

**AMRUTVAHINI COLLEGE OF ENGINEERING,
SANGAMNER**

DEPARTMENT OF COMPUTER ENGINEERING

2020-2021

Project Synopsis

on

**“Early Diabetic Retinopathy Detection Using Deep Learning
Algorithms”**



BE Computer Engineering

by

Group ID - 4210

Ms. Walunj Yashashree Appasaheb(Roll No:-4257)

Ms. Unde Komal Babasaheb(Roll No:-4247)

Ms. Vaishnav Rutuja Kailas(Roll No:-4248)

Ms. Sonawane Chhaya Narayan(Roll No:-4238)

Ms. S. B. Bhonde

Project Guide

Dept. of Computer Engineering

Dr. M. A. Wakchaure

Project Coordinator

Dept. of Computer Engineering

Prof. R. L. Paikrao

H.O.D

Dept. of Computer Engineering

- **Title:** Early Diabetic Retinopathy Detection Using Deep Learning Algorithms

- **Domain and Sub-domain:** Image processing, Neural Network

- **Objectives:**

1. To study existing work in retinal fundus photographs using deep learning algorithms.
2. To pre-process data for better feature extraction.
3. To apply classification algorithm like template matching algorithm.

- **Abstract:**

Predicting the presence of Microaneurysms in the fundus images and the identification of diabetic retinopathy in early-stage has always been a major challenge for decades. Diabetic Retinopathy (DR) is affected by prolonged high blood glucose level which leads to microvascular complications and irreversible vision loss. Microaneurysms formation and macular edema in the retinal is the initial sign of DR and diagnosis at the right time can reduce the risk of non proliferated diabetic retinopathy. The rapid improvement of deep learning makes it gradually become an efficient technique to provide an interesting solution for medical image analysis problems.

The proposed system analyses the presence of microaneurysm in fundus image using convolutional neural network algorithms that embeds deep learning as a core component accelerated with GPU(Graphics Processing Unit) which will perform medical image detection and segmentation with high-performance and low-latency inference. The semantic segmentation algorithm is utilized to classify the fundus picture as normal or infected. Semantic segmentation divides the image pixels based on their common semantic to identify the feature of microaneurysm.

The proposed system can be trend effectively using deep convolution neural network for semantic segmentation of fundus images which can increase the efficiency and accuracy of NPDR (non proliferated diabetic retinopathy) prediction.

- **Keywords:** Microaneurysm, Diabetic Retinopathy, Deep convolution neural network, Semantic segmentation, non proliferated diabetic retinopathy.

- **Problem Definition:**

To analyse the presence of microaneurysm in fundus image using convolutional neural network algorithms that embeds deep learning as a core component accelerated with GPU(Graphics Processing Unit) which will perform medical image detection and segmentation with high-performance and low-latency inference.

- **List of Modules:**1)Selection of retinal fundus image

2)Image preprocessing

3)Feature extraction

4)Segmentation

5)Template Matching

6)Lesion detection algorithm

- **Current Market Survey:**

The main causing of visual loss in the world is diabetic retinopathy. In the initial stages of this disease, the retinal microvasculature is affected by several abnormalities in the eye fundus such as the microaneurysms and/or dot hemorrhages, vascular hyper permeability signs, exudates, and capillary closures. Microaneurysm dynamics primarily increase the risk that the laser photocoagulation requires progression to the level. Diabetic retinopathy lesions are commonly accepted to be reversed and the progression of the retinopathy can only be slower during the early stages of the disease. The identification by repeated examination of patients affected of these initial lesions (mainly Microaneurysms and small blood cells) is expected as a new possibility of improving retinopathy treatment.

Early detection and treatment of DR are very important because it is a progressive disease and its severity depends on the number and types of lesions in the fundus image. The main components of a healthy retina are blood vessels, optic discs, and macula, and any variations in these components are symptoms of eye disease.

- **Scope of The Project:**

1. In the present work, more emphasis is given for the retinal images in the Non-proliferative stage of Diabetic Retinopathy. Further, there is a scope to extend this work in the area of proliferative stage of Diabetic Retinopathy.
2. Various algorithms have been adopted for segmentation purpose and they have been tested for their consistency. However, the algorithm that is not covered in this work may be tried to obtain still better results.
3. The images from the standard databases are used for evaluation purpose. The real time images can be used for evaluation with the assistance of expert ophthalmologists.
4. It is further suggested that the future extension of this work may consider the segmentation of other abnormal features like drusen, cotton wool spot etc. during developing of automatic screening system of DR.

