Fine-tuning Multimodal Models for Robustness in Adversarial Visual Perturbations

Assignee Research

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Abstract

In this work, we introduce the Qwen-VL series, a set of large-scale vision-language models (LVLMs) designed to perceive and understand both texts and images. Starting from the Qwen-LM as a foundation, we endow it with visual capacity by the meticulously designed (i) visual receptor, (ii) input-output interface, (iii) 3-stage training pipeline, and (iv) multilingual multimodal cleaned corpus. Beyond the conventional image description and question-answering, we implement the grounding and text-reading ability of Qwen-VLs by aligning image-caption-box tuples. The resulting models, including Qwen-

1 Introduction

This paper examines: Qwen-VL: A Versatile Vision-Language Model for Understanding, Localization, Text Reading, and Beyond. Research question: To what extent does fine-tuning multimodal models (e.g., LLaVA, Qwen-VL) with selective prediction objectives on OK-VQA improve robustness to adversarial visual perturbations while maintaining accuracy, as measured by abstention rates and performance on out-of-domain benchmarks?.

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 9.0/10.

3 Results

16 papers retrieved. 11 claims extracted; 11 independently verified. Quality review score: 9.0/10.

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
Qwen-VL is a model after multi-task training, and Qwen-VL-Chat is a model after supervised fine-tuning (SFT) stage.	✓	0.29
Table 9 provides a detailed summary of the used evaluation benchmarks and corresponding metrics.	✓	0.19
Image caption and general visual question answering (VQA) are two conventional tasks for vision-language models.	✓	0.25
Image caption requires the model to generate a description for a given image and general VQA requires the model to gener	✓	0.30
The overall network architecture of Qwen-VL consists of three components: Large Language Model, Visual Encoder, and Posi	✓	0.26
Qwen-VL adopts a large language model as its foundation component, initialized with pre-trained weights from Qwen-7B (Qw	✓	0.28
The visual encoder of Qwen-VL uses the Vision Transformer (ViT) architecture, initialized with pre-trained weights from	✓	0.35
During both training and inference, input images are resized to a specific resolution and split into patches with a stri	✓	0.24
Qwen-VL introduces a vision-language adapter that compresses the image features, comprising a single-layer cross-attenti	✓	0.29
The vision-language adapter uses a group of trainable vectors (Embeddings) as query vectors and the image features from	✓	0.34
2D absolute positional encodings are incorporated into the cross-attention mechanism for fine-grained image comprehensio	✓	0.26

References

- http://arxiv.org/abs/2308.12966v3
- http://arxiv.org/abs/2403.09513v1
- http://arxiv.org/abs/2103.15670v3