Review Form 1.7

Journal Name:	**Current Journal of Applied Science and Technology**
Manuscript Number:	**Ms_CJAST_112781**
Title of the Manuscript:	**Aid system for estimating agricultural yield using a deep learning technique: Tomato case**
Type of the Article	

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PART 1: Review Comments

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Compulsory REVISION comments **1. Is the manuscript important for scientific community?** (Please write few sentences on this manuscript) **2. Is the title of the article suitable?** (If not please suggest an alternative title) **3. Is the abstract of the article comprehensive?** **4. Are subsections and structure of the manuscript appropriate?** **5. Do you think the manuscript is scientifically correct?** **6. Are the references sufficient and recent? If you have suggestion of additional references, please mention in the review form.** **(Apart from above mentioned 6 points, reviewers are free to provide additional suggestions/comments)**	**1. Is the manuscript important for scientific community?** Yes, the manuscript is important to the scientific community. The manuscript makes a new contribution in the field of precision agriculture, namely by developing an assistance system to estimate agricultural yields using deep learning techniques. The system uses Faster-RCNN, the cutting-edge technology of object detection models, to detect and localize tomatoes in images. Then, the system estimates the actual size of tomatoes using the Ground Sampling Distance method and predicts their mass using a regression model. The manuscript made several important contributions to the scientific community, including: a. The manuscript shows that deep learning techniques can be used to estimate agricultural yields more efficiently and accurately than traditional methods. Traditional methods, such as manual counting, require a lot of time and effort and are not always accurate. The system proposed in the manuscript can detect and localize tomatoes in a short time and with a high level of accuracy. b. The manuscript provides direction for the development of a more accurate agricultural product detection and estimation system. The experimental results show that the mass estimation model used is still too generic and needs to be adapted for certain tomato species. In addition, the system proposed in the manuscript can only be used for systems whose collected data is calibrated using a single camera placed perpendicular to the surface of the object. Overall, the manuscript is a significant contribution to the scientific community. The manuscript shows that deep learning techniques can be used to develop more efficient and accurate systems for detection and estimation of agricultural yields. Here are some suggestions for improving the manuscript: a. The manuscript can be expanded by discussing the implementation of the proposed system on a larger scale. For example, the manuscript can discuss how the system can be used to estimate agricultural products for the entire plantation or even for the entire country. b. The manuscript can be added with an economic analysis of the proposed use of the system. For example, the manuscript can discuss how the use of the system can reduce agricultural operational costs. **2. Is the title of the article suitable?** The title,"Aid system for estimating agricultural yield using a deep learning technique:Tomato case",issuitable,but it could be improved in a few ways: Strengths: a. It is clear and concise,accurately conveying the main topic of the article. b. It mentions the key technology used (deep learning) and the specific application (tomato yield estimation). c. It includes the qualifier "case" which implies there may be future applications for other crops. Potential improvements: a. Specificity:Consider mentioning the specific type of deep learning technique used (e.g.,Faster-RCNN) as it differentiates your approach from others. b. Highlight:You could emphasize the benefit of using this system,such as "Improved" or "Precise" in the title. c. Intrigue:While clarity is important,you could also consider a slightly more intriguing title that	