- **Literature Survey:**

Wei Zhou et al [26] proposed the sparse principal component analysis based unsupervised classification approach (SPCAUCM) for microaneurysms (MA) detection. The characteristics of the sparse Principal Component Analysis which blends the elastic net penalty with Principle Component Analysis can be used to select effective features. Non-MAs data vary widely, the collection of non-microaneurysms training sets is quite subject to data, huge training sets not only take time and impact class imbalance problems. Since the non-MA class samples need not be taken into account, the class imbalance issue can be prevented.

C. P. Wilkinson et al [27] introduced the Early Treatment Diabetic Retinopathy Study (ETDRS) based on the initial classification system. Build consensus regarding the classification of DR and diabetic macular edema clinical disease classification systems available around the world, and improve communication and coordination of treatment among doctors who care for diabetic patients. A research was carried out in advance of the Wisconsin Epidemiological Studies on Diabetic Retinopathy publications. Each Member reviewed it by e-mail. To stratify responses a changed Delphi framework was used. Separate diabetic

retinopathy and macled edema systems were developed at a later workshop. The group members reassessed these and the modified Delphi system was used again to measure degrees of agreement.

Varun Gulshan et al [28] initialized the Deep Convolutional Neural Network (DCNN) for the recognition of DR in retinal fundus pictures. Deep learning can be used in retinal fundus photographs to create an algorithm to identify DR and diabetic macular edema automatically. Based on the major decision of the ophthalmologist team, the specificity and sensitivity of the algorithm for determining DR stated as moderate or worse DR or both were generated. The algorithm with 96.5

Carla Agurto et al [29] suggested the Multiscale Amplitude modulation-frequency-modulation (AM-FM) approach for discrimination between pathological and normal retinal pictures. The areas included microaneurysms, exudates, retinal neovascularization, hemorrhage, patterns of normal vessels and normal retinal background. The instantaneous amplitude cumulative distribution functions, the immediate frequency magnitude, and the relative instant frequency angles of several scales are utilized as texture feature vectors. They used inter structure similarity with distance metrics between extracted feature vectors. The results show that the pathological lesions and normal retinal structures are statistically different based on AM-FM characteristics.

- **Software and Hardware requirements of the project:**

1. Software

1. Microsoft visual studio 2010, C#.Net, CUDA (Compute Unified Device Architecture)
2. Operating System: Windows XP, Windows 7

2. Hardware

1. RAM: 2 GB or more
2. HDD: 500 GB or more
3. Processor: Pentium 4.0 GHz or higher

- **Contribution to society:**

1. Early identification is been done using this application to normal patients.
2. This system can useful in hospitals for pre checkup. If the big system is not available.

- **Probable date of completion:** January 2021

- **Outcomes:**

1. This System will provide an automated system that will assist ophthalmologists to grade the fundus images as early NPDR, moderate NPDR, and severe NPDR.
2. By using principle component analysis, dimension of data is significantly reduce.

References

- [1] Lifeng Qio, Ying Zhu, and Hui Zhou. Diabetic retinopathy detection using prognosis of microaneurysm and early diagnosis system for non-proliferative diabetic retinopathy based on deep learning algorithms. *IEEE Access*. June 2020.
- [2] R. Pires, S. Avila, J. Weiner, E. Valle, M. D. Abràmoff, and A. Rocha, "A data-driven approach to referable diabetic retinopathy detection." *Artif. Intell. Med.*, vol. 96, pp. 93-106, May 2019.
- [3] P. Costa, T. Araujo, G. Aresta, A. Galdrán, A. M. Mendonca, A. Smailagic, and A. Campilho. "Ey-WeS: Weakly supervised pre-trained convolutional neural networks for diabetic retinopathy detection," in *Proc. 16th Int. Conf. Mach. Vis. Appl. (MVA)*, May 2019, pp. 1-6.
- [4] F. D. Verbraak, M. D. Abràmoff, G. C. F. Bausch, C. Klaver, G. Nijpels, R. O. Schlingemann, and A. A. van der Heijden. "Diagnostic accuracy of a device for the automated detection of diabetic retinopathy in a primary care setting," *Diabetes Care*, vol. 42, no. 4, pp. 651-656, Apr. 2019.
- [5] S. Wan, Y. Liang, and Y. Zhang. "Deep convolutional neural networks for diabetic retinopathy detection by image classification," *Comput. Electr. Eng.*, vol. 72, pp. 274-282, Nov. 2018.
- [6] M. D. Abràmoff, P. T. Lavín, M. Birch, N. Shah, and J. C. Folk, "Pivotal trial of an autonomous AI-based diagnostic system for detection of diabetic

