# Review Form

| **Paper ID** | 100822 |
|---|---|
| **Paper Title** | The Optimal Robust Configuration in Cloud Environment Based on Heuristic Optimization Algorithm |

| **Recommendation for Publication** |
|---|
|  |

**Comments from reviewer:**

*1.   Basic reporting:*

1- **Clarity and Unambiguity:** certain sentences are excessively intricate and could be deconstructed to enhance comprehension.

- **Suggested Improvement:** Streamline intricate sentences and guarantee uniformity in terminology.

- **For example:** "In order to minimize the profit margin that falls below the minimum acceptable level for cloud service providers, and to minimize the waiting time that exceeds the maximum acceptable duration for customers, we propose a method for measuring robustness. Using the proposed heuristic optimization algorithm, we are able to attain the most efficient combination of server size and speed."

2- **Professional English:** the text contains numerous grammatical errors, clumsy wording, and non-conventional expressions. For instance, the phrase "the cost consumption always become higher correspondingly" should be revised to "the cost consumption always becomes correspondingly higher."

- **Proposed Enhancement:** Please thoroughly examine and modify the text to guarantee grammatical precision and coherent progression. Employ professional and technical terminology suitable for an academic paper.

- **For example:** "As the cost of consumption increases in direct proportion."

3- **Technical Correctness:** some technical descriptions lack precision, for example, when stating that the "number and speed of servers should be adequately configured in a feasible region" without providing a clear definition of what is meant by a feasible region.

- **Suggested Enhancement:** Offer comprehensive and exact technical explanations. Provide precise definitions for terms and ensure that all concepts are thoroughly elucidated.

**For instance:** The configuration of the number and speed of servers should be done within a feasible region, which is defined as the range of configurations that satisfy both the minimum profit requirements for providers and the maximum waiting time limits for customers.

**4- Expression and Courtesy:** the overall tone of the article is generally suitable, although it could be enhanced to be more captivating and succinct. Ensure that the expression maintains a formal and courteous tone.

**- Proposed Enhancement:** Revise the language and ensure brevity while upholding a formal scholarly manner.

**- For example:** "This study focuses on the necessity of implementing a strong resource configuration in cloud computing systems that encounter unpredictable disturbances. Our objective is to improve the reliability and efficiency of cloud services by using queuing theory to model the system and implementing a heuristic optimization algorithm."

**5- Inconsistent Citation Format:** The citation format is inconsistent. For instance, "Li et al. (2012)" and "Jayaprakash et al. (2021)" are referenced differently than other sources. Consistency is key in scholarly writing.

   - **Suggestion:** Use a consistent citation style (e.g., APA, IEEE) throughout the paper.

*6- Lack of Citation for Some Statements:* Certain general statements lack proper citations. The statement "Cloud services are widely used by many organizations and individual users due to the presence of various advantages such as high efficiency, reliability, and low cost" necessitates substantiation with a citation.

**- Suggestion:** It is advisable to provide suitable references for all assertions in order to enhance the paper's credibility.

**7- Over-Reliance on Older Sources:** While the paper references some recent works (e.g., Jayaprakash et al., 2021), it also heavily relies on older references (e.g., Li et al., 2012).

**- Suggestion:** Incorporate more recent studies to demonstrate the paper's relevance to current research trends.

**8- Specific Studies Cited Without Clear Context:** Some studies are mentioned without clear context or explanation of their relevance. For instance, the work by Hui et al. (2019) and Gong et al. (2019) are listed

without sufficient detail on how they relate to the current study.

**- Suggestion:** Provide a brief explanation of how each cited study contributes to or contrasts with the current research.

**9- Insufficient Background on Perturbations:** Although the paper acknowledges the existence of perturbations in cloud environments, it fails to provide a comprehensive explanation for the significance and prevalence of these specific perturbations, such as server breakdowns and bandwidth sharing.

**- Suggestion**: Elaborate on the significance of these disturbances and their influence on the performance of cloud services, offering additional context to support the rationale for conducting the study.

**10- Unclear Connection Between Previous Work and Current Study:** The correlation between the referenced literature and the present research goals is occasionally ambiguous.

