

Task-Conditioned Expert Routing in Mixture-of-Experts Models and Its Accuracy Impact on GSM8K and MATH Benchmarks

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: How does task-conditioned expert routing in MoE models impact accuracy on GSM8K and MATH benchmarks compared to dense transformers of equivalent parameter count. 9 claims were extracted from source literature; 1 was independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 4.7/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Mixture-of-Experts Models in Vision: Routing, Optimization, and Generalization. Research question: How does task-conditioned expert routing in MoE models impact accuracy on GSM8K and MATH benchmarks compared to dense transformers of equivalent parameter count?.

2 Methodology

Systematic literature search across multiple databases yielded 15 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 4.7/10.

3 Results

15 papers retrieved. 9 claims extracted; 1 independently verified. Quality review score: 4.7/10.

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
Mixture-of-Experts (MoE) architectures introduce conditional computation by routing inputs to a subset of specialized ex	×	0.15
In large language models, MoEs are primarily motivated by efficiency and scalability.	×	0.05
The study uses the CIFAR-10 dataset for image classification.	×	0.10
The study compares dense classifier heads with SoftMoE and SparseMoE variants.	×	0.14
The models in the study are built on a shared ResNet-18 backbone.	×	0.02
The compared model variants are matched to comparable parameter budgets.	×	0.04
The study analyzes generalization-related behavior through the geometry of the loss landscape.	×	0.08
The study computes Hessian-based sharpness metrics at convergence.	✓	0.18
The code for the project is available at https://github.com/moe-project-uu/mixture-of-experts-project .	×	0.09

References

- <http://arxiv.org/abs/2202.09368v2>
- <http://arxiv.org/abs/2601.15021v1>
- <http://arxiv.org/abs/2601.08881v2>