- retinopathy in primary care offices," *NPJ Digit. Med.*, vol. 1, no. 1, p. 39, 2018.
- [7] A. Rakhlin, "Diabetic retinopathy detection through integration of deep learning classification framework," *bioRxiv*, Jun. 2018, Art. no. 225508.
- [8] M. C. Savastano, M. Federici, B. Falsini, A. Caporossi, and A. M. Minnella, "Detecting papillary neovascularization in proliferative diabetic retinopathy using optical coherence tomography angiography," *Acta Ophthalmologica*, vol. 96, no. 3, pp. 321-323, May 2018.
- [9] Costa, P., Galdran, A., Smilagic, A., Campilho, A. (2018). A weakly supervised framework for interpretable diabetic retinopathy detection on retinal images. *IEEE Access*, 6, 18747-18758.
- [10] Safi, H., Safi, S., Hafezi-Moghadam, A., Ahmadieh, H. (2018). Early detection of diabetic retinopathy. *Survey of ophthalmology*. 63(5), 601-608.
- [11] Savastano, M. C., Federici, M., Falsini, B., Caporossi, A., Minnella, A. M. (2018). Detecting papillary neovascularization in proliferative diabetic retinopathy using optical coherence tomography angiography. *Acta Ophthalmol*, 96(3), 321-323.
- [12] Zhou, W., Wu, C., Chen, D., Yi, Y., Du, W. (2017). Automatic microaneurysm detection using the sparse principal component analysis-based unsupervised classification method. *IEEE Access*, 5, 2563-2572.
- [13] Solkar, S. D., Das, L. (2017). Survey on retinal blood vessels segmentation techniques for detection of diabetic retinopathy. *Diabetes*.
- [14] Amin, J., Sharif, M., Yasmin, M., Ali, H., Fernandes, S. L. (2017). A method for the detection and classification of diabetic retinopathy using structural predictors of bright lesions. *Journal of Computational Science*, 19, 153-164.

SAVITRIBAI PHULE PUNE UNIVERSITY

Project Review Report

(Semester -I)

Early Diabetic Retinopathy Detection Using Deep Learning Algorithms

SUBMITTED TOWARDS THE
PARTIAL FULFILMENT OF THE REQUIREMENTS OF

BACHELOR OF ENGINEERING

(Department of Computer Engineering - Sem-I)

BY

Group ID : 4210

Student names 1. Walunj Yashashree Appasaheb (4257)

2. Unde Komal Babasaheb (4247)

3. Vaishnav Rutuja Kailas (4248)

4. Sonawane Chhaya Narayan (4238)

Under The Guidance Of

Prof. S. B. Bhonde



DEPARTMENT OF COMPUTER ENGINEERING

AMRUTVAHINI COLLEGE OF ENGINEERING, SANGAMNER

A/P: AMRUTNAGAR – SANGAMNER (422608)

YEAR: 2020-21

INDEX

S.N.	Activity Scheduled	Date
1	Semester Start	1.7.20
2	Formation and Registration of Project groups	6.7.20
3	Display of Guides list along with their Domain Expertise	23.7.20
4	Domain Selection By Students	13.8.20
5	Guide Allocation and Synopsis Proposal	9.9.20
6	Presentation and Finalization of Synopsis	24.9.20
7	First presentation about progress of project work(Review I) Problem Statement, Motivation, objectives and Literature Review	17.12.20
8	Second presentation about progress of project work (Review II) Feasibility study and Scope	17.12.20
9	Third Presentation (Review III) . Requirement Analysis	7.1.2021
10	Fourth presentation about progress of project work(Review IV) Database and system design	7.1.2021
11	Submission of partial project report	3.6.2021
12	Project work Examination	14.6.2021

Group ID :-		4210		
Sr. No.	Roll No	Name of Students	Title of Project	Contact No
1.	4257	Walunj Yashashree Appasaheb	Early Diabetic Retinopathy Detection Using Deep Learning Algorithms	9588441202
2.	4247	Unde Komal Babasaheb		9284137929
3.	4248	Vaishnav Rutuja Kailas		9579227400
4.	4238	Sonawane Chhaya Narayan		8767038455



Project Review - I : Problem Statement, Motivation, objectives and Literature Review.

