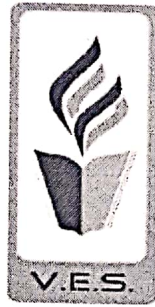


**VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF
TECHNOLOGY**
Department of Computer Engineering



Certificate

This is to certify that *Piyusha Bauskar, Pallavi Brahmaurkar, Omkar Mororgiri, Gauri Sagane* of Fourth Year Computer Engineering studying under the University of Mumbai have satisfactorily completed the project on "*Detection of Eye Tumor And Its Response To Treatment*" as a part of their coursework of PROJECT-II for Semester-VIII under the guidance of their mentor *Prof. Priya R L* in the year 2019-2020 .

This project report entitled *Detection of Eye Tumor And Its Response To Treatment* by *Piyusha Bauskar, Pallavi Brahmaurkar, Omkar Mororgiri, Gauri Sagane* is approved for the degree of BE Computer Engineering

Programme Outcomes	Grade
PO1,PO2,PO3,PO4,PO5,PO6,PO7, PO8, PO9, PO10, PO11, PO12 PSO1, PSO2	

Date: September, 2020

Project Guide : Prof. Priya R.L.

[Signature]



Vivekanand Education Society's Institute of Technology

(Affiliated to University of Mumbai, Approved by AICTE & Recognised by Govt. of Maharashtra)

Dr. (Mrs.) J. M. Nair
M. Tech., Ph.D. (IT-8)
Principal

Ref. No.: VESIT/PR/1328/2019-2020
MEMORANDUM OF UNDERSTANDING

Date: 30/10/2019

THIS MEMORANDUM OF UNDERSTANDING is made on this day of 1st November, year 2019, by and between Vivekanand Education Society's Institute of Technology (V.E.S.I.T.), Department of Computer Engineering, Chembur and PBMA's H. V. Desai Eye Hospital having their place of work at Pune.

RECITALS:

1. The Department of Computer Engineering, V.E.S.I.T. is desirous to conduct research in the area of Health Care and execute a project titled "Detection of Eye Tumor and its Response to Treatment".
2. The purpose of this study is to develop a system for efficient calculation of Retinoblastoma.
3. The outcome measures of the project shall be conducted through clinical tests.
4. STUDY RATIONALE: To detect the presence of Retinoblastoma in fundus images of eyes and to provide an efficient report stating the percent reduction of the tumor at each stage during the treatment.

NOW IT IS AGREED BETWEEN THE PARTIES AS FOLLOWS:

1. PURPOSE AND OBJECTIVE OF THE RESEARCH /PROJECT

- 1.1 To examine the feasibility/develop and validate the system for detection of Retinoblastoma and its response to treatment.

Primary objective: To detect Retinoblastoma in fundus images of eyes and to monitor the improvements occurred at each stage of the treatment.

Secondary objective: To develop a tool to gather data so as to determine whether a patient has improvement after treatment to eye tumor patients.

2. ARRANGEMENT

- 2.1.1 It is agreed and understood that Department of Computer, V.E.S.I.T. and Department of Oculoplasty, PBMA's H. V. Desai Eye Hospital jointly shall do Data Collection, Data modeling and Analysis and Report Writing.
- 2.1.2 It is agreed and understood that V.E.S.I.T, Department of Computer Engineering and PBMA's H. V. Desai Eye Hospital, Department of Oculoplasty shall jointly do Protocol Preparation, Overall Coordination and Expert Advice.
- 2.1.3 It is agreed and understood that the total duration of the project is from the day of the signing of the MOU till April 2020.
- 2.1.4 It is agreed that the parties associate exclusively for the purpose of the project within the region specified.
- 2.1.5 Each party agrees and undertakes that they will not enter into or any way seek award of any contract for the project or any part thereof other than in accordance with MOU without the written consent of the other party hereto.

2.1.6 The parties hereto Department of Oculoplasty, PBMA's H. V. Desai Eye Hospital and Department of Computer Engineering V.E.S.I.T, shall have no objection to the use of the data collected under the project for research purposes as is required under the project.

2.1.7 The parties have no objection to the results and the report of the project work to be submitted as partial fulfilment of Bachelor of Engineering for the students working in this project under Mumbai University. This report should acknowledge the collaboration of the two parties.

3. RESPONSIBILITIES

3.1 The Department of Oculoplasty, PBMA's H. V. Desai Eye Hospital will act as the Study Department for the feasibility of the study and will control and manage the day to day activities necessary for the study.

3.2 PBMA's H. V. Desai Eye Hospital, shall also recruit the participants of the study and the persons responsible for the same are Dr. Kuldeep Dole, Dr. Sonal Chaugule and Mrs. Priya R. L, Assistant Professor, Department of Computer Engineering, V.E.S.I.T.

3.3 The person responsible for recruiting will also be responsible for taking informed consent.

3.4 The persons responsible in Department of Computer Engineering, V.E.S.I.T. and Department of Oculoplasty, PBMA's H. V. Desai Eye Hospital are Mrs. Priya R. L, BE students(4) and Dr. Kuldeep Dole and Dr. Sonal Chaugule respectively.

