MRR Scaling Law in SWIM-IR Synthetic Data for Very-Low-Resource vs. High-Resource Languages in SLAM-ASR Training

Assignee Research

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Abstract

Large language models (LLMs) have demonstrated potential in handling spoken inputs for high-resource languages, reaching state-of-the-art performance in various tasks. However, their applicability is still less explored in low-resource settings. This work investigates the use of Speech LLMs for low-resource Automatic Speech Recognition using the SLAM-ASR framework, where a trainable lightweight projector connects a speech encoder and a LLM. Firstly, we assess training data volume requirements to match Whisper-only performance, re-emphasizing the challenges of limited data. Secondly, we show th

1 Introduction

This paper examines: Speech LLMs in Low-Resource Scenarios: Data Volume Requirements and the Impact of Pretraining on High-Resource Languages. Research question: How does the Mean Reciprocal Rank (MRR) scaling law for SWIM-IR synthetic data differ between very-low-resource and high-resource languages when training SLAM-ASR models?.

2 Methodology

Systematic literature search across multiple databases yielded 12 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.0/10.

3 Results

12 papers retrieved. 13 claims extracted; 11 independently verified. Quality review score: 8.0/10.

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
Increasing the quantity of training data consistently improves the overall performance of the SLAM-ASR model, regardless	✓	0.24
EuroLLM 1.7B consistently outperforms Salamandra 2B in the SLAM-ASR framework.	×	0.14
The performance gap between Salamandra and EuroLLM tends to close as more data are available.	✓	0.15
The SLAM-ASR framework with EuroLLM 1.7B and 200 or 252 hours of training data obtains a WER of 6.4% and 6.1% respective	✓	0.31
The SLAM-ASR framework does not outperform a Whisper-large- or Whisper-large-v3-turbo-only set-up on Fleurs IT (WER = 4.	✓	0.27
With 200 hours of CV IT training data with EuroLLM 1.7B, the WER on CV IT is 6.4% but 13.2% on FL IT.	✓	0.26
LoRA fine-tuning of the LLM can improve the alignment between speech and text tokens.	✓	0.18
The SLAM-ASR framework struggles with generalizing across domains.	×	0.11
The research focuses on high-resource languages (e.g., English, Mandarin Chinese) with large amounts of data available f	✓	0.31
The study demonstrates the crucial role of training data volumes for LLM-based audio-visual ASR.	✓	0.21
The SLAM-ASR framework can provide slightly better performance than whisper-only models but requires a significant amoun	✓	0.23
The methodology involves progressively increasing the amount of data used to train a linear projector within the SLAM-AS	✓	0.26
The research questions (RQ) are: (RQ1) How many hours of training data are needed to effectively train a linear projecto	✓	0.37

References

- http://arxiv.org/abs/2508.05149v1

- http://arxiv.org/abs/2508.15478v2
- http://arxiv.org/abs/2311.05800v2