Sr. No.	Question	Date	Remark / Grade	Sign of Guide
1.	Does the statement gives clear identification about what your project will accomplish?		yes	<u>BBB</u>
2.	Is the statement short and concise?		yes	<u>BBB</u>
3.	Can a person who is not familiar with the project understand scope of the project by reading the project problem statement?		yes	<u>BBB</u>
4.	The project's objectives of study (what product, process, resource etc.) are being addressed?		yes	<u>BBB</u>
5.	Is similar type of methodology / model used for existing work?	17-12-20	yes	<u>BBB</u>
6.	Is the studied literature sufficient to decide scope of the project?		yes	<u>BBB</u>
7.	Are the objectives set will help to achieve goal of the project?		yes	<u>BBB</u>
8.	Does Research gap identified will lead to find motivation of project?		yes	<u>BBB</u>
9.	Does your project contribute to our society by any means and will lead to find motivation?		yes	<u>BBB</u>
10.	Are the objectives clearly and unambiguously listed?		yes	<u>BBB</u>

Remark and Suggestions:

Code is available opensource, asked them to modify it.

Name and Sign of Reviewers:

1. Prof. M. B. Jaidya - 
2. Ms. S. B. Bhonde - BBB
3. Mr. V. K. Abhang - 

Project Review-II: Feasibility and Scope

Student is expected to deliver presentation covering Feasibility and Scope

Sr. No.	Question	Date	Remark / Grade	Sign of Guide
1.	Is the project's view point is understood		yes	<u>BBB</u>
2.	Is the project goal statement is in alignment with the sponsoring organization's business goal and mission?		yes	<u>BBB</u>
3.	Who is the project's end user?		Hospital	<u>BBB</u>
4.	What is the projected cost of producing a product?		yes	<u>BBB</u>
5.	Is project achievable in specified (Time, Cost Budget)?		yes	<u>BBB</u>
6.	Are the requirements with in the scope of the project?		yes	<u>BBB</u>
7.	Is the scope properly defined?		yes	<u>BBB</u>
8.	Does the problem statement clearly define scope of the project?		yes	<u>BBB</u>
9.	Do the project requirements fit into available software and hardware?	17-12	yes	<u>BBB</u>
10.	Whether the milestones are stated completely and project timeline is given?		yes	<u>BBB</u>
11.	Whether risks like technical risks, Operational risks, schedule risks, business risks are identified correctly or not?		yes	<u>BBB</u>
12.	Whether Risk prioritization is done properly or not and any back up plan is there or not?		yes	<u>BBB</u>
Remark and Suggestions:				

Name and Sign of Reviewers:

1. Prof. M. B. Jaidya — BBB
2. Mr. V. K. Abhang — BBB
3. Ms. S. B. Bhonde — BBB



Project Review-III: Requirement Analysis

Student is expected to deliver presentation covering Requirement Analysis

Sr. No.	Question	Date	Remark / Grade	Sign of Guide
1.	Is information domain analysis complete, consistent and accurate?		yes	<u>beb</u>
2.	Is problem statement categorized in identified area and targeted towards specific area there in?		yes	<u>beb</u>
3.	Is external and internal interfacing properly defined?		yes	<u>beb</u>
4.	Are requirement consistent with schedule, resources and budget?		yes	<u>beb</u>
5.	Are all requirements traceable to system level?		yes	<u>beb</u>
6.	What is needed to make the product?		yes	<u>beb</u>
7.	Is there a demand for the produce?		yes.	<u>beb</u>
8.	Is identification of stakeholders is done properly?	7-1-21	yes	<u>beb</u>
9.	Whether all requirements are captured and documented in line with scope?		yes	<u>beb</u>
10.	Whether all type of analysis classes are identified or not?		yes	<u>beb</u>
11.	Whether the Acceptance criteria is decided are not?		yes	<u>beb</u>

Remark and Suggestions:

Name and Sign of Reviewers:

