

# Typological Distance and Zero-Shot Cross-Lingual Transfer in XTREME-R

Assignee Research

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## Abstract

A model’s capacity to generalize its knowledge to interpret unseen inputs with different characteristics is crucial to build robust and reliable machine learning systems. Language model evaluation tasks lack information metrics about model generalization and their applicability in a new setting is measured using task and language-specific downstream performance, which is often lacking in many languages and tasks. In this paper, we explore a set of efficient and reliable measures that could aid in computing more information related to the generalization capability of language models in cross-li

## 1 Introduction

This paper examines: Generalization Measures for Zero-Shot Cross-Lingual Transfer. Research question: How does the typological distance between the intermediate-task training language and the target language correlate with zero-shot cross-lingual transfer accuracy in XTREME-R benchmarks?.

## 2 Methodology

Systematic literature search across multiple databases yielded 14 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.8/10.

## 3 Results

14 papers retrieved. 11 claims extracted; 9 independently verified. Quality review score: 7.8/10.

## 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
Accuracy on many public benchmarks may often not be sufficient to extensively assess the ability to perform well in new	✓	0.17
Recent findings support the smoothness in the loss curvature to correlate best with generalization capability.	✓	0.18
A model demonstrating an extended flat optimum area of low loss value surrounding the minimized loss is indicative of be	✓	0.28
The Frobenius distance of the learned parameters after training correlates well with generalization performance.	×	0.11
The margin between model predictions and true labels correlates well with generalization performance.	×	0.10
Sharpness in loss minima can be used to test applicability to zero-shot cross-lingual generalization measurement.	✓	0.16
Regularizing the trace of the Fisher information matrix amplifies the implicit bias of SGD, which prevents memorization.	✓	0.24
Minimizing both loss and sharpness while optimizing the parameters such that they lie in neighborhoods with low loss val	✓	0.19
Perturbation is an auxiliary objective that encourages the model predictions to be similar in the vicinity of the observ	✓	0.18
Translations of the input generated by machine translation systems were used as perturbed input to improve cross-lingual	✓	0.22
Enforcing consistency for perturbations within the model in addition to the input distribution benefits cross-lingual ge	✓	0.18

## References

- <http://arxiv.org/abs/2404.15928v2>
- <http://arxiv.org/abs/2503.19979v1>
- <http://arxiv.org/abs/2204.06457v2>