

## Foreign Object Detection and Localization in Chest X-rays using Deep Learning

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**ABSTRACT:** Pulmonary abnormalities, such as Tuberculosis (TB), Asthma and/or Chronic obstructive are global threats. Nearly 1.6 million died from TB alone according to the WHO (World Health Organization) report 2019. Computer scientists together with medical experts have designed and reported automated screening systems for chest X-ray (CXR) images. However, most of the research works did not consider detecting foreign objects, such as buttons, coins, ring, pins, bone pieces and other medical devices (e.g. pacemaker) all together that can hinder the performance of automatic screening system. The circle-like foreign objects, such as coins are often confused with nodules, which is one of the primary indicators of Tuberculosis. Thus, in an automated screening process foreign objects need to be separated. Unlike the previous works, we will employ deep learning models, such as Faster R-CNN (Faster Region Proposal Convolutional Neural Network), to detect almost all kinds of foreign objects in CXR images. This research is mainly focused on the detection of foreign objects that are of almost all shapes, sizes and texture in CXR using convolutional neural network. Instead of relying on handcrafted features, we now let machine to find distinguished features to achieve an error as low as possible (technically,  $10^{-4}$ ). We also localize their spatial position in CXR, so that the further process of screening can be advanced and at the same time misdiagnosis and confusion can be eliminated.