1. Prof. M. B. Daidya — 
2. Mr. V. K. Abhang — 
3. Ms. S. B. Bhonde — beb

Project Review-IV: Design

Sr. No.	Question	Date	Remark / Grade	Sign of Guide
1.	Are requirement reflected in the system architecture?		yes	<u>Sub</u>
2.	Does the design support both project (product) and project goals?		yes	<u>Sub</u>
3.	Does the design address all the issues form the requirement?		yes	<u>Sub</u>
4.	Is effective modularity achieved and modules are functionally independent?		yes	<u>Sub</u>
5.	Are structural diagrams (class, Object, etc) are well defined?		yes	<u>Sub</u>
6.	Are all class associations clearly defined and understood?(Is it cleat which classes provide which services)?		yes	<u>Sub</u>
7.	Are the classes in the class diagram clear? (What they represent in the architecture design document?)		yes	<u>Sub</u>
8.	Is inheritance appropriately used?		yes	<u>Sub</u>
9.	Are the multiplicities in the use case diagram depicted in the class diagram?	7-1-21	yes	<u>Sub</u>
10.	Are all objects used in sequence diagram?		yes	<u>Sub</u>
11.	Are the symbols used in all diagrams corresponding to UML standards?		yes	<u>Sub</u>
12.	Are behavioral diagrams (use case, sequence, activity, etc.) well defined and understood?		yes	<u>Sub</u>
13.	Does each case have clearly defined actors and input/output?		yes	<u>Sub</u>
14.	Does the sequence diagram matches with class diagram?		yes	<u>Sub</u>
15.	Is ag gregation/ containment (used) clearly defined and understood?		yes	<u>Sub</u>
16.	Whe ther State charts are capturing system's dynamic behavior correctly or not?		yes	<u>Sub</u>
17.	Rela ted to procedural thinking whether DFDs and CFDs along with transaction and transformation flow are done correctly or not?		yes	<u>Sub</u>
Remark and Suggestions:				



Name and Sign of Reviewers:

1. Swati B. Bhonde- Sub
2. Mr. J. K. Abhang Sub
3. Prof. M. B. Daidya- Sub

Internal Evaluation Sheet (Semester I)

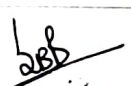
Sr. No.	Name(s) of the student In the project Teams	Problem Statement / Motivation / Objectives / Scope/ Feasibility Requirement (05)	Literature Survey (05)	Requirement Analysis(05), Modeling & Designing (10)	Planning & Proto-typing (05)	Presentat-ion & Question - Answer (10)	Partial Project Report (10)	Total (50)
1.	Walunj Yashshee	4	4	14	4	9	8	43
2.	Unde komal	4	4	12	4	8	8	40
3.	Vaishnav Rutuja	4	4	12	4	7	8	39
4.	Sonaware Chaya	4	4	14	4	8	8	41

Name and Signature of Evaluation Committee:


1. Prof. M. B. Jaidya — 
2. Prof. V. K. Abhang — 

Examiners Feedback and Suggestions:

- all objectives of project were met.
- Accuracy was also around 92.3%.


Prof. S.B. Bhonde
Signature of Guide


Dr. M.A. Wakchaure
Project Coordinator


Prof. R.L. Paikrao
Head of Department

SAVITRIBAI PHULE PUNE UNIVERSITY**Project Review Report II**

(Sem-II)

ON**TITLE :**

SUBMITTED TOWARDS THE
PARTIAL FULFILLMENT OF THE REQUIREMENTS OF

BACHELOR OF ENGINEERING

(Department of Computer Engineering - Sem-II)

BY

Group Id : 4240

- Student name 1. - Walunj Yashashree
2. - Unde Komal
3. - Vaishnat Rutuja
4. - Sonawane Chaya

Under The Guidance Of

Name - S. B. Bhonde.

**DEPARTMENT OF COMPUTER ENGINEERING****AMRUTVAHINI COLLEGE OF ENGINEERING, SANGAMNER****A/P: AMRUTNAGAR - SANGAMNER (422608)****YEAR: 2018-19**

Schedule of Project Work

Semester II

	Activity Scheduled	Date
1	Progress Monitoring for second semester	Last Week of December
2	Software Model Selection Process	First week of January
3	Forth presentation about progress of project work. Review 1: Modeling (Model Refinement and Algorithm development)	Second week of January
4	Coding Process and Implementation	Third week of January
5	Coding Process and Implementation	Fourth week of January
6	Coding Process and Implementation	First Week of February
7	Fifth presentation about progress of project work. Review II : Coding / Implementation	Second week of February
8	Writing a test cases & Selection of Testing tools	Third week of February
9	Writing a test cases & Selection of Testing tools	Fourth Week of February
10	Writing a test cases & Validation techniques	First week of March
11	Sixth presentation about progress of project work Review III: Validation and Testing	Second week of March
12	Report writing process Starts	Third week of March
13	Review IV : Team Work and Final Presentation	Fourth week of March
14	Submission of final project report and Project Work Review V : Report Writing	First week of April
15	Project Examination	As per SPPU Notification

1. Contest Participation Details.

A. Participation In project Competition / Contest

Sr. No.	Name and Place of Project Competition and Exhibition	Date	Certificates prizes won if any
1	Alpha Arts & Science college, Chennai	19-3-21	—
2	Samarth Co E, Belhe	20-12-21	
3			
4			

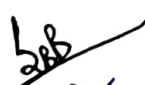


Attach attested copy of certificate(s)

