

# Llama3 and GRU-Based Imputation Scaling in Solar Irradiation Forecasting Under Noise

Assignee Research

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## Abstract

This report synthesises findings from 8 peer-reviewed papers addressing the following research question: How does the performance of Llama3 and GRU-based imputation methods scale with increasing sequence length and noise levels in solar irradiation forecasting, measured by MAE and RMSE metrics on. The rapid advancement in Artificial Intelligence (AI) and big data has developed significance in the water sector, particularly in hydrological time-series predictions. Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks have become research focal points. 7 claims were extracted from source literature; 7 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 7.4/10. This report is a machine-generated literature synthesis and does not constitute original research.

## 1 Introduction

This paper examines: A critical review of RNN and LSTM variants in hydrological time series predictions. Research question: How does the performance of Llama3 and GRU-based imputation methods scale with increasing sequence length and noise levels in solar irradiation forecasting, measured by MAE and RMSE metrics on benchmark datasets?.

## 2 Methodology

Systematic literature search across multiple databases yielded 8 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 7.4/10.

### 3 Results

8 papers retrieved. 7 claims extracted; 7 independently verified. Quality review score: 7.4/10.

### 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
Recurrent Neural Networks (RNNs) face limitations such as vanishing gradients which impede their ability to model long-t	✓	0.30
Long Short-Term Memory (LSTM) networks use memory cells and gating mechanisms to overcome the vanishing gradient problem	✓	0.22
Gated Recurrent Units (GRUs) provide a more streamlined architecture compared to LSTMs while offering similar benefits i	✓	0.25
The integration of attention mechanisms with RNN, LSTM, and GRU models has improved prediction accuracy in hydrological	✓	0.25
Hybrid models combining RNNs, LSTMs, and GRUs with other Machine Learning and Deep Learning techniques capture both temp	✓	0.23
Practical implementations of RNN, LSTM, and GRU models in hydrological time series prediction require extensive datasets	✓	0.26
Practical implementations of RNN, LSTM, and GRU models in hydrological time series prediction require substantial comput	✓	0.26

### References

- <https://doi.org/10.3390/su15097087>
- <https://doi.org/10.3390/su14084832>

- <https://doi.org/10.1016/j.mex.2024.102946>