**Cardiac Single Proton Emission Computed Tomography (SPECT) Heart Diagnosis Data Set**

Kurgan et al. [1] use data mining and knowledge discovery approach to computerize the process of myocardial perfusion diagnosis from cardiac SPECT images. Cardiac SPECT imaging technique is characterized by low sensitivity, high signal to noise ratio, and application of very complex image reconstruction algorithms. It is successfully used in clinical trials because of the relatively low cost. A database consisting of 267 cleaned patient SPECT images, accompanied by clinical information and physician interpretation was created first. Typical 2D-image resolution is 6464, all the images are black and white, 8 bits per pixel with 256 shades of gray, see Fig. 1.



Fig. 1. Perfusion on cardiac SPECT images: (a) Normal perfusion; (b) Abnormal perfusion.

They use image analysis in combination with machine learning tools to mimic a diagnostic process. The image analysis algorithm extracts features from cardiac SPECT images. After feature extraction, 44 continuous feature patterns were created for each patient. The feature pattern was further processed to obtain 22 binary partial diagnoses. The 22 binary partial diagnoses dataset can be obtained from UCI Machine Learning repository [2].

Kurgan at al. (2001) generated diagnostic rules from cardiac SPECT data. This problem involved database containing cardiac SPECT heart images collected on 267 patients in stress and rest studies. CLIP3 algorithm was applied to generate diagnostic rules for overall diagnosis of the patient’s study, by using information of partial, in the predefined regions of the heart muscle, diagnoses. This is a two-classes problem: first class describes normal patients (55 examples), and second patients with coronary artery disease (212 examples). Three diagnostic rules were generated. The rules accuracy was 84%.

In this study, we use this binary data set to explore the research objective. Each of the patients is classified into two categories: normal and abnormal. The normal patients are labeled as 0, the abnormal patients are labeled as 1. The data set has 267 instances and 23 attributes, one of the attributes is the diagnostic result. In 267 instances, 55 are the normal patients, and 212 are the abnormal patients.

1. L. A. Kurgan, K. J. Cios, R. Tadeusiewicz, M. Ogiela, and L. S. Goodenday, "Knowledge Discovery Approach to Automated Cardiac SPECT Diagnosis," Artificial Intelligence in Medicine, vol. 23(2), pp. 149-169, Oct 2001.
2. D. Dua, and E. Karra Taniskidou, (2017). UCI Machine Learning Repository [http://archive.ics.uci.edu/ml]. Irvine, CA: University of California, School of Information and Computer Science.