B. Paper Publication/ Presentation/IPR

Sr. No.	Name of Organizer	Date	Certificates prizes won if any
1	IJCRT, ISSN-2320-2882,	Jan, 2021	
2	vol. 9, Issue - 1.		
3			
4			

Attach attested copy of certificate(s)

Name and Sign of Reviewers:

- 1.(Guide) - Ms. S.B. Bhonde - 
- 2.(Reviewer1) - Prof. M.B. Daidya - 
- 3.(Reviewer2) - Mr. D.K. Abhang - 

Rubrics

A. Idea Inception

Grade (Grade Point)/ Parameter	Excellent (10-9)	Very Good (6-8)	Fair (3-5)	Poor (1-2)
Problem Definition and Scope of the Project	8	8		
Literature Survey		8		
Software Engineering Approach		7		
Requirement Analysis		7		

B. Implementation

Grade (Grade Point)/ Parameter	Excellent (10-9)	Very Good (6-8)	Fair (3-5)	Poor (1-2)
Implementation- Design, platform, coding,	9			
Optimization considerations(Memory, time, Resources, Costing)		8		
Thorough Testing of all modules		7		
Integration of modules and project as whole		7		

C. Documents

Grade (Grade Point)/ Parameter	Excellent (10-9)	Very Good (6-8)	Fair (3-5)	Poor (1-2)
Synopsis		8		
Project Report	9			
Quick references		8		
System manual		7		
Installation Guide		6		

Work Book

8

D. Demonstration

Grade (Grade Point)/ Parameter	Excellent (10-9)	Very Good (6-8)	Fair (3-5)	Poor (1-2)
Project Presentation and Demonstration(User Interface, ease of use, usability)	9			
Understanding individual capacity & involvement in the project	9			
Team Work (Distribution of work, intra-team communication and togetherness)	9			
Outcomes / Usability		8		

E. Contest Participation / Awards, Publications and IPR




Grade (Grade Point)/ Parameter	Excellent (10-9)	Very Good (6-8)	Fair (3-5)	Poor (1-2)
Participation in various contests	10			
Appreciation and Awards	—			
Publications	10			
Copyright (If Any)	—			
Patent (If Any)	—			
Commercial value /product Conversion of Work	—			

Project Review: (Semester II)
1. Project Review-I: Modeling (Model Refinement and Algorithm development)
 Student is expected to deliver presentation covering Modeling.

Date: 16/1/2021

Sr. No.	Questions (10 Marks Each) Students Name			
1	Which software Development Process model is used? (Water fall, Incremental, RAD) How? (at this level?)	8	RAD	8
2	Do you clearly identify data objects, their attributes and relationships? (All constraints fro SRS are captured or not?)	8	8	8
3	Have you clearly matched the objects with respective classes and their responsibilities?	8	8	8
4	Have you analyzed the requirements and represented them into respective models?	11	11	11
5	Can you differentiate between different system states and depict them in the form of state transition diagram?	8	8	8
6	Does the mathematical model clearly imply design of the project?	8	8	8
7	Does the mathematical model clearly states goal of project?	8	8	8
8	Does the interface between the modules properly identified?	8	8	8
9	Does any functional dependencies are identified and described?	11	11	11
10	Which architectural model does your system supports?	8	8	8
11	Whether Deployment diagram is inline with selected architecture?	8	11	8
12	Whether all components are designed properly and represented in component diagram?	8	8	8
13	Whether NP-completeness of algorithms is checked or not?	8	8	8
Total (130)		91	91	91
Out Of 10		11	11	11
Remark and Suggestions:				

Name and Sign of Reviewers:

1.(Guide) - Swati B. Bhonde - 
 2.(Reviewer1) - Prof. M. B. Baidya - 
 3.(Reviewer2) - Mr. V. K. Abhang 

2. Project Review-II: Coding / Implementation




Student is expected to deliver presentation covering Coding / Implementation

Date: 18-2-2021

Sr. No.	Questions (10 Marks Each) / Students Name	10	10	10	10	10
1	Does the code completely and correctly implement the design?	8		7	7	10
2	Does the code comply with the coding standard?	8		8	7	8
3	Is the code well structured, consistent in style, and consistently formatted?	8		7	7	7
4	Are all functions in the design coded?	8		8	8	8
5	Does the code make use of object oriented concepts?	7		8	8	7
6	Does the code support granularity?	7		7	8	7
7	Does the language used for coding is correctly chosen as per the project need?	8		8	8	8
8	If any off the shelf components are used, Have you understood the functionalities of using it?	7		8	8	7
9	Are all comments consistent with the code?	8		8	8	8
10	Whether code optimization is done properly or not? (By using language features)	8		8	8	8
	Total (100)	77		77	77	76
	Out Of (40)	39		39	39	38