**- Suggestion:** Elaborate on the ways in which previous research has established the foundation for the present study and identify the specific areas of the literature that this paper intends to address.

**11- Insufficient Detail on Heuristic Algorithms:** Although the introduction briefly mentions the use of heuristic algorithms, it lacks adequate explanation regarding the rationale behind selecting these particular algorithms and their comparative advantages over others in the field.

**- Suggestion:** Present a concise summary of the heuristic algorithms employed, their common applications, and their appropriateness for this research.

**12- Misalignment with PeerJ-Research Manuscript Template:**

- In the PeerJ format, this content (THE MODELS) should be integrated into the "Materials & Methods" section. Consider renaming this section to fit within the broader "Materials & Methods" framework.

- This could be merged "PROBLEM DESCRIPTION" with the "Materials & Methods" section under a subsection such as "Problem Formulation" or "Problem Statement".

- "OPTIMAL ROBUST CONFIGURATION" should be included in the "Materials & Methods" section, specifically focusing on the methodology for achieving the robust configuration.

**13- Missing Sections in PeerJ Format:**

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*a-       Materials & Methods:*

- **Observation**: The current structure lacks a clear "Materials & Methods" section.
- **Suggestion**: Consolidate "THE MODELS," "PROBLEM DESCRIPTION," and "OPTIMAL ROBUST CONFIGURATION" into a comprehensive "Materials & Methods" section. This should describe the experimental setup, data sources, models, and methodologies in detail.

**b- Results:**

**Observation**: There is no distinct "RESULTS" section.

**Suggestion**: Create a new "Results" section to present the findings of the study, including any data analysis, comparisons, and performance evaluations of the proposed configuration scheme.

**c- Discussion:**

**Observation**: The current structure does not include a separate "DISCUSSION" section.

**Suggestion**: Add a "Discussion" section to interpret the results, compare them with related work, discuss implications, and highlight the novelty and contributions of the study. This is crucial for contextualizing the findings within the broader field.

**d- Acknowledgements:**

**Observation**: The structure lacks an "ACKNOWLEDGEMENTS" section.

**Suggestion**: Include an "Acknowledgements" section to thank individuals and organizations that supported the research.

**14- Self-Containment and Relevance to Hypotheses:**

**a- Comprehensive Results:**

**Observation**: The article does not have a distinct "Results" section, making it difficult to determine if all relevant results are presented.

**Suggestion**: Introduce a "Results" section where all findings related to the hypotheses are clearly presented.

Ensure this section includes data, analyses, and interpretations directly tied to the hypotheses.

**b- Linking Results to Hypotheses:**

**Observation**: There is a lack of explicit linkage between the results presented and the initial hypotheses or research questions.

**Suggestion**: In the discussion section (or a newly added one), explicitly link the results back to the hypotheses. Discuss how the findings support or refute the hypotheses, and elaborate on the implications.

**c- Avoiding Fragmentation:**

**Observation**: The article seems to subdivide the study into several sections (e.g., "The Models," "Problem Description," "Optimal Robust Configuration") without a clear narrative tying them together.

**Suggestion**: Ensure the study is presented as a cohesive unit. Each section should build on the previous ones, clearly leading to the results and discussion.

**d- Detailed Methodology:**

**Observation**: The methodology, particularly how the models and configurations were tested and validated, is scattered across sections.

**Suggestion**: Consolidate the methodology in a comprehensive "Materials & Methods" section. This should include detailed descriptions of the models, experimental setup, and procedures used to test the hypotheses.

**e- Interpretation of Perturbations:**

**Observation**: The discussion of perturbations and their impact is not consistently tied to the main objectives throughout the article.

**Suggestion**: Ensure that the impact of perturbations on cloud configurations is consistently addressed in relation to the hypotheses. Each perturbation discussed should have a clear connection to the study's objectives and results.

**f- Conclusion Relevance:**

**Observation**: The conclusion section summarizes the study but may lack depth in tying results back to the

initial hypotheses.

**Suggestion**: Strengthen the conclusion by explicitly discussing how the findings relate to the hypotheses. Summarize the key results and their implications for the research questions posed.

