ABSTRACT

This research explores the application of machine learning algorithms for the classification of medical images based on MedMNIST v2 dataset. The MedMNIST v2 dataset, a large-scale collection of standardized biomedical images imitated from MNIST database (Modified National Institute of Standards and Technology database), served as the foundation of training and evaluating models.

INTRODUCTION

Image classification has always been a prominent research direction in machine learning subject in the world. Within the subject, biomedical image classification plays a crucial role, contributing significantly to the advancement of artificial intelligence and progress in medical technology. In response to gradually escalating demand for medical image recognition technology, Yang et al. proposed a large-scale MNIST-like dataset called MedMNIST v2, which consists of 708,069 2D images and 9,998 3D images in various categories. Inside the MedMNIST v2 dataset, all sorts of collections have been split randomly at the patient level with a ratio of 7:1:2 into training-validation-test and all the images are formatted to 28 x 28 （2D）or 28\*28\*28 (3D), enabling researchers even with no prior experience in medical imaging to easily utilize it.

Specifically, this research focused on the PathMNIST dataset and the PenumoniaMNIST respectively for binary classification task and multi-class classification task. The former one contains 5,856 pediatric chest X-Ray images, which have been center-cropped with a window size of length of the short edge and resized into 1 x 28 x 28. Two examples are shown in Fig 1. The subsequent one provides 100,000 non-overlapping image patches from hematoxylin and eosin stained histological images, labelled into 9 types of tissues.