Remark and Suggestions:

Name and Sign of Reviewers:

1.(Guide) - Ms. Swati B. Bhonde - 
 2.(Reviewer1) Prof. M. B. Daidya - 
 3.(Reviewer2) Mr. V. K. Abhang - 

Date 4.3.21


3. Project Review-III (A) : Validation and Testing

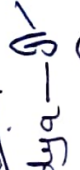
Student is expected to deliver presentation covering Validation and Testing


Sr. No.	Questions (10 Marks Each)/ Students Name	10	10	10	10	10
1	Have you done alpha testing?	7		10		10
2	Have you done beta testing?	7	8		7	7
3	Have you validated the requirements, design and code as per standard?	7	7		7	8
4	Have you performed GUI testing of project? How?	7	7		7	7
5	Does your system comply with basic usability norms?	7	7		7	7
6	Have you tested the code using standard datasets available in your area of project?	7	7		7	7
7	Have you tested the code in real time environment?	8	8		7	7
8	After integration of all components whether total performance of system is checked or not?	7	7		7	7
9	After integration of all components whether total performance of system is checked or not?	7	7		7	7
	Total (90)	65	65		63	62
	Out of 10	7	7		6	6

Remark and Suggestions:

Name and Sign of Reviewers:

1.(Guide) - Swati B. Bhande - 

2.(Reviewer1) - Prof. M. B. Daidya - 

3.(Reviewer2) Mr. V. K. Abhang - 

4. Project Review-III (B) : Understanding Individual Involvement

Student is expected to deliver presentation covering Individual Contribution

Date 27-3-2021

Sr. No.	Questions (10 Marks Each) / Students Name	10	10	10	10	10
1	What is your individual involvement in Building various phases of project ?	9	9	8	8	8
2	How many papers referred by you?	8	8	8	8	8
3	What is your contribution in project?	8	8	8	8	8
4	How do you cooperated and coordinated?	8	8	8	8	8
5	How do you justify that your project is Society Oriented?	8	8	8	8	8
	Total (50)	39+2=41	39+2=41	40	40	40
	Out of 10	8	8	8	8	8

Remark and Suggestions:

Name and Sign of Reviewers:

- 1.(Guide) - Swati B. Bhonde - bb
- 2.(Reviewer1) - Prof. M. B. Jaidya - JK
- 3.(Reviewer2) - Mr. V. K. Abhang - KA

5. Project Review-IV (A): Team Work
Student is expected explain team work done by them

Date 10.4.21

Sr. No.	Questions (10 Marks Each) / Students Name	10	10	10	10	10
1	Have you visited any similar problem in society on which you are working?	8	8	8	8	8
2	How was the conversation between you and stake holders?	8	8	8	8	8
3	How you have done your work distribution?	8	8	8	8	8
4	How effective is team coordination?	8	8	8	8	8
5	Understanding individual roles in team?	40	40	40	40	40
	Total 50	40	40	40	40	40
	Out Of 10	8	8	8	8	8

Remark and Suggestions:

Name and Sign of Reviewers:
 1.(Guide) - Swati B. Bhonde - *[Signature]*
 2.(Reviewer1) Prof. M. B. Jaidya - *[Signature]*
 3.(Reviewer2) Mr. V. K. Abhang - *[Signature]*

2. Project Review-IV (B): Demonstration/ Presentation


Student is expected


Date 24.4.21


Sr. No.	Questions (10 Marks Each) / Students Name	10	10	10	10
1	Whether all modules are working as per SRS ?	7	8	7	8
2	How user friendly GUI is?	8	8	7	7
3	Overall Understanding of all the system and modules?	8	7	8	8
4	Whether project can be converted in to product?	8	8	8	7
5	Overall performance of presentation?	8	8	8	8
	Total : 50	39	39	38	38
	Out Of 10	8	8	8	8

Remark and Suggestions:

Name and Sign of Reviewers:

