Abstract

This thesis scrutinizes the application of Artificial Intelligence (AI), specifically deep learning, in detecting Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) or COVID-19 using Chest X-ray Radiography (CXR). It explores the development process of AI solutions for healthcare, with a focus on addressing the limitations and enhancing the generalizability of deep learning algorithms for COVID-19 detection through CXR. The study examines CXR as a cost-effective, portable, and readily available diagnostic tool, particularly during peak pandemic periods when PCR testing was insufficient. This study highlights the challenge of 'shortcut learning,' where the presence of hidden shortcuts or spurious correlations in training data affects model generalizability and develops methods to detect shortcut features present in datasets. This comprehensive analysis involves curating training data, designing and optimizing models, and evaluating their generalizability and interpretability. The study includes chapters detailing the clinical background of COVID-19, datasets utilized, investigation of shortcut learning, training and evaluation methods, model interpretability, and conclusions for future work in this area. The objective is to advance the integration of AI into clinical settings and improve the accuracy and speed of COVID-19 detection.