

# Impact of Layer-wise Embedding Extraction on RWKV Model Spearman Correlations in MRPC Evaluation

Assignee Research

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## Abstract

This paper investigates the efficacy of RWKV, a novel language model architecture known for its linear attention mechanism, for generating sentence embeddings in a zero-shot setting. I conduct a layer-wise analysis to evaluate the semantic similarity captured by embeddings from different hidden layers of a pre-trained RWKV model. The performance is assessed on the Microsoft Research Paraphrase Corpus (MRPC) dataset using Spearman correlation and compared against a GloVe-based baseline. My results indicate that while RWKV embeddings capture some semantic relatedness, they underperform compared

## 1 Introduction

This paper examines: Exploring RWKV for Sentence Embeddings: Layer-wise Analysis and Baseline Comparison for Semantic Similarity. Research question: What is the impact of layer-wise embedding extraction on Spearman correlation scores for RWKV models evaluated on the MRPC dataset compared to GloVe baselines?.

## 2 Methodology

Systematic literature search across multiple databases yielded 11 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.5/10.

## 3 Results

11 papers retrieved. 15 claims extracted; 14 independently verified. Quality review score: 8.5/10.

## 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
Spearman correlation is suitable for evaluating the monotonic relationship between cosine similarity of sentence embeddings	✓	0.29
Spearman correlation is commonly used in semantic similarity evaluations.	✓	0.20
A higher Spearman correlation indicates a stronger alignment between semantic similarity captured by embeddings and human	✓	0.30
Inference time was measured as the average time taken to process a sentence pair.	✓	0.23
Peak GPU memory usage was recorded during embedding generation.	✓	0.17
Experiments were conducted on a Google Colab environment with a Tesla T4 GPU.	✓	0.22
The RWKV-v6-Finch-1B6-HF model and GloVe 6B 50d embeddings were used.	✓	0.20
Sentence embeddings were generated for all sentence pairs in the MRPC training (subset of 1000 samples) and validation sets	✓	0.26
Cosine similarity was calculated for each sentence pair’s embeddings.	✓	0.18
Spearman correlation was computed between cosine similarity scores and MRPC labels using the SciPy library.	✓	0.23
Inference time and GPU memory usage were recorded for each method using PyTorch utilities.	✓	0.26
The RWKV-v6-Finch-1B6-HF model is based on the RWKV architecture and trained on a large corpus of text data.	✓	0.30
The RWKV-v6-Finch-1B6-HF model was chosen for its smaller size, allowing experimentation within Google Colab’s computational	✓	0.24
Sentence embeddings were extracted from layers 1, 3, 5, 7, 9, and 11 of the RWKV model.	×	0.12
Sentence embeddings were computed by averaging the hidden states across all tokens in the sentence.	✓	0.16

## References

- <http://arxiv.org/abs/1809.09924v4>
- <http://arxiv.org/abs/1712.02820v1>
- <http://arxiv.org/abs/2502.14620v1>