	sparks curiosity in potential readers.This could involve highlighting a surprising result or focusing on the broader potential of the technology. Here are some examples of alternative titles that incorporate these suggestions: a. Faster-RCNN for Precise Tomato Yield Estimation: A Deep Learning Approach b. Improving Agricultural Yield Estimation with Deep Learning: The Case of Tomatoes c. Beyond Counting: How Deep Learning Could Revolutionize Crop Yield Predictions Ultimately,the best title will depend on your specific goals and the intended audience. **3. Is the abstract of the article comprehensive?** The abstract provides a solid overview of the study, highlighting the main components and findings. However, there are a few areas where it could potentially be improved or clarified: a. Objective and Context: The abstract clearly states the main goal - to improve the precision of estimating crop yield using a deep learning-based tomato detection and localization system. It also sets the context by mentioning the limitations of traditional methods. b. Methodology: It succinctly describes the technology used (Faster-RCNN for object detection), the dataset (150 images normalized to 100*100 pixels in RGB), and the methods for estimating size and mass of tomatoes (Ground Sampling Distance method and a regression model). c. Results: The abstract presents the outcomes in terms of average absolute error and quadratic error, which quantitatively describes the model's performance. d. Conclusion: It concludes by asserting that the system provides a more efficient and accurate way to estimate tomato crop yields on a large scale. Areas for enhancement or clarification might include: a. Dataset Description: More detail on the dataset could be beneficial. For instance, information about the diversity of the images (varying lighting conditions, angles, stages of tomato ripeness, etc.) would add depth to the understanding of the model's training environment. b. Model Performance Context: While the error metrics are provided, it would be helpful to have a comparison with existing methods or industry standards to contextualize these numbers. An error rate of 42.365% might be an improvement, but without a benchmark, it's hard to gauge the significance of this improvement. c. Implications and Applications: A brief mention of the potential implications or practical applications of this system in the field of precision agriculture would provide a stronger conclusion and relevance to the study. d. Limitations and Future Work: Any research can be furthered by acknowledging its limitations and suggesting areas for future research. This could involve addressing the challenges faced during the study or proposing how the model could be scaled or improved. Incorporating these elements could make the abstract more comprehensive, providing a clearer, more detailed snapshot of the research and its implications. **4. Are subsections and structure of the manuscript appropriate?** The structure and subsections of the manuscript seem well-organized and cover a comprehensive range of topics relevant to the research. Each section appears to serve a specific purpose and contributes to the overall narrative of the manuscript. Here’s a breakdown of the appropriateness of each section: a. Introduction: Sets the context well by explaining the need for precision in crop yield predictions and the limitations of traditional methods. Introduces the proposed solution effectively. b. State of the Art: A detailed review of existing methods and technologies, providing a good background and justifying the need for the proposed method. It compares different	

techniques, including remote sensing and computer vision, and discusses their limitations, which helps in setting the stage for the proposed solution.

c. Conceptual Clarification:
   - 3.1 to 3.8.2: These subsections provide an extensive background on various concepts and technologies related to the research, such as agricultural yield, object detection, deep learning, CNNs, performance metrics, etc. This section is quite dense and may benefit from a concise presentation, focusing on concepts directly relevant to the research to improve readability and engagement.

d. Materials and Methods:
   - to 4.5: Describes the models and methods used in the research in detail. This section is crucial as it explains how the research was conducted, the models used, and how the actual sizes of the objects were determined.
   - 4.6: Discusses the database design for detection, providing insights into the data used for training the model. It's good that this subsection discusses the diversity of the dataset and the annotation process.
   - 4.7: Describes the system architecture comprehensively, detailing each step of the detection and mass estimation process.

e. Results and Discussion: This section discusses the outcomes of the research, the performance of the model, and the interpretation of results. It critically analyzes the model's performance, acknowledges limitations, and suggests improvements, which is a strong aspect of any research.

f. Conclusion and Prospects: Summarizes the findings, discusses the implications, and provides an outlook. It acknowledges the limitations of the current system and suggests directions for future research.

g. Overall, the manuscript seems well-structured with each section serving a clear purpose.

However, a few suggestions for improvement include:

a. Conciseness in Conceptual Clarification: The section on conceptual clarification is quite detailed and might be overwhelming for readers not deeply familiar with the field. It could be made more concise, focusing on concepts that are directly applied in the research.

b. Integration of Figures and Tables: The manuscript could benefit from the integration of figures, tables, and diagrams, especially in the conceptual clarification and materials & methods sections, to break the text and facilitate understanding of complex concepts and methodologies.

c. Balancing Depth and Accessibility: While it's important to provide a thorough background, ensuring the manuscript remains accessible to readers who might not have a deep background in all the discussed areas (like deep learning or specific object detection models) is also crucial.

d. Ensure consistent terminology throughout the manuscript. Ensure consistent terminology throughout the manuscript. Ensure consistent terminology throughout the manuscript.