**15- Formal Results and Areas for Improvement:**

**a- Detailed Proofs:**

- **Observation**: The article alludes to various methodologies and algorithms without furnishing comprehensive justifications or derivations of their soundness and efficacy.

- **Suggestion**: Provide comprehensive justifications or deductions for all significant theorems and propositions. When presenting a heuristic algorithm, it is important to include a proof or formal argument that showcases its correctness, efficiency, and ability to achieve optimal or nearly optimal solutions.

**b- Terms and Concepts:**

Explicitly define all technical terms and concepts the first time they are mentioned. Employ unambiguous and precise terminology to eliminate any potential for confusion.

**c- In-depth Explanations:** Present comprehensive demonstrations for all theorems and propositions. If the proof is extensive, it is advisable to include it in an appendix. However, it is important to provide a summary or outline of the proof in the main text.

*2. Experimental design*

**1- Clearly Define the Research Question:**

- **Observation**: The research question is implied but not explicitly stated.

- **Suggestion**: Clearly articulate the research question at the beginning of the introduction section. This will provide readers with a clear understanding of the study's focus.

- **Example:** This study aims to investigate how cloud service providers can optimize resource configuration to achieve a balance between Quality of Service (QoS) and cost, particularly when faced with unpredictable perturbations.

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**2- State the Relevance and Meaningfulness of the Research Question:**

- **Observation**: The significance of the research question is analyzed, but it could be more closely associated with specific challenges faced by industries or prevailing technological trends.

- **Suggestion**: Emphasize the pragmatic importance of the research question, linking it to tangible difficulties encountered by cloud service providers in the real world.

- **Example**: "Given the growing dependence on cloud computing for essential applications, it is crucial to prioritize high Quality of Service (QoS) while effectively managing expenses." This research question is pertinent as it tackles the urgent requirement for resilient resource management strategies in ever-changing cloud environments.

**3- Identify and Describe the Knowledge Gap:**

- **Observation**: The article alludes to prior research but does not explicitly pinpoint the particular void in knowledge that it aims to fill.

- **Suggestion**: Thoroughly pinpoint the deficiency in the current body of knowledge and elucidate how this research endeavor intends to address and rectify that deficiency.

- **Example**: "Although prior research has examined the distribution of resources in cloud environments, there is a dearth of comprehensive strategies that consider unforeseen disruptions." This study addresses the lack of a comprehensive resource configuration scheme that can effectively optimize performance in dynamic conditions.

**4- Explicitly State How the Study Contributes to Filling the Knowledge Gap:**

- **Observation**: The article implies contributions but does not clearly state them in relation to the identified knowledge gap.

- **Suggestion**: Clearly outline the study's contributions in addressing the identified knowledge gap.

- **Example**: "This study contributes to the field by: (1) defining boundedness constraints for profit and average waiting time, (2) proposing an optimal robust configuration scheme, and (3) validating the scheme through heuristic algorithms and experimental comparisons.

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**5- Ensure Coherence in Linking the Research Question to the Knowledge Gap:**

- **Observation**: The relationship between the research question and the knowledge gap is not explicitly expressed.

- **Suggestion**: Construct a logical and cohesive storyline that explicitly connects the research inquiry to the recognized deficiency in knowledge, and elucidates how investigating the question will bridge the gap.

- **Example**: "Considering the recognized deficiency in handling resource allocation during disturbances, the research question of this study is crucial." The study offers practical insights and strategies for cloud service providers to manage the impact of disruptions by effectively balancing Quality of Service (QoS) and cost in dynamic conditions.

**6- Ensure Comprehensive Methodological Details:**

- **Observation**: Although the article covers models and algorithms, it does not provide in-depth methodological explanations.

- **Suggestion**: Present a thorough explanation of the methodology, outlining the precise procedures employed to formulate and evaluate the algorithms. This will aid in establishing the level of technical precision in the investigation.

- **Example**: The heuristic algorithms were implemented using a systematic approach that involved following a series of precise steps. Every individual step underwent rigorous testing utilizing specific tools or datasets, and the obtained results were thoroughly verified against benchmark criteria.

