**LIST OF CORRECTIONS**

**Paper Title:** **Calcification Detection for Intravascular Ultrasound Image using Direct Acyclic Graph Architecture: Pre-Trained Model for 1-Channel Image**

**Paper Number:** **1570609164**

**Reviewer 1**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **COMMENT** | **ORIGINAL** | **REVISE** |
| 1 | The paper investigated the detection of calcification in coronary artery disease using Transfer Learning Direct Acyclic Graph architecture and CNN. I believe the authors used K-fold cross validation for the training and testing of proposed method. The total testing data supposes to be same as the total number of the dataset, i.e. 2175. Thus, the figures in Table 2 need to be revised accordingly. For example, for a 2-fold cross validation, the experiment is conducted two times, with each time, the total training data number is same as the total testing number. | Table 2 shows the Cartesian Coordinate images and Polar Reconstructed Coordinate images performance. For the Cartesian coordinate images, the range value for 2-fold is from 88.30% to 98.70%, whilst the range value for 3-fold is 93.80% to 98.90% and 5-fold the range value is 94.30% to 98.80%. The 10-fold has shown an excellent performance value, ranging from 92.50% to 100.0%. For Polar Reconstructed coordinate image, the range value for 2-fold is from 90.60% to 97.90%, whilst the range value for 3-fold is 93.20% to 99.50% and 5-fold the range value is 97.20% to 99.70%. The 10-fold has shown a performance value ranging from 92.50% to 100.0%. Table 2 shows improvement results i.e. the performance measures such as the accuracy, sensitivity, specificity and Negative Prediction Value are better when the k-fold is larger, that is when more images are used for training and fewer images are used for testing. | Table 1 shows the Cartesian Coordinate images and Polar Reconstructed Coordinate images performance. For the Cartesian coordinate images, the range value for 2-fold is from 88.30% to 98.70%, whilst the range value for 3-fold is 93.80% to 98.90% and 5-fold the range value is 94.30% to 98.80%. The 10-fold has shown an excellent performance value, ranging from 92.50% to 100.0%. For Polar Reconstructed coordinate image, the range value for 2-fold is from 90.60% to 97.90%, whilst the range value for 3-fold is 93.20% to 99.50% and 5-fold the range value is 97.20% to 99.70%. The 10-fold has shown a performance value ranging from 92.50% to 100.0%. Table 2 shows improvement results i.e. the performance measures such as the accuracy, sensitivity, specificity and Negative Prediction Value are better when the k-fold is larger, that is when more images are used for training and fewer images are used for testing.  As attachment |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

**Reviewer 2**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **COMMENT** | **ORIGINAL** | **REVISE** |
| 1 | 1. Please describe the ground truth of data in Methods and Material section. For example, the images of calcification had been verified by dentist. Age mean, location, year, gender and so om. | The dataset B used in this study was from MICCAI Challenge 2011 [27]. The dataset set B consists of 2175 images where 1645 are images with plaque composites, and another 530 images are with composites plaque and calcification. All the images were extracted from in vivo pullbacks of coronary artery of 10 patients. The Intravascular Ultrasound imaging systems used for the acquisition is Si5 equipped with 20MHz Eagle Eye monorail catheter. The image we analysed is a Cartesian coordinate image in portable network graphic (PNG). This total images from the dataset B were divided into two classes that were, calcification present and calcification absent. The original size of the images is 384 by 384 with 1-channel. | The dataset set B uised from MICCAI Challenge 2011 consists of 2175 images from 10 patients, where 1645 are images with plaque composites, and another 530 images are with composites plaque and calcification [27]. All the images were extracted from in vivo pullbacks of the coronary artery. The Intravascular Ultrasound imaging systems used for the acquisition is Si5 equipped with 20MHz Eagle Eye monorail catheter. The image we analysed is a Cartesian coordinate image in a portable network graphic (PNG). This total images from the dataset B were divided into two classes that were, calcification present and calcification absent. The original size of the images is 384 by 384 with 1-channel. In this study, two types of image were used to analyse the presence and absence of the calcification that was the Cartesian Coordinate images and Polar Reconstructed Coordinate images. The second image, the Polar Reconstructed Coordinate image, was obtained by transforming the Cartesian Coordinate Image using the Daugman Rubber Sheet Normalization model. The size of the second image was resized, same as the Cartesian coordinate image that is the size of 384 by 384 with 1-channel. |
| 2 | 2. Please write the accuracy, sensitivity, specificity, and so on in terms of value in Conclusion section. | The proposed convolutional neural network architecture shows that the results obtained from the Polar Reconstructed Coordinates images are better as compared to the Cartesian coordinate image. In this study, using a Direct Acyclic Graph and Transfer Learning has shown that deep learning had better results to differentiate images with calcification presence and calcification absence. When compared with two types of images, both images had an excellent performance measure evaluation result in Accuracy, 99.08% and 98.16%, Sensitivity, 89.80% and 97.60% whilst Negative Predictive Value, 89.20% and 92.50% and the perfect performance measure evaluation result in Sensitivity and Negative Prediction Value were 100%. | The proposed convolutional neural network architecture shows that the results obtained from the Polar Reconstructed Coordinates images are better as compared to the Cartesian coordinate image. In this study, using a Direct Acyclic Graph and Transfer Learning has shown that deep learning had better results to differentiate images with calcification presence and calcification absence. When compared with two types of images, both images had an excellent performance measure evaluation result in Accuracy, 99.08% and 98.16%, Sensitivity, 89.80% and 97.60% whilst Negative Predictive Value, 89.20% and 92.50% and the perfect performance measure evaluation result in Sensitivity and Negative Prediction Value were 100%.  As attachment |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

**Reviewer 3**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **COMMENT** | **ORIGINAL** | **REVISE** |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| 4 |  |  |  |
| 5 |  |  |  |

Reviewer 1:

The paper investigated the detection of calcification in coronary artery disease using Transfer Learning Direct Acyclic Graph architecture and CNN. I believe the authors used K-fold cross validation for the training and testing of proposed method. The total testing data supposes to be same as the total number of the dataset, i.e. 2175. Thus, the figures in Table 2 need to be revised accordingly. For example, for a 2-fold cross validation, the experiment is conducted two times, with each time, the total training data number is same as the total testing number.

Comment:

The total image used was 2175, therefore, for the testing + training = 2175. The formula for k-fold, the training and testing as mentioned in proposed architecture.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| k-fold | Split | Training | Testing (confusion Matrix) | Total Image |
| 2-fold | 0.4999 | 1087 | 1088 | 2175 |
| 3-fold | 0.6666 | 1448 | 725 | 2175 |
| 5-fold | 0.8000 | 1740 | 435 | 2175 |
| 10-fold | 0.9000 | 1958 | 217 | 2175 |

Reviewer 2:

1. Please describe the ground truth of data in Methods and Material section. For example, the images of calcification had been verified by dentist. Age mean, location, year, gender and so om.

2. Please write the accuracy, sensitivity, specificity, and so on in terms of value in Conclusion section.

Comment:

1. The Ground truth given was based on MICCAI 2011 challenge. The detail shared of the data set were from 10 patients, **no** details such as of age, mean, location, year, gender and so on were shared.
2. Has add in the conclusion for both performance measures evaluation results