In summary, the manuscript is well-organized and covers the necessary ground. With minor adjustments for readability and conciseness, it would likely serve as a comprehensive and informative piece for readers interested in this research area.

5. Do you think the manuscript is scientifically correct?

The manuscript you've provided gives a detailed and comprehensive overview of a study in the field of precision agriculture using computer vision and deep learning techniques for tomato yield estimation. It covers various aspects including the motivation for the study, state-of-the-art techniques, methodologies, system architecture, experimental results, and a discussion on the outcomes. Here are some critical evaluations based on the sections provided:

a. Introduction & State of the Art:
   - The introduction adequately sets the stage by highlighting the challenges with

traditional crop yield estimation methods and introduces the proposed solution.
- The review of state-of-the-art techniques is extensive, covering a range of methods from remote sensing to computer vision. This section establishes the context and the gap that the study aims to fill.

b. Conceptual Clarification:
- This section provides a detailed background on various concepts relevant to the study such as agricultural yield, object detection, deep learning, and neural networks. This is beneficial for readers not familiar with the field.
- The explanations are thorough, although the level of detail might be more than what is typically expected in an abstract or introduction. Ensuring that this information is concise and directly relevant to the methods used in the study would enhance readability and focus.

c. Materials and Methods:
- The methodology is well-detailed, explaining the use of R-CNN, Faster R-CNN, and YOLO models for object detection and methods for determining actual sizes of objects in an image.
- The database design is elaborated, which is good for reproducibility. However, the normalization of images to 100*100 pixels might be a point of concern depending on the complexity of the features that need to be detected. The small resolution could potentially lead to loss of detail, affecting the model's ability to accurately detect and localize tomatoes.

d. Results and Discussion:
- The results section is thorough, presenting the model's performance and discussing the results with relevant metrics (mAp, MAE, MSE, RMSE).
- The discussion acknowledges the limitations of the study, such as the generic nature of the mass estimation model and the challenges in detection due to occlusion by leaves or overlapping of tomatoes.
- The high error rates (MAE of 42.365 and RMSE of 51.0444) indicate there's significant room for improvement. While the study acknowledges this, more discussion on potential reasons and ways to mitigate these errors would be beneficial.

e. Conclusion and Prospects:
- The conclusion effectively summarizes the work done and the findings of the study.
- It rightly points out the limitations and suggests the direction for future work, such as developing a more specialized mass estimation model for different tomato species.

Overall, the manuscript appears to be scientifically sound with a clear structure and comprehensive coverage of the topic. The methods are well-explained, and the results are discussed in detail. However, ensuring the clarity of the conceptual sections and improving the accuracy of the model would further strengthen the manuscript. The high error rates in the results indicate that while the proposed system is a promising step towards automated yield estimation, more work is needed to refine the model and improve its accuracy.

6. Are the references sufficient and recent? If you have suggestion of additional references, please mention in the review form.

The references provided are quite extensive and cover a range of topics relevant to your study, including deep learning, object detection, and specific applications in agriculture. They include seminal works as well as more recent studies, which is good for demonstrating the evolution of the field and the current state of the art.

The distribution of references in the manuscript demonstrates a broad spectrum of literature, spanning from older foundational works to more recent studies. Specifically, references from the period 2015 - 2019 constitute the majority, accounting for 50% of the citations. References from before 2014 make up 40%, providing a solid historical context and foundational knowledge. However, the most recent period, 2020 - 2024, is represented by only 5% of the references. It is generally recommended to have a good balance of recent references, ideally with over 80% of citations from the last 10 years, to ensure the research is grounded in the current state of the field. In light of this, incorporating more recent studies, particularly from 2020 - 2024, would not only