**7- Include Validation and Verification Steps:**

- **Observation**: The validation and verification processes lack detailed descriptions.

- **Suggestion**: Outline the procedures employed to validate and verify the models and algorithms, guaranteeing the dependability and replicability of the outcomes.

- **Example**: "In order to verify the strength and reliability of our configuration scheme, we conducted thorough simulations using [specific simulation tools]." The results were validated through cross-verification with additional methods or datasets to ensure their accuracy.

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**8- Provide Detailed Experimental Setup:**

- **Observation**: The experimental setup and conditions in which the experiments were conducted lack comprehensive details.

- **Suggestion**: Provide comprehensive explanations of the experimental configuration, encompassing the specific hardware and software utilized, datasets employed, and parameters employed in the simulations.

- **Example**: The experiments were performed on a particular hardware configuration utilizing specific software tools and versions. The utilized datasets encompassed [provide a concise description of the datasets], while the specified parameters included [enumerate the parameters]."

**9- Demonstrate Robustness and Reliability:**

- **Observation**: The results imply robustness and reliability, but they are not explicitly demonstrated.

- **Suggestion**: Provide comprehensive findings that demonstrate the strength and dependability of the suggested approach. Provide a thorough analysis of the existing methods by making comparisons and highlighting their strengths and weaknesses.
- **Example**: The proposed scheme underwent testing across a range of scenarios, including [specific scenarios]. The results exhibited a noteworthy enhancement in [specific metrics] in contrast to the current methodologies. Nevertheless, it is important to acknowledge that the scheme has certain constraints under [specific conditions], which will be tackled in future research.

**10- Include Statistical Analysis:**

- **Observation**: The findings lack comprehensive statistical analysis to substantiate them.

- **Suggestion**: Incorporate statistical analyses to provide evidence for the results, showcasing the importance and dependability of the findings.

- **Example**: "Statistical analyses were performed using [specific statistical methods]. The results showed a significant improvement in [specific metrics], with a p-value of [specific value], indicating strong evidence against the null hypothesis."

**11- Specific Suggestions for methodology Improvement:**

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**a- Provide Detailed Algorithm Descriptions:**

- **Observation**: The article discusses the utilization of heuristic algorithms and neighborhood search methods, but it does not provide comprehensive explanations.

- **Suggestion**: Provide detailed explanations of the algorithms employed, including step-by-step instructions and, if needed, visual representations such as flowcharts.

- **Example**: "The heuristic algorithm follows these steps:

➢ Initialize the population with random configurations.
➢ Evaluate the fitness of each configuration based on [specific criteria].
➢ Select the top configurations and apply crossover and mutation operations to generate new configurations.
➢ Repeat the evaluation and selection process until convergence or a predefined number of iterations is reached."

**b- Include Comprehensive Experimental Setup:**

- **Observation**: The experimental setup is not fully detailed.

- **Suggestion**: Provide a comprehensive description of the hardware, software, datasets, and parameters used in the experiments.

- **Example**: "The experiments were conducted on a server with an Intel Xeon E5-2690 v4 processor, 128 GB of RAM, and running Ubuntu 20.04. The algorithms were implemented in Python 3.8 using libraries such as NumPy and SciPy. We used the [specific dataset] for training and validation, with the following parameters: [list parameters]."

**c- Illustrative Examples and Case Studies:**

- **Observation**: The article is deficient in providing illustrative examples or case studies that effectively demonstrate the practical implementation of the methods.

- **Suggestion**: present one or more concrete examples or case studies that demonstrate the practical implementation of the methods in real-life situations.

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- **Example**: "We implemented the suggested configuration scheme in a case study that involved a cloud service provider with fluctuating workloads." The findings indicated a 20% enhancement in profit and a 15% decrease in average waiting time when compared to the initial setup.

## *3. Validity of the findings*

Areas Where the Article Fails to Meet Standards:

1- The article lacks a clear explanation of the significance and originality of its contributions. In order to adhere to publication standards, the paper should emphasize the ways in which the proposed scheme contributes to the advancement of cloud computing resource management, specifically in its ability to handle perturbations.

