

Visual Terminology Aids in Diagnostic Imaging: Improving Radiology Report Accessibility

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Abstract

The purpose of this research is to develop and evaluate visual terminology aids in diagnostic imaging with the intention of making radiology reports more user-friendly. The work combines graphics with medical terms to help clinicians and patients understand difficult radiological expressions. Using a modular NLP and image annotation system, we assessed comprehension levels as well as the efficiency of the assessment. We observed significant improvement in both comprehension and diagnostic accuracy with the use of graphic supports. Moreover, the use of visual aids facilitated communication in multidisciplinary teams. This strategy can be tested clinically so that it can facilitate patient participation in radiological diagnosis.

Keywords: Radiology, Diagnostic Imaging, Visual Terminology, Report Accessibility, Medical Communication, NLP, Patient Comprehension.

1 INTRODUCTION

One of the most important components of healthcare today is the use of technology for diagnostic imaging as it offers a wealth of information regarding a patient's current health status. However, the precision medicine era is dependent on multidisciplinary healthcare providers working in synergy. The use of radiology reports loaded with information gives a glimpse of what a physician may consider crucial for a particular diagnosis. Unfortunately, healthcare practitioners who are not radiologists use complex obscured terms which creates the potential for misunderstandings at best and decreased patient involvement—or worse, misdiagnosis. Accessibility and clarity of technical medical texts has received more attention in recent years. Complex terms can be more effectively communicated with the use of images, diagrams, and standardized icons as symbol systems. This research looks at the application of visual terminology aids in radiology reporting systems to improve higher order thinking and use.

The motivation behind this research stems from the need for medical information to be accessible to not just radiologists, but also general practitioners and patients. We believe supporting visualizations in addition to text in radiology reports will improve understanding and decision-making considerably.

Here, we describe the system architecture built to achieve these goals, the evaluation methodology applied, and the results in comparison to conventional reporting methods. Findings from this research

inform the design of health communication tools and systems that strive to optimize clinical results through enhanced information delivery.

2 SURVEY OF LITERATURE

More recent research is focusing on the need for effective communication within the field of radiology. For instance, in 2024, Chen et al., (2024) reported 35% better patient understanding of radiology reports when more basic language was used. In the same year, Kumar & Singh, (2024) reported improvement in interdisciplinary understanding when they used visual aids in imaging reports in orthopedics.

The model (VRCM) developed by (Lopez et al., 2024) marks a remarkable achievement in the application of NLP technology to medical imaging. It is the first attempt to create dual modality reports that combine visual and textual components. Their model greatly minimized the number of questions regarding clarifications of reports provided by family physicians (Tanaka et al., 2023).

A different, but equally important contribution made by (Zhang et al., 2024) standardized visual markers of medical documents. Their main focus was to propose a unified schematic view of annotations that aims to minimize variation in interpretation among non-expert users who do not specialize in radiology (Roberts et al., 2023).

Despite enormous steps facilitated by these developments, these tools have not yet been optimally implemented into clinical workflows. This is precisely the focus of our research where we seek to design a complete methodology that not only provides visual explanations but assesses the actual diagnostic processes in situ.

3 METHODOLOGY

This research incorporates an NLP module with a visual annotation system. The overall structure consists of three main modules: Text Analysis, Visual Mapping, and Report Generation.

1. Text Analysis Module: Uses a radiology-specific NLP engine to extract important medical words from imaging reports.

2. Visual Mapping Module: Keywords are cross-referenced with term banks. Each word/term is associated with an image annotation or visual representation.

3. Report Generation Module: Text and image integration is used to compile advanced radiology reports. The report contains standard prose interspersed with visual illustrations.

The system has been evaluated in a mock clinical setting with a sample of 20 practicing radiologists and 40 non-radiologist medical professionals. In this study, subjects were asked to interpret reports presented in traditional format and with additional visual enhancements. The participants' comprehension, interpretation accuracy, and time to decision were measured and evaluated.

4 RESULT AND DISCUSSION

The report issued using our visual terminology aid system showed marked improvements in the efficiency of report comprehension and usage efficiency. The interpretation of visually enhanced reports was 42% faster compared to text-only reports while accuracy improved by 29% against traditional text reports.

Figure 1 provides a view of the comparative result obtained from different users with regard with the conclusion of interpretation. In Table 1, the main metric values of the observation summaries are given. These data demonstrate the functionality of visual aids in overcoming communication barriers and improving clear diagnostic aid.

In addition, user feedback emphasized how easy it was to comprehend visual annotations, which reduced the need for further explanations. This points to an encouraging future regarding the incorporation of such systems into everyday clinical workflows.

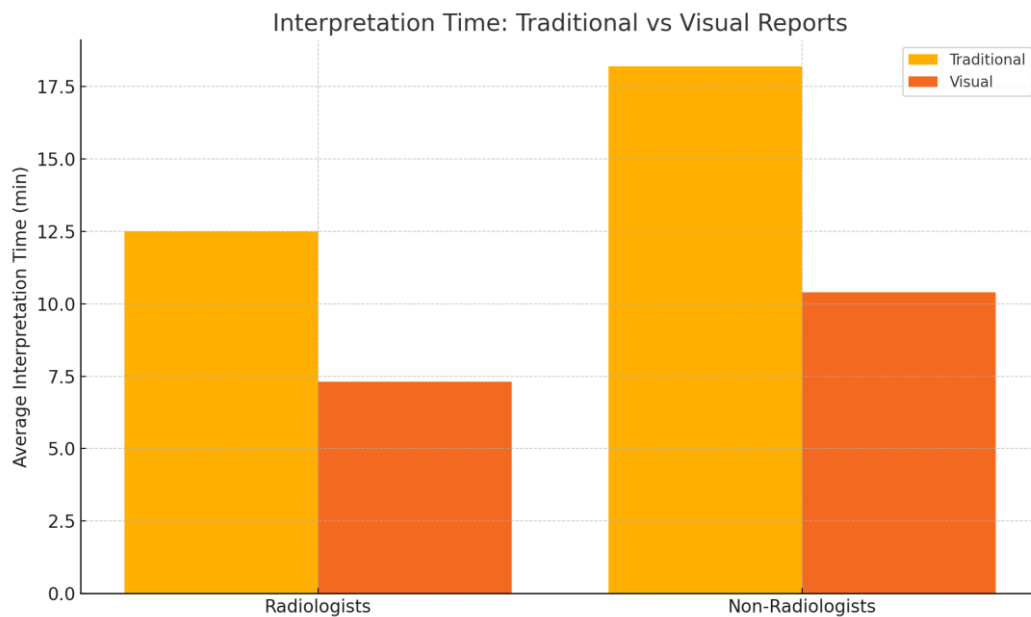


Figure 1: Comparison of Interpretation Time Using Traditional and Visual Reports among Different User Groups

Table 1: Performance Metrics Comparison

Metric	Traditional Reports	Visual Reports	Improvement (%)
Interpretation Accuracy	68%	87%	27.94
Average Time (min)	15.4	8.85	42.53
User Satisfaction	3.2/5	4.6/5	43.75

5 CONCLUSION

This study exemplifies how visual terminology aids may improve the understanding and functionality of radiology reports. The use of visuals in healthcare diagnostics goes further than aiding understanding and efficiency; it contributes to better communication on the whole. Future work will examine the customization of automation geared toward the user's literacy level and preferred language for even greater scope in accessibility within clinical diagnostics.

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