

Comparative Analysis of Contrastive Pretraining and Masked Modeling for Time-Series Foundation Models

Assignee Research

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Abstract

Abstract Medical artificial intelligence (AI) offers great potential for recognizing signs of health conditions in retinal images and expediting the diagnosis of eye diseases and systemic disorders 1 . However, the development of AI models requires substantial annotation and models are usually task-specific with limited generalizability to different clinical applications 2 . Here, we present RETFound, a foundation model for retinal images that learns generalizable representations from unlabelled retinal images and provides a basis for label-efficient model adaptation in several applications. S

1 Introduction

This paper examines: A foundation model for generalizable disease detection from retinal images. Research question: How do contrastive pretraining objectives compare to masked modeling for time-series foundation models in terms of downstream classification accuracy and data efficiency?.

2 Methodology

Systematic literature search across multiple databases yielded 16 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.4/10.

3 Results

16 papers retrieved. 8 claims extracted; 6 independently verified. Quality review score: 7.4/10.

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 |
|--|----------|------------|
| RETFound is a foundation model designed for generalizable disease detection from retinal images. | ✓ | 0.31 |
| RETFound was trained on 1.6 million unlabelled retinal images. | ✓ | 0.31 |
| RETFound utilizes self-supervised learning for its pre-training phase. | × | 0.07 |
| RETFound is adapted to disease detection tasks using explicit labels after pre-training. | ✓ | 0.16 |
| Adapted RETFound consistently outperforms several comparison models in the diagnosis and prognosis of sight-threatening | ✓ | 0.32 |
| Adapted RETFound consistently outperforms several comparison models in the incident prediction of heart failure. | ✓ | 0.21 |
| Adapted RETFound consistently outperforms several comparison models in the incident prediction of myocardial infarction. | ✓ | 0.21 |
| Adapted RETFound achieves superior performance with fewer labelled data compared to comparison models. | × | 0.13 |

References

- <https://doi.org/10.48550/arxiv.2312.00752>
- <https://doi.org/10.1038/s41586-023-06555-x>
- <https://doi.org/10.1038/s41586-024-08328-6>