**- Proposed Enhancement:** Articulate the distinctive elements of the proposed resilient resource allocation strategy and its potential influence on enhancing the profitability of cloud service providers and the satisfaction of customers.

2- The paper does not include a thorough analysis of the reasons for replication and the advantages it brings to the existing body of literature. Replication is essential for verifying findings and guaranteeing dependability.

**- Proposed Enhancement:** Incorporate a segment that elucidates the justification for duplicating the suggested scheme and its anticipated contributions to the wider body of knowledge on managing cloud computing resources.

**3- Experimental Validation:** Although the paper acknowledges the presence of experimental comparisons, it fails to provide comprehensive explanations of the experimental configuration, parameters, and metrics employed for validation.

**- Proposed Enhancement:** Please furnish an elaborate account of the experimental framework, encompassing the arrangement, variables, and criteria for evaluating performance. Analyze the outcomes in connection with the hypotheses or research inquiries presented.

**4- Literature Review:** The literature review section is thorough, but it could benefit from a more targeted approach in identifying the specific gaps that the current research intends to address.

**- Proposed Enhancement:** Refine the literature review to concentrate on the precise deficiencies that this study targets, highlighting how it advances upon and deviates from prior research.

5- All underlying data are provided; They are robust, statistically sound, and controllable. However, this data set is not well described within the paper, so a section (Data Description) describing the data must be allocated within the (Materials & Methods) section.

6- The conclusion section fails to explicitly address the three key research questions that were outlined in the introduction.

**Proposed Enhancement:** It is necessary to clearly state in the conclusion how the research has specifically tackled each of these three questions.

7- The conclusions should be closely correlated with the findings derived from the study. The paper asserts the superiority of the proposed algorithm over ESOA and WOA, but it lacks specific evidence or metrics from the experiments to substantiate this claim in the conclusion section.

**- Proposed Enhancement:** Incorporate precise outcomes or measurements that showcase the performance enhancements of the proposed algorithm in comparison to ESOA and WOA.

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8- The conclusion should refrain from suggesting causal relationships unless they are substantiated by meticulously conducted experiments. The current conclusion suggests that the heuristic optimization algorithm leads to optimal configurations without addressing potential limitations or the specific conditions in which this is valid.

**- Proposed Enhancement:** It should be noted that although the heuristic optimization algorithm exhibits promising outcomes, its efficacy may be contingent upon the particular circumstances or assumptions employed in the study.

9-The conclusion should be confined to the boundaries of the findings presented in the paper. Refrain from making sweeping assertions that lack direct support from the experimental data.

**- Proposed Enhancement:** Direct the conclusion towards the precise discoveries of the investigation, refraining from excessively general assertions.

*4- Additional comments*

1- The authors should not use acronym without explanation. All acronyms must be defined before use. e.g., MEC, VM, etc.…

2- The explanation about the algorithms is not enough. Furthermore, the meaning of variables/functions is not clear. Readers will be confused.

3- It is possible to draw a parallel with other studies that utilize different data sets, in a specific table. Nevertheless, it is evident that the research may vary in terms of the study's duration, the employed methodology, and the metrics utilized for evaluation. Nevertheless, the proposed model demonstrates its superiority." The authors' interpretation is not supported by any demonstrations. This is overemphasis. The authors should justify the authors' interpretation by demonstrating specific data.

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With best regards

| Evaluation of Paper | | |
|---|---|---|
| **Contents** | **Innovation** | □Highly Innovate    **□Sufficiently Innovate**<br>□Slightly Innovate    □Not Novel |
| | **Integrality** | □Poor    □Fair    **□Good**    □Outstanding |
| | **Presentation** | □Totally Accessible    **□Mostly Accessible**<br>□Partially Accessible    □Inaccessible |
| | **Technical depth** | □Superficial<br>□Suitable for the non-specialist<br>**□Appropriate for the generally knowledgeable individual working in the field**<br>□Suitable only for an expert |
| **Presentation & English** | | □Satisfactory    **□Needs improvement**    □Poor |
| **Overall organization** | | □Satisfactory    **□Could be improved**    □Poor |