



**Department of Electrical and Computer Engineering
North South University**

Senior Design Project

Developing a Mobile Application using Deep Learning for Cataract Classification

Tasnia Ishrat Khan

ID#1911539642

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Faculty Advisor:

Dr Mohammad Monirujjaman Khan

Associate Professor

ECE Department

SUMMER, 2023

LETTER OF TRANSMITTAL

June, 2023

To

Dr. Rajesh Palit
Chairman,
Department of Electrical and Computer Engineering
North South University, Dhaka

Subject: Submission of Capstone Project Report on “Developing a Mobile Application using Deep Learning for Cataract Classification ”

Dear Sir,

With due respect, we would like to submit our **Capstone Project Report on “Developing a Mobile Application using Deep Learning for Cataract Classification”** as a part of our BSc program. The report deals with Cataract Detection using Smartphone Cameras. This project was very much valuable to us as it helped us gain experience from practical fields and apply in real life. We tried to the maximum competence to meet all the dimensions required from this report.

We will be highly obliged if you kindly receive this report and provide your valuable judgment. It would be our immense pleasure if you find this report useful and informative to have an apparent perspective on the issue.

Sincerely Yours,

Tasnia Ishrat Khan

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ECE Department
North South University, Bangladesh

Fatima Ibrahim

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ECE Department
North South University, Bangladesh

APPROVAL

Tasnia Ishrat Khan (ID # 1911539642), Fatima Ibrahim (ID # 2121340642) from Electrical and Computer Engineering Department of North South University, have worked on the Senior Design Project titled “**Developing a Mobile Application using Deep Learning for Cataract Classification**” under the supervision of Dr Mohammad Monirujjaman Khan partial fulfillment of the requirement for the degree of Bachelors of Science in Engineering and has been accepted as satisfactory.

Supervisor’s Signature

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Dr Mohammad Monirujjaman Khan

Associate Professor

Department of Electrical and Computer Engineering
North South University
Dhaka, Bangladesh.

Chairman’s Signature

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Dr. Rajesh Palit

Professor

Department of Electrical and Computer Engineering
North South University
Dhaka, Bangladesh.

DECLARATION

This is to declare that this project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. All project related information will remain confidential and shall not be disclosed without the formal consent of the project supervisor. Relevant previous works presented in this report have been properly acknowledged and cited. The plagiarism policy, as stated by the supervisor, has been maintained.

Students' names & Signatures

1. Tasnia Ishrat Khan

2. Fatima Ibrahim

ACKNOWLEDGEMENTS

The authors would like to express their heartfelt gratitude towards their project and research supervisor, Dr Mohammad Monirujjaman Khan, Associate Professor, Department of Electrical and Computer Engineering, North South University, Bangladesh, for his invaluable support, precise guidance and advice pertaining to the experiments, research and theoretical studies carried out during the course of the current project and also in the preparation of the current report.

Furthermore, the authors would like to thank the Department of Electrical and Computer Engineering, North South University, Bangladesh for facilitating the research. The authors would also like to thank their loved ones for their countless sacrifices and continual support.

ABSTRACT

Developed a Mobile Application using Deep Learning for Cataract Classification

One of the leading global causes of vision loss and blindness is the cataract. The percentage of blind people is around 50%. As a result, early cataract detection and prevention may limit vision loss and blindness. Contrary to cataract, artificial intelligence (AI) has made significant progress in the treatment of glaucoma, macular degeneration, diabetic retinopathy, corneal abnormalities, and age-related eye diseases. However, the vast majority of cataract detection algorithms in use are built using common machine learning techniques. On the other hand, manual extraction of retinal features is a laborious method that needs a skilled ophthalmologist. In order to detect cataracts, we have built the framework of an Android application. We then used algorithms to extract accuracy, graphs, trainable and untrainable parameters, and differentiation of cataract and non-cataract eye images from a gathered dataset. In order to identify the cataract using color fundus images, we presented the VGG19 (Visual Geometry Group), and digital image we presented Inception V3, which is a CNN (convolutional neural network) model. This will be incorporated into an Android application. The results of fundus image, the training procedure demonstrate that the model attained a flawless accuracy of 1.0000 on the training data for epochs 10 to 15. It scored an accuracy of 0.963 on the validation set, which is still quite high. With values ranging from 0.25 to 0.27, the validation loss was similarly largely consistent. The model is doing well and has mastered correctly classifying the photos. On the test data, the model produced a loss of 0.25735 and an accuracy of 0.9241. The result of the digital image, accuracy is 0.973 on the validation set, which is quite high and on the test data, the model produced a loss of 0.26753 and accuracy of 0.93491. The significance of these results is that the model performs effectively, can reliably categorize test photos with high accuracy, and will be trustworthy for patients to utilize.