Image recognition is a kind of advance technique in structure health monitoring.

This paper give the the method and application.

However, novelty should be emphasized and more fact and data should be presented for the case.

Novelty of this paper related to assign the corrective actions for critical components and risky components during the operation based on artificial intelligence. Meanwhile traditional maintenance method did not consider the expansion of damages and output results of the maintenance activities to evaluate the consequence of decision making during the operation.

Based on intermittent train movement in short intervals, inspection during the operation is necessary for safety. However, many crises threaten the inspectors during the operation if they follow the traditional inspection. Therefore, a routine test has hidden costs such as an unsafe environment for inspectors and this prioritization method for finding the venerable zones will improve the visual inspection efficiency and increase the value of information.

The durability of reinforced concrete is a forecasting item without any connection with the image processing method till now.

Finally, the durability of reinforced concrete after risk analysis is not connected with image processing based on degradation surface status within a time window. This research will focus on this gap to improve condition-based maintenance.

The content in the example are too simple ,which does not need to be processed by computer.

Please give the explanation for that.

Finding the damage growth and estimating the degradation trend is not possible by traditional visual inspection. More than the proposed structural health monitoring tools for data gathering, this quantitative method estimates the status of reinforced concrete without individual perception. Therefore regardless of that human error elimination, the computer aid records data and trends those data with a risk logic concept to prioritize the vulnerable zones based on their degradation rate.

The authors brought up a structural health monitoring method based on automated image analysis. Despite clearly providing the research methodology and results, this manuscript does not provide any productive or innovative ideas regarding this topic. The methodology applied in this manuscript has been well developed and generally applied. Much further and advanced researches have been done and published – the idea behind this manuscript is very preliminary in terms of image-based structural health monitoring.

Based on literature review and surveying the other research articles, image processing has been exploited as a tools to reach the research aim. Meanwhile in this research not only compare the operators of image processing but also combine the data gathering with mathematical tools and statistical approach in terms of risk concept. Merging the data processing in term of vulnerable zones with image processing tools for finding the maximum difference between the image processing operators in each element helps the user to decide about maintenance planning with the hybrid approach. Also, this comparison approach maximizing the value of information after data gathering by the image processing operator which is an innovative idea regarding the topic.

Moreover, this manuscript failed to reach a solid and integrated conclusion. First, the image analysis results came from a very representative case, which the damage was very obvious and large in size. More sophisticated damage patterns are required to further verify the image analysis code, and further discussion/analysis on the image analysis results is needed (i.e. damage types, size, crack width/length, etc.). Second, the methodology and results in the probability of failure part has limited correlation to actual “failure” but damage and has limited correlation to the results of exposure analysis. Third, the authors came up with many topics, such as durability index, degradation model, but did not provide any supportive test-related discussion, results nor conclusion.

Several tools such as ground penetrant radar (GPR), ultrasonic (UT) tools, X-ray tube, accelerometer, moisture meters, Linear Variable Differential Transformer (LVDT), Flat jack and other measuring tools are proper for finding the features of the structure. Some of them are proper for finding the internal damage and some of them are proper for external damages based on features comparison before and after the degradation. This paper is not focused on expensive tools to find the damage. Therefore, an automation visual test selects to develop the decision system at a lower cost in the software field. Lower costs with developed software will cover the networks’ infrastructure and vulnerable zones will check with expensive tools such as GPR and UT tools to find the internal damages.

Some of the points discussed in the literature review section remain uncovered. E.g. CNN, Estimation of the life span, etc.

CNN has been removed from the literature and life span estimation has been explain in conclusion based on the model which has been shown in figure 6 and the words of life span removed. If service limit and ultimate limit consider as thresholds in the degradation model, it is possible to estimate the next step for the structure status based on the degradation models and compare the next step of structure status with the expected structure status

The other points related to SHM (Damage detection and data gathering), data processing (image processing, Probabilistic-based structural assessment and Risk assessment) that are tools of this research.

The quantity and quality of figures have to be improved. Especially for the test apparatus, detailed, scientific figures are preferred. Higher resolution image is needed for the result figures.

The figures has been send in a separate file. The figure for the software result is a screen copy and this is the final resolution in any case.

The language of this manuscript must be improved. A lot of grammar errors and ambiguous sentences.

The manuscript was checked again by the Grammarly software and it was reviewed again based on the editor's suggestion.

Reviewed paper is related to the Durability of reinforced concrete elements via automated visualization and finding Damage in concrete using the durability index. Bellow I have listed problems

1.      The methodology author says for finding the remaining life estimation of the concrete element, but the estimation of remaining life is missing throughout the manuscript.

