

Title: Interpretable Out-of-Distribution Detection for Medical Images using Generative Adversarial Networks and the MIDRC Data Repository

Description: In this work, we present a novel method for detecting anomalous chest x-rays using a generative adversarial network (GAN). We used the Medical Imaging Data Resource Center (MIDRC) repository, which contains a large collection of chest x-rays from various sources. However, as the MIDRC creators reported in the previous PBDW conference, not all the submitted images are actually chest x-rays, and they had to manually filter out the irrelevant ones. To avoid this tedious process, we are training a GAN on the chest x-ray data only, so that it will learn to generate realistic and consistent chest x-ray images. Then, we will use the GAN to reconstruct the training data, and measure the reconstruction error for each image. We hypothesize that the images with the highest reconstruction error will be the ones that deviate from the normal chest x-ray distribution, and thus contain some anomalous features. We will compare the original and reconstructed images visually, and identify several types of anomalies, such as foreign objects, failed image reconstruction, and non-chest images. We will also evaluate our method quantitatively by comparing the reconstruction metrics between four categories: non chest x-ray, portion of chest in x-ray, anomalous chest x-ray, and normal chest x-ray. Our method will not only be able to distinguish between these four categories, but will also be able to demonstrate visually what the anomalous aspects of each image are. We anticipate that our work could be used to filter out irrelevant images that are submitted to large data repositories in the future.