Dear Editor-In-Chief and Associate Editor

As recommended, we are submitting the revised version of the paper previously entitled *"Towards Visually Explainable Periocular Recognition: A Brief Survey”*, with the ID *electronics-1303683*.

We addressed all the comments and questions of the reviewers, presented below, stating our answers and changes in the document.

**DISCLAIMER:** We added the following code to the header of the “template.tex” file (so that the changes are easily distinguishable from the original version). These changes should appear in a bright blue colour and, if needed, can be set to the default black colour by commenting the next line:



**REVIEWER 1**

1. **COMMENT / QUESTION**

"The paper is very interesting and focused on machine learning explainability, a trendy topic covered in scholarly literature as recently as 2018, for a total of approximately 60 works.”

* **ANSWER**

We acknowledge your interest in this topic, in general, and our work, in particular. Indeed, Interpretability has become more desirable in recent years, with realistic prospects for further growth and applicability.

1. **COMMENT / QUESTION**

"The abstract section must adjust to the Journal's recommendations, namely: (…).”

* **ANSWER**

By following the guidelines, we have updated the abstract to contemplate more detail as to the experiments performed and how they sustain the conclusions and further work (the 200-word constraint is still fulfilled).

1. **COMMENT / QUESTION**

“I am not entirely comfortable with the title, as soon as it mentions that it is a "brief survey". I suggest as a more appropriate title "Machine learning explainability: advances in periocular recognition.”

* **ANSWER**

Thanks for the suggestion! We have updated the title accordingly.

1. **COMMENT / QUESTION**

"Lines 40-41 state the following: "Biometrics is a particularly successful application of ML, with systems deployed worldwide reaching (and even surpassing) human-level performance". Some references seem appropriate to support this strong assertion.”

* **ANSWER**

We have added a number of relevant citations that support said statement.

1. **COMMENT / QUESTION**

"There appear to be not many systematic studies on the topic, but perhaps the authors can find additional value for Chapter 2 using the following query: (…).”

* **ANSWER**

The paper mentioned has some really interesting points as to how we can categorise Interpretability. According to the scale presented in that paper, we have updated the description of our method to include a view on where we place it in said scale, as well as, the properties mentioned in section 2 that our solution comprises.

1. **COMMENT / QUESTION**

"Lines 217-219 talk about "competitive performance numbers with regard to state-of-the-art methods" from previous work. It is convenient to present these numerical results again in this paper, not only to refer to the previous work.”

* **ANSWER**

A table, and accompanying description, have been appropriately added to illustrate the quantitative results.

1. **COMMENT / QUESTION**

"Final remarks:

1) Consider expanding the Conclusions section to one of Conclusions and future work.”

* **ANSWER**

This suggestion was taken into account by adding some lines that contemplate the ways in which *Explainable Periocular Recognition* should improve in subsequent works.

**REVIEWER 2**

1. **COMMENT / QUESTION**

"Explain more clearly about the technical categories for AI interpretability, so as to give a general view for this problem, not just focus solely on the problem of periocular recognition.”

* **ANSWER**

As it becomes evident in the title and overall text, this work definitely focuses on periocular recognition. Despite that, we also present generic techniques, mention that our solution could be applied to other domains and even describe several attributes that interpretable AI systems can have. To conclude then, we believe that we have balanced the space given to the specific use case (periocular recognition) and overarching field in which this work sits.

1. **COMMENT / QUESTION**

"Describe the advantages and disadvantages of each method evenly. Consider adding a paragraph of explanation or example about the process of applying each method to find visual cues. For example: after summarizing from the reference paper [7] and the author’s practical experiment, the steps that apply LIME in visual interpretation are (1) how to segment the image, (2) how to select the combination of different parts, (3) model prediction results analysis.”

* **ANSWER**

Thank you for this suggestion! We have added brief descriptions of the incorporation of LIME, SHAP and other into the periocular recognition process. Regarding image segmentation (assumed to be into super-pixels) and combination of parts, we have used the oficial source code for LIME and SHAP. Therefore, our procedure is the same as the original authors, ensuring fair and unbiased comparisons.

1. **COMMENT / QUESTION**

"For the interpretability method (described in section 3) proposed by the author, what are the interpretability characteristics, application value and application scenarios? It’s better to have more description and discussion. For example: among all of the desired characteristics for explainers mentioned in reference paper [7], how many have been satisfied by the proposed method? In addition, what is the major goal of the proposed method? Does it only briefly give explanation for the output of AI model or it can describe more details about the inner operation inside AI model so that it gives more insight for analyzing the internal representation of the model?”

* **ANSWER**

The properties / characteristics that our solution comprises have been described at the beginning of section 3. As for the application value and / or scenarios, i tis pretty obvious. If there is a system that performs periocular recognition (or any other similar form of recognition), there is potential for a solution like this to be implemented. Recognition is relevant and widely used. We make that point, just as we mention the rise of transparency concerns, in AI systems, from both users and authorities. With this foundation, we sustain the scenarios, feasibility and importance of a solution like the one we are describing in this paper.

1. **COMMENT / QUESTION**

"For the discussion of the advantages and disadvantages of each method, it will be better if the author can insert more experimental results inside the discussion section.”

* **ANSWER**

This suggestion was heavily considered and is of great usefulness! Therefore, section 3 now includes results from all the main approaches, in addition to the ones seen in reference paper [15]. Appropriate description and discussion were also added, to support the newly added results.

**REVIEWER 3**

1. **COMMENT / QUESTION**

"This survey paper talks about model interpretability requirements in machine learning and mentions some of the existing methods and techniques. It then shows the examples of interpretation and hard cases in a periocular recognition task. However, it significantly lacks the substances of the technical contributions including ideas, methods and experiments. The example area of the visual models mentioned in the paper is too limited. The survey of the existing work is hence also limited to principle explanations rather than sufficient comparisons of the state of the art work and results in machine-learning model interpretations. It simply describes some of the existing methods in model interpretation and the authors' previous work on a periocular recognition task. The interpretability statement and argument in the conclusion is also not well supported by the discussions and experiments. The overall work written in this paper significantly lacks publishable content to the current research community and is not suitable for Electronics journal.”

* **ANSWER**

As the original title suggested, the purpose of this paper was (and still is) to present the main concepts in Interpretability, as well as, the ways in which it could be applied to the periocular recognition task. The goal is to provide a “one-stop” document for those seeking to grasp the main ideas of this particular field (and application). To achieve such goal, we start by describing the field, followed by a description of its main techniques (such as LIME or SHAP) with adequate descriptions (by “adequate” we mean that readers can definitely understand the concepts, while at the same time leaving some room for them to check the original paper(s) if they so desire – we do not seek to impose our work over the original sources, which are of great value and should be read in parallel to this paper). Then, we showcase an approach that specifically targets the periocular region, with arguably better results than the baselines (we have added some results with the standard techniques so that you can make a direct comparison). Then, we proceed to presenting the scenarios in which we observed noticeable difficulties from one, several or all approaches. Finally, we naturally conclude the document by 1) summarising what the reader read and 2) alluding to future directions for the explanations to become even more useful.

With the revisions made, we reassure the belief that this work is relevant, well presented and positively improved with respect to the previous version.