1.(Guide) - Swati B. Bhonde - 

2.(Reviewer1) - Prof. M. B. Daidya - 

3.(Reviewer2) Mr. J. K. Abhang - 




6. Project Review-V : Report Writing

Student is expected to deliver presentation covering Report Writing

Date 12.6.21

Sr. No.	Questions (10 Marks Each) / Students Name	10	10	10	10	10
1	Is the report written as per the prescribed format?					
2	Is the report timely prepared?	9	8	8	8	10
3	Is the report properly organized, spelled, grammatically correct?	8	9	8	8	8
4	Is the report plagiarism free?	8	8	8	8	8
5	Is the report precise and written to the point?	7	8	8	8	8
6	Is the report contains complete results and comparative graphs?	8	7	7	7	8
7	Are all figures and tables properly numbered and labeled?	8	8	8	7	8
8	Are all figures and tables properly cited?	8	8	8	8	8
9	Weather references are properly cited?	8	8	8	8	7
	Total(90)	72	72	72	70	70
	Out of 10	7	7	7	7	7
Remark and Suggestions:						

Name and Sign of Reviewers:



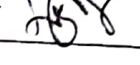
1.(Guide) - Ms. Swati B. Bhande - 
 2.(Reviewer1) - Prof. M. B. Daidya - 
 3.(Reviewer2) - Ms. V. K. Abhang - 

Internal Evaluation Sheet (Semester II)

Sr. No.	Name of the students in the project group	Modeling (10)	Coding And Implementation (40)	Testing (10)	Understanding, Individual Involvement / Contribution in the project (10)	Team Work (10)	Demonstration Cum Presentation (10)	Documents & Report (10)	Total (100)
1.	Wahunj Yashashree	9	38	8	9	9	8	8	90
2.	Unde Komal	9	38	8	7	9	8	8	87
3.	Vaishnav Rutuja	9	36	8	7	9	8	8	85
4.	Sonanture Chhaya	9	37	8	7	9	8	8	86

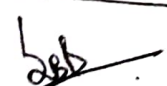
Refer Rubrics which is Given)

Name and Sign of Reviewers:

(Guide) - Ms. Swati B. Bhonde - (Reviewer1) - Prof. M. B. Vaidya - (Reviewer2) - Mr. R. L. Paikrao - 

Examiners Feedback and Suggestions:

Accuracy of classification results was upto 91%.


 Signature of Guide
 [Name Of Guide]

(Swati B. Bhonde)


 Prof. R. L. Paikrao
 Head of Department

peripherals, telecoms networks and devices and data centers – was 830 Mt CO₂ emission, about 2% of the estimated total emissions from human activity released that year (a figure equivalent to aviation). ICT hardware poses severe environmental problems both during its production and its disposal. Each stage of a computer's life, from its production, throughout its use, and into its disposal, presents environmental problems. Manufacturing computers and their various electronic and non-electronic components consumes electricity, raw materials, chemicals, and water, and generates hazardous waste. All these directly or indirectly increase carbon dioxide emissions and impact the environment and the trend is to increase in the BAU (Business As Usual) scenario.

Green Computing-

Hence you all our students are requested to follow green computing practices. Green computing is the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems — such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment. Green computing includes the dimensions of environmental sustainability, the economics of energy efficiency, and the total cost of ownership, which includes the cost of disposal and recycling. Green computing benefits the environment by improving energy efficiency, lowering greenhouse gas emissions, using less harmful materials, and encouraging reuse and recycling. Green design, Green manufacturing, Green use, Green disposal are complementary paths of green ICT. Only focusing on these four fronts we can achieve total environmental sustainability from the IT side and make IT greener throughout its entire lifecycle

Social Life and Computing-

Each IT professional must keep in mind the three key components of a corporate Green IT best practices policy -Environment, Economy and Social aspect. The invention of the computer has completely changed the way we live our lives. Nearly everything is controlled by a computer; cars, satellites, phones, etc. Computers have made our lives easier. Computers can also have positive effects on a person's social life when their power to connect over great distances is harnessed fully. Computers have both positive and negative impact in our society. While technology is a wonderful thing it is almost likely that it can be used in an immoral or wrong way. There is a price to pay for everything even if it appears it's making life easier on people. While proper lifecycle management can greatly boost a IT company's ecological and environmental sustainability position, it can also contribute to achieving goals on the social front. Hardware retirement practices are the primary concern in this regard. In addition to seeking carbon neutrality, a proper asset retirement strategy should seek sustainability in the communities where companies operate.

The following social objectives should be considered:

1. To optimize sustainability in their IT infrastructure, companies should focus on each state of the IT lifecycle
2. Setting the Appropriate Corporate Sustainability Policy
3. Avoiding unethical labor practices and Controlling unethical exports
4. Accountability in the Recycling e-waste and Sustainability Metrics and Reporting
5. Greater Transparency Regarding Material Analysis and Extraction
6. Compliance with stringent, evolving security regulations

Software Engineering Code of Ethics and Professional Practices

(