4. CONFIDENTIALITY

4.1.1 The parties and the persons responsible and working on the project shall keep confidential all information relating to the project that is confidential in nature, including the participants details, test reports etc. Confidentiality of the participants (patients) shall be maintained in all publications of the study too.

4.1.2 No confidential information shall be revealed to any third person without the express written consent of the party or participant whose information is confidential in nature.

4.1.3 Use of confidential information for any purpose other than the said purpose of the project shall not be allowed unless all parties agree and give consent for the same.

4.1.4 No public announcement, press release, public statement etc. shall be made about the study project till its final completion and without the consent for the same.

4.1.5 Parties shall conform to the guidelines for research, good clinical practice and medical ethics and shall not breach the same.

5. CONSIDERATION

5.1.1 There is no financial consideration to be paid by either of the parties to this MOU.

6. OWNERSHIP OR CREDIT OF THE STUDY RESEARCH/PROJECT

6.1.1 It is agreed that the ownership and credit for the research project shall be shared by all the parties involved in the project handling execution and analysis of the same.

6.1.2 Ethical review of the research project shall be done and all rules and regulations shall be followed strictly by all parties.

7. The governing law shall be the law applicable in India for the time being in force. If there is a dispute or difference on the ownership or credentials of the project, or any other aspect of the project or as to the rights and the responsibilities and obligations of the parties hereto, the same shall be referred to the common arbitrator/ Ethics committee, as agreed upon by





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Dr. (Mrs.) J. M. Nair
M. Tech, Ph.D. (IT-01)
Principal

Ref. No: VESIT/PRL/1325/2019 - 2020

Date: 30/10/2019

both parties, for resolving the dispute and the decision of said arbitrator shall be final and binding for all the parties. The agreement of arbitrator shall be governed under Indian Arbitration and conciliation, 1996 for the time being in force. The venue for such arbitration shall be Mumbai India.

8. Any notice under this MOU or change of persons in charge or responsible for projects shall be sent to other party in writing by either post, email, facsimile or delivered by hand. The notice to the party should be sent to the address mentioned in this MOU.
9. The MOU shall be terminated at the completion of project. In case for some reason it is stopped or terminated prior to completion by either party, reasons for the same would have to be given in writing and approval from the Ethics committee and any concerned authority for the same would have to be taken. Decision on the impact of such termination on the participants would also have to be assessed and appropriate compensation would have to be paid by the party terminating the project prior to its completion.
10. The entire MOU constitutes the final and concluded agreement between the parties. It replaces all other, if any, MOUs or agreements signed for the above said project, whether in oral or in writing.
11. The paper publications, participation in competitions and seminar or presentations should be ethically reviewed and all rules and regulations shall be followed strictly by all parties.
12. It is agreed that the ownership and credit for the prototype/product/patent hence developed shall be shared by both parties, equally.

The parties have set their hands to this MOU voluntarily on the day and year first mentioned herein.

Signed and executed by

(Signature of Dr. Madan Deshpande)
Principal Investigator
Col. Dr. Madan Deshpande
Chief Medical Director
PBMA's H. V. Desai Eye Hospital



(Signature of Mrs. Priya R. L.)
Principal Investigator
Mrs. Priya R. L.
Assistant Professor,
Dept. Of Computer Engineering
V.E.S Institute of Technology, Mumbai

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Abstract

Retinoblastoma (Rb) is a rare form of cancer that rapidly develops from the immature cells of the retina, the light-detecting tissue of the eye. Retinoblastoma is caused by changes (mutations) in retinoblastoma 1 (RB1) gene in the retinoblasts. Those mutations cause retinoblasts to grow out of control and form a tumor called retinoblastoma. Early detection of leukocoria can improve the overall treatment duration. In general, to identify a retinoblastoma the doctor uses an ophthalmoscope that shines brightly through the pupil to examine the back of the eye and see the presence of white or yellowish white tumor lesions in the eye. Also, techniques like Red Reflex, Hirschberg Test, etc are used for diagnosis but during treatment cannot provide an estimate of changes in tumor size. Therefore, a system is needed to help the expert to diagnose retinoblastoma.

Thus, we propose an idea to develop an application that will detect the presence of Retinoblastoma in fundus images of eyes and also will be reporting the volumetric changes in the tumor at each stage during the treatment. The proposed system will take the fundus image of eyes of a patient as input which will be preprocessed using image processing techniques like resizing, scaling, contrast stretching, thresholding, etc. The processed images will then be fed to a neural network to train the model for detecting Retinoblastoma. Then, Segmentation techniques such as region growing and thresholding can be used to extract the tumor. After extracting the tumor, the number of pixels present in it can be calculated. Similarly, tumor presence in the next stages of treatment can be calculated. Then percent reduction can be calculated by comparing the current and previous pixel count of the tumor.