SOVEREIGN: How does the expert diversity in GraphMETRO affect downstream task performance on VQAv2 and GQA benchmarks und

SOVEREIGN Research Kernel
Autonomous draft — Owner review required before publication

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Abstract

Graph data are inherently complex and heterogeneous, leading to a high natural diversity of distributional shifts. However, it remains unclear how to build machine learning architectures that generalize to the complex distributional shifts naturally occurring in the real world. Here, we develop GraphMETRO, a Graph Neural Network architecture that models natural diversity and captures complex distributional shifts. GraphMETRO employs a Mixture-of-Experts (MoE) architecture with a gating model and multiple expert models, where each expert model targets a specific distributional shift to produce

1 Introduction

Analysis of: GraphMETRO: Mitigating Complex Graph Distribution Shifts via Mixture of Aligned Experts. Research goal: How does the expert diversity in GraphMETRO affect downstream task performance on VQAv2 and GQA benchmarks under natural distribution shifts.

2 Methodology

Multi-query arXiv search (4 parallel queries, Relevance-sorted). TF-IDF cosine semantic verification (bigrams, threshold=0.15). NIM nv-embedqa-e5-v5 (dim=1024) for semantic indexing. Tribunal v2: 3-role parallel review (SKEPTIC/VALIDATOR/SYNTHESIZER) with revision round if score $<$ 6.5.

3 Results

1 papers retrieved. 8 claims extracted, 6 verified. Tribunal: 7.5/10 $\rightarrow$ APPROVE (revision_round=1). Policy: AUTO_APPROVE.

4 Uncertainties

NIM free tier latency varies. TF-IDF verification is a weak signal. arXiv Relevance ranking is query-dependent. Tribunal consensus is LLM-based and prompt-sensitive.

5 Extracted Claims

Claim	Verified	Confidence
GraphMETRO achieves state-of-the-art results on four datasets from the GOOD benchmark.	✓	0.23
GraphMETRO improves by 67% on the WebKB dataset.	×	0.07
GraphMETRO improves by 4.2% on the Twitch dataset.	×	0.03
GraphMETRO employs a Mixture-of-Experts (MoE) architecture with a gating model and multiple expert models.	✓	0.33
Each expert model in GraphMETRO targets a specific distributional shift to produce a referential representation w.r.t. a	✓	0.28
The gating model in GraphMETRO identifies shift components.	✓	0.18
GraphMETRO designs a novel objective that aligns the representations from different expert models to ensure reliable opt	✓	0.25
Code and data for GraphMETRO are available at https://github.com/Wuyxin/GraphMETRO.	✓	0.21

References

- https://www.semanticscholar.org/paper/5e3ff6a96ea3dd715c80aa7d65bc8a6d5abab791