

IoT-Enabled Medical Image Management: A Framework for Real-Time Analysis, Secure Archiving, and Distributed Diagnostics

Arpita Kadel

Assistant Professor

Department of Electronics and Instrumentation Engineering
Shri G. S. Institute of Technology and Science, Indore (M.P.), India
Email ID: arpitakadel4@gmail.com

Abstract – The use of Internet of Things (IoT) devices in the healthcare industry, such as handheld imaging sensors to linked in-hospital devices, is creating medical image data in volumes and speeds never seen before. This data flood is a challenge to the traditional Picture Archiving and Communication Systems (PACS) and it is an opportunity of advanced analytics. The given paper suggests a complex model of applying IoT to the medical image processing with the support of the ideas of radiomics, edge computing, and secure distributed systems. We discuss how IoT allows to receive the pictures of remote or point-of-care devices, process and triage in cases of real-time, and transfer data safely to cloud or fog nodes to process it with the intensive radiomics analysis with the help of machine learning (ML) models. Continuing on innovations to predictive analytics through supervised learning, image retrieval via deep learning, and data augmentation via generative models, we present a system that would serve such purposes as remote diagnostics, ongoing observation over such chronic diseases, outbreak tracking of epidemic outbreaks. Of the interest to this framework are the solutions to the inherent issue of IoT in healthcare, which are: data security, privacy, interoperability and missing or noisy data. The paper ends with the transformation potential of such integration of global health equity, telemedicine and personal individual and proactive care.

Keywords – Internet of Things (IoT), Medical Imaging, Edge Computing, Radiomics, Remote Diagnostics, Secure Data Transmission, Real-Time Analytics, Telemedicine.