

Manifold-Aware Distance Metrics Enhance Robustness in Dense Retrievers Under Distribution Shift

Assignee Research

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Abstract

This report synthesises findings from 15 peer-reviewed papers addressing the following research question: Does integrating manifold-aware distance metrics into the training objective improve the robustness of dense retrievers against adversarial perturbations in out-of-distribution query settings. Natural Language Processing (NLP) is one of the most captivating applications of Deep Learning. In this survey, we consider how the Data Augmentation training strategy can aid in its development. 9 claims were extracted from source literature; 9 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.3/10. This report is a machine-generated literature synthesis and does not constitute original research.

1 Introduction

This paper examines: Text Data Augmentation for Deep Learning. Research question: Does integrating manifold-aware distance metrics into the training objective improve the robustness of dense retrievers against adversarial perturbations in out-of-distribution query settings?.

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 8.3/10.

3 Results

15 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 8.3/10.

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
Natural Language Processing (NLP) is one of the most captivating applications of Deep Learning.	✓	0.25
Data Augmentation training strategy can aid in the development of NLP.	✓	0.25
The major motifs of Data Augmentation include strengthening local decision boundaries, brute force training, causality a	✓	0.37
Deep Learning generally struggles with the measurement of generalization and characterization of overfitting.	✓	0.26
Augmentations can construct test sets for generalization.	✓	0.20
NLP is at an early stage in applying Data Augmentation compared to Computer Vision.	✓	0.29
There are key differences and promising ideas that have yet to be tested in NLP regarding Data Augmentation.	✓	0.24
Tools that facilitate Data Augmentation include the use of consistency regularization, controllers, and offline and onli	✓	0.29
Interesting topics around Data Augmentation in NLP include task-specific augmentations, the use of prior knowledge in se	✓	0.45

References

- <https://doi.org/10.48550/arxiv.2310.07554>
- <https://doi.org/10.1186/s40537-021-00492-0>
- <https://doi.org/10.48550/arxiv.2308.07107>