Life span estimation has been explain in conclusion based on the model which has been shown in figure 6 and the words of life span removed. If service limit and ultimate limit consider as thresholds in the degradation model, it is possible to estimate the next step for the structure status based on the degradation models and compare the next step of structure status with the expected structure status.

2.      The manuscript's topic is inappropriate, even if it is written like,…….Via automated SHM visualization technique

It is done

3.      The research gap is not mentioned after the end of the literature review.

The research gap add to the end of literature review part 1.

4.      Not a proper use of the English language and fluency needs to be improved throughout the entire manuscript as content is difficult to understand, such examples are listed below

Also, monitoring has been studied for comparing and analysis for corrective action selection….

The result shows in this component, damage area increase 24 percentage after a definite time.

After gathering the data, it is necessary to analyze them as well as a comparison the states of quality

Moreover, RC components with Spalling defect as well as exposed rebar after crack propagation have a higher risk for an RC structure for long term operating to compare other elements with the only small damaged area as well as limited crack

All of them have been changed.

5.      Terminology used in most places is difficult to understand, inappropriate synonyms have been used , some examples are shown below

Cusses

Aptitude of concrete

They are remove from the manuscript.

6.      Several words in between the sentences are starting with capital letters which need not be required unless it is a shorthand/abbreviation or a proper noun, for example

Spalling

It has been changed.

7.      In section 2.4, the equation defines risk as a function of 2 variables Pf and Sf, an explanation of the variable Pf is missing and the same must be given in the section

The exploitation of Pf has been denoted in section 2.3.1 the same as Sf in section 2.3.2. However the calculation for them has been explained after the case study detail added to manuscript in section 3.1.3.1 and 3.1.3.2

8.      Which automated software is used for measuring the damaged area in this research

In section 2.1 the software detail explain as follows:

* Core i7 Processors
* 16 GB of random access memory (RAM)
* C# Programming language

9.      In Table 2 how the calculation is carried out for failure density of deck and probability of failure

As it mentioned in the manuscript it is necessary to find the number of failure on the RC elements and approximate volume of them to estimate the failure density with visual inspection.

Based on the approximate volume and the quantity of damaged area on that material, probability of failure in each element has been estimated as it shows in table 2, 3-A and 3-B.

10.  How the calculation for damage growth Sf values in table 4 has been carried out?  is the author implies linear implement of Sf along different time intervals (with 3-month gap) in a year. If Yes, the author needs to justify

Yes. It is changed as follows.

Therefore after finding the critical component of the bridges based on it is possible to find according to the results of automated visual inspection and then it is possible to calculate risk and durability index with linear implement of along different time intervals during the operation.

Reinforced Concrete (RC) durability is crucial in estimating the long-term quality and structural performance. This research presents an approach based on automated visualization for extracting quantitative indexes beside or instead of visual inspection without subjective interspersion of humans or probable human errors during the inspection.

The topic is significant in structural health monitoring. Therefore, it should fall into Journal applsic. However, several questions might pay attention to:

1.       There are some typos in the manuscript. Recommend the authors should check it carefully before submitting it.

The manuscript was checked again by the Grammarly software and it was reviewed again based on the editor's suggestion.

2.       The authors mentioned, “Convolutional neural network (CNN) is one of the most significant progress in machine learning, and it is gaining researcher’s interest recently” in section 1. However, there is no research on CNN involved.

Due to insufficient space for detail explanation in this manuscript, CNN has been removed from literature review of this paper as you suggestion to explain more.

3.       The content in sections 1.1 and 1.2 has nothing to do with their title. Therefore, please give the right title.

The title has been changed as it proposed

4.       Many figures or table captions haven’t reflected their meaning, such as Figure 1-5, table 1-2. Please rename it precisely.

The captions have been changed as it proposed

5.       The authors need to add the equation number for each equation. In addition, each variable has the necessary annotation in the equation.

It is done

6.       The image in Figure 5 is in low resolution. Recommend the authors provide the high pixel image instead.

The figures has been sent in a separate file. The figure for the software result is a screen copy and this is the final resolution in any case.

7.       In Figures 1 and 4, the authors must provide the equipment information in detail.

The equipment detail in figure 1 explain with detail in figure 4 and the bellow of figure 4 as the reviewer suggest

For fixing the camera on the ground, the location of its stand had been marked for the second data gathering. Also, drainage hole has a potential place for defect expansion and extracting the durability index due to these change. After a comparison between images, significant changes are existing between the first data gathering and the second imaging determine for the research aim..

8.       There is no discussion section in the manuscript.

Case study analysis change to discussion as reviewer suggest

9.       The conclusion section also can be improved. Some of the conclusions seem to be the results. Recommend the authors improve the section as soon as possible.

It is done

Hopefully, this will help in the revision of the manuscript.