

## REVIEWER'S REPORT

Manuscript No.: IJAR-59218

Title: Machine Learning-Based Network Intelligence Framework for Autonomous Data Center Operations.

### Recommendation:

Accept as it is .....  
**Accept after minor revision.....**  
 Accept after major revision .....  
 Do not accept (*Reasons below*) .....

| Rating         | Excel. | Good | Fair | Poor |
|----------------|--------|------|------|------|
| Originality    | ✓      |      |      |      |
| Techn. Quality |        | ✓    |      |      |
| Clarity        |        | ✓    |      |      |
| Significance   | ✓      |      |      |      |

Reviewer Id: JPR-294

### Reviewer's Comment for Publication.

This manuscript presents a relevant and timely integrative review of machine-learning-based network intelligence for autonomous data-center operations. It brings together several important research areas, including telemetry analysis, anomaly detection, forecasting, graph neural networks, reinforcement learning, intent-based networking, digital twins, and closed-loop assurance. The proposed framework organizes these capabilities into observation, representation, intelligence, decision, actuation, and assurance layers, providing a useful systems-level perspective.

The manuscript has a clear research motivation and explicitly states its objectives and research questions. The literature synthesis also appropriately recognizes important deployment challenges such as concept drift, incomplete observability, sparse labels, unsafe reinforcement-learning exploration, topology changes, and limited production-scale evidence.

The methodology describes the databases searched, search concepts, inclusion and exclusion criteria, screening process, quality considerations, and synthesis procedure. The decision not to perform numerical pooling is reasonable given the heterogeneous datasets, topologies, metrics, and control horizons represented in the literature.

### Minor revisions are recommended:

1. **Strengthen the review methodology.** Although the search databases and inclusion criteria are described, the manuscript does not provide the actual search strings used for each database. Providing representative or complete search strings would improve reproducibility.
2. **Clarify study selection.** The manuscript explicitly states that numerical screening totals were not maintained. The authors should nevertheless provide, if available, approximate numbers of records identified, screened, and finally included, or clearly explain why these data cannot be reconstructed.

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3. **Improve Table 1 formatting.** Several table entries appear fragmented because of line breaks, particularly the columns for inputs, strengths, limitations, and autonomy tiers. The table should be reformatted for readability and consistency.
4. **Improve Figure presentation.** Figures 1 and 2 are important to the proposed framework, but the manuscript should ensure that the final figures clearly show the relationships among observation, representation, intelligence, decision, actuation, assurance, and feedback loops.
5. **Clarify the framework's validation status.** The manuscript appropriately identifies the proposed framework as conceptual. It would be useful to state more explicitly that the framework has not yet been experimentally validated and that its effectiveness remains to be demonstrated across heterogeneous production environments.
6. **Strengthen the connection between literature evidence and framework components.** The discussion identifies several important findings, but a concise mapping of representative studies to each proposed framework layer could make the evidence supporting the architecture easier to assess.
7. **Check references carefully.** The authors should verify consistency in reference formatting, author names, journal information, DOI presentation, and citation-reference correspondence throughout the manuscript.
8. **Language and formatting proofreading.** A final editorial review is recommended to correct spacing, line-break artifacts, table formatting, and occasional wording issues. The manuscript should use consistent terminology for “data center,” “data-center,” “machine learning,” and related technical terms.
9. **Avoid potentially broad claims without qualification.** Statements concerning the effectiveness or suitability of particular machine-learning families should remain explicitly tied to the reviewed evidence and operational context, particularly because the manuscript itself emphasizes heterogeneous evaluation settings.
10. **Expand practical validation criteria.** The manuscript usefully distinguishes model quality from operational quality and identifies metrics such as service-level violations, recovery time, rollback success, false-action rate, and operational workload. These criteria could be more directly incorporated into the proposed framework's evaluation plan.

Overall, the manuscript addresses an important interdisciplinary topic and provides a coherent conceptual framework connecting machine learning with autonomous data-center network operations. Its discussion of assurance, policy boundaries, uncertainty, digital-twin validation, rollback, and human escalation adds practical value beyond algorithm-level discussions. With the above minor methodological, formatting, and clarification revisions, the manuscript would be suitable for publication.