Thesis Defense

Computer Science Master's Program

"Generative Data Augmentation: Using DCGAN to Expand Training Datasets for Chest X-Ray Pneumonia Detection"

By **Ryan Maier**

Abstract:

Recent advancements in computer vision have demonstrated remarkable success in image classification tasks, particularly when provided with an ample supply of accurately labeled images for training. These techniques have also exhibited significant potential in revolutionizing computer-aided medical diagnosis by enabling the segmentation and classification of medical images, leveraging Convolutional Neural Networks (CNNs) and similar models. However, the integration of such technologies into clinical practice faces notable challenges. Chief among these is the obstacle of acquiring high-quality medical imaging data for training purposes. Patient privacy concerns often hinder researchers from accessing large datasets, while less common medical conditions pose additional hurdles due to scarcity of relevant data. This study aims to address the issue of insufficient data availability in medical imaging analysis. We present experiments employing Deep Convolutional Generative Adversarial Networks (DCGANs) to augment training datasets of chest X-ray images, specifically targeting the identification of pneumonia-affected lungs using CNNs. Our findings demonstrate that DCGAN-based generative data augmentation consistently enhances classification performance, even when training sets are severely limited in size.

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Committee: Dr. Jonathan Ventura, Dr. Franz Kurfess, Dr. Alex Dekhtyar