Recent Advances in Artificial Intelligence for Radiology Report Generation: A Brief Review

Caitlyn Tran, BS,[1] Basudha Pal[2], Thomas Stirrat, BS,[1] Victoria Shi, BS,[3] Muhammad Umair, MD[4]
[1]Georgetown University School of Medicine, Washington, DC 20007, USA
[2]Johns Hopkins University, PhD Program, Department of Electrical and Computer Engineering, Baltimore, MD 21218, USA
[3]Johns Hopkins University School of Medicine, Baltimore, MD 21287, USA
[4]Columbia University Vagelos College of Physicians and Surgeons, New York, NY 10032, USA

Introduction

Rising imaging volumes combined with radiologist workforce shortages have created significant workflow bottlenecks → potential solution: artificial intelligence (AI)

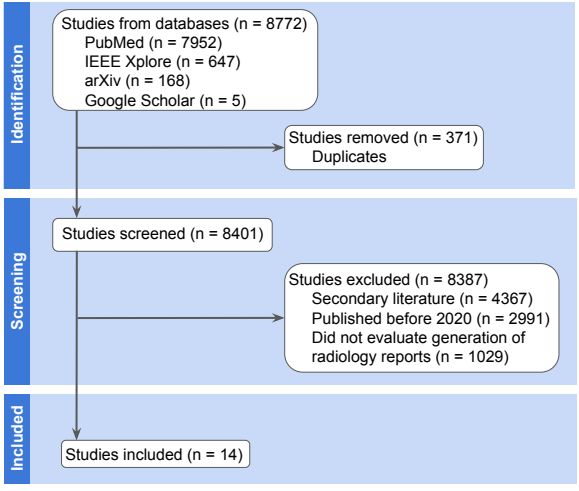
+85% imaging utilization increase among Medicare enrollees (2003-2016)

+66% imaging utilization increase among commercially insured adults (2003-2016)

+13% radiologist workforce growth over the same period

This review evaluates recent advancements in AI vision-language models (VLMs) for radiology report generation

Methods



Results

- 11 of 14 VLMs trained primarily on chest radiographs (MIMIC-CXR) with limited representation of CT, MRI, and ultrasound
- No single optimization strategy dominates → each has distinct trade-offs between between linguistic fidelity and clinical accuracy

Common Optimization Strategies:

Strategy	Strengths	Weaknesses	Example VLMs
Masked Modeling	↑ Natural language generation performance (METEOR, CIDEr-D)	↓ Clinical entity-relation accuracy (RadGraph F1)	METransformer R2GenGPT
Contrastive alignment	↑ Entity-relation accuracy	↓ N-gram precision	CXR-RePaiR-2/ Select BioViL-T

- Models incorporating multiple optimization strategies demonstrated more balanced performances
- 4 of 14 studies included human evaluation
  - AI reports were rated equal or better than human-written reports in 40–60% of cases
  - AI reports had higher rates of omission and errors, especially for complex findings

Conclusion

- Although AI VLMs show potential for automated radiology report generation, they remain limited by a lack of multimodal training datasets, unstandardized evaluation metrics, and errors
- If limitations are addressed and VLMs are properly integrated with human oversight, VLMs could serve as assistive tools that enhance efficiency and patient care

Key Takeaways

- AI radiology report generation has advanced rapidly with VLMs
- VLM-generated reports (2020-2024) are promising but require radiologist oversight for safe clinical use, especially in complex cases
- No single optimization strategy dominates → hybrid approaches show the most promise
- Current limited dataset diversity restricts generalizability and model performance
- Lack of standardized evaluation metrics remains a major barrier to clinical adoption

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