

# Adaptive Weighting in Contrastive Learning for Large-Scale ECG Classification

Assignee Research

June 7, 2026

## Abstract

This report synthesises findings from 14 peer-reviewed papers addressing the following research question: How does the scalability of contrastive learning with adaptive weighting schemes compare to standard contrastive losses when applied to larger ECG datasets, as measured by AUC-ROC and model convergence speed on extended versions of MIT-BIH and PTB-XL?. 15 claims were extracted from source literature; 2 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.4/10. This report is a machine-generated literature synthesis and does not constitute original research.

## 1 Introduction

This paper examines: ECG-Lens: Benchmarking ML & DL Models on PTB-XL Dataset. Research question: How does the scalability of contrastive learning with adaptive weighting schemes compare to standard contrastive losses when applied to larger ECG datasets, as measured by AUC-ROC and model convergence speed on extended versions of MIT-BIH and PTB-XL?.

## 2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.4/10.

## 3 Results

14 papers retrieved. 15 claims extracted; 2 independently verified. Quality review score: 4.4/10.

## 4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

## 5 Extracted Claims

Claim	Verified	Confidence
The PTB-XL dataset contains 7,293 records classified as NORM (Normal ECG pattern/Sinus Rhythm).	×	0.06
The PTB-XL dataset contains 4,103 records classified as MI (Myocardial Infarction/Heart Attack).	×	0.04
The PTB-XL dataset contains 3,869 records classified as ST/T Change (Ischemia, Injury).	×	0.04
The PTB-XL dataset contains 3,790 records classified as CD (Conduction Disturbance/Bundle Branch Block).	×	0.04
The PTB-XL dataset contains 2,782 records classified as HY (Ventricular Hypertrophy/Enlarged Ventricle).	×	0.04
The Random Forest Classifier achieved an accuracy of 54% on the PTB-XL dataset.	×	0.13
The Decision Tree model achieved an accuracy of 52% on the PTB-XL dataset.	×	0.10
The Logistic Regression model achieved an accuracy of 40% on the PTB-XL dataset.	×	0.11
The Decision Tree model achieved an F1-Score of 22% and a ROC-AUC score of 58%.	×	0.13
The ECG-Lens Model achieved an accuracy of 80% on the PTB-XL dataset.	✓	0.16
The LSTM Model achieved an accuracy of 73% on the PTB-XL dataset.	×	0.08
The CNN Model achieved an accuracy of 71% on the PTB-XL dataset.	×	0.09
The ECG-Lens Model achieved a ROC-AUC score of 90%.	✓	0.18
The ECG-Lens Model achieved an F1-Score of 78%.	×	0.13
The study classifies ECG statements into five distinct superclasses using the PTB-XL dataset.	×	0.06

## References

- <http://arxiv.org/abs/2604.15822v1>
- <http://arxiv.org/abs/2603.07558v1>

- <http://arxiv.org/abs/2004.13701v1>