

# Multi-Label Classification of Pathologies Found on Short ECG Signals of Varying Dimensionality

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*Introduction.* Automated detection of several key cardiac pathologies in reduced-lead ECGs is an enabling factor in applying ECG analysis on a larger scale. The PhysioNet/Computing in Cardiology Challenge 2021 (hereafter referred to as The Challenge) identifies a set of key cardiac pathologies and challenges us with the task to automatically detect them. Critical to this task is the extraction of features from these ECGs which, combined, mark the presence of one or more of these key cardiac pathologies.

*Methodology.* Algorithms were devised to automatically extract features based on the definitions as used in medical practice. A binary classifier for each key cardiac pathology was trained using these features, extracted from the labeled ECGs from The Challenge. The binary classifiers were combined into a multi-label classifier by learning thresholds on the scores of the binary classifiers using cross-validation.

*Results.* Our contribution achieved a challenge metric score of 0.55, 0.54, 0.54 and 0.51 placing us (team DSC) 10, 9, 10 and 12 out of 80 teams on 12-lead, 6-lead, 3-lead and 2-lead validation datasets respectively. Cross validation on the publicly available training data provided by The Challenge resulted in a challenge metric score of 0.49, 0.46, 0.47 and 0.43.