been extracted. Lastly, using the source code metrics and the vulnerability annotations (i.e., labels) as the input in supervised machine learning (classification) algorithms, the accuracy of each individual algorithm is evaluated against the accuracy of an ensemble classifier (namely voting). The model accuracies demonstrate the feasibility of identifying and prioritising smart contracts for further inspection prior to deployment to the blockchain network. The ensemble classifier performed better (accuracy = 0.79) compared to each classifier when used individually.

The application domains for artificial intelligence and machine learning are expanding exponentially in recent times. The domains such as automation in software and business processes, healthcare, agriculture, robotics, and mostly natural language processing have seen the most adaptations. The domain of natural language processing seeks the maximum adaptation due to various sub domain applications such as textual classification, detection of emotions, design and delivery of virtual assistant tools, extraction of knowledge, content summarization, content recommendations, user profiling for content consumption habits, grammar and dialect verification, and text summation. These subdomains cater to a wide range of purposes such as user profiling or emotion extraction for surveying or feedback analysis for data-driven applications.

This chapter describes the evolution of RF/microwave instruments within two decades. The described RF/microwave instruments focus more on low-cost amateur RF signal sources, power detectors, spectrum analyzers (SA), vector network analyzers (VNA), and software-defined radios (SDR). Each instrument is introduced, and its uses are compared. This chapter reviews in detail the development history and development factors of amateur RF/microwave instruments in the past 20 years. Through this chapter, fresh RF/microwave amateurs and hobbyists will better understand the development of low-cost instruments in the present and also in the future, as well as provide guidelines for RF/microwave amateurs and hobbyists in the selection and purchase of such instruments. In fact, some amateur instruments are also used in 5G researches and IoT applications when considering their instrument size, research budget, and the need to use a large number of instruments in the application.