	strengthen the manuscript's relevance and timeliness but also ensure it reflects the latest advancements and trends in computer vision and deep learning applied to precision agriculture. However, to ensure the manuscript is well-grounded and up to date, consider the following suggestions: a. Inclusion of More Recent Studies: ▪ The field of deep learning and computer vision is rapidly evolving. Ensure that the most recent and relevant studies, particularly from the last 1-2 years, are included. This might involve adding newer references that discuss the latest advancements in models like Faster R-CNN or YOLO, or recent applications of deep learning in precision agriculture. b. Comparison with Relevant Benchmarks: ▪ If there are standard benchmarks or datasets commonly used in the field for performance comparison, consider including references to studies that use these benchmarks. This can help readers understand how your model's performance compares with others. c. Inclusion of Methodology-Specific References: ▪ If your study uses specific preprocessing techniques, data augmentation methods, or novel training strategies, include references to studies that discuss these methodologies. This can provide a stronger foundation for your approach and help readers understand the choices you made. d. Inclusion of References for Statistical Methods: ▪ Your manuscript discusses various error metrics (MAE, MSE, RMSE). Include references for these metrics if they involve specific interpretations or methods unique to your field of study. e. Citing Reviews or Meta-Analyses: ▪ Including references to review articles or meta-analyses can provide readers with a broader perspective on the field and help situate your study within the larger body of research. f. References for Tools and Databases: ▪ If you used specific tools (like labelImage) or databases (like fruit-360), ensure that these are properly cited, giving credit to the developers, and helping readers access these resources for their own research. g. Cross-Referencing Within Your Manuscript: ▪ Ensure that the methods, results, and discussion sections of your manuscript adequately reference the studies listed. This strengthens your narrative by clearly connecting your study's approach and findings with the existing literature.	

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Minor REVISION comments **1. Is language/English quality of the article suitable for scholarly communications?**	The manuscript demonstrates a comprehensive understanding and presentation of the subject matter, utilizing technical and domain-specific terminology effectively. The language and structure are largely appropriate for scholarly communication, with a clear delineation of sections and a logical progression from the introduction through to the conclusion. Here are some observations and suggestions to enhance the English quality and academic tone of the article: a. Consistency and Clarity: ▪ Ensure consistency in terminology throughout the manuscript. For instance, terms like 'mass estimation', 'yield prediction', or 'tomato detection' should be used consistently. ▪ Clarify complex sentences to ensure the message is conveyed clearly. For example, complex explanations in the 'Materials and Methods' section could be broken down into simpler sentences or bullet points for clarity. b. Technical Precision: ▪ Use precise technical language, especially when describing methodologies and results. For instance, instead of "the network has been trained," it may be more accurate to say "the network was trained using a supervised learning approach on a dataset comprising...". c. Grammatical and Syntactical Accuracy: ▪ While the overall grammar is good, proofreading to correct minor grammatical errors and improve sentence structure would enhance the readability. For instance, ensuring subject-verb agreement, correct use of articles ('a', 'an', 'the'), and preposition usage can significantly impact the manuscript's clarity. ▪ Use of bullet points or numbered lists for complex information, such as the steps involved in a process or methodology, can improve readability and comprehension. d. Academic Tone and Style: ▪ Maintain an objective and formal tone throughout the manuscript. Avoid using the first-person narrative ('we', 'our') where possible, and consider using passive voice or third-person constructs. ▪ Ensure that all figures, tables, and equations are correctly numbered, labeled, and referenced in the text. e. Reference and Citation Formatting: ▪ Check that all references are cited correctly in the text and that the reference list is formatted according to the appropriate academic style guide (e.g., APA, MLA, Chicago). f. Visual Data Representation: ▪ Ensure that all images, graphs, and tables are of high quality, clearly labeled, and effectively support the textual content. Consider adding captions or brief descriptions to enhance understanding. In summary, while the manuscript is well-structured and the language is suitably academic for scholarly communication, attention to detail in terms of clarity, grammatical precision, and consistency will further enhance its quality. It's recommended to have the manuscript reviewed by a peer or a professional editor to ensure it meets the high standards of academic writing.	
Optional/General comments	-	

PART 2:

	Reviewer's comment	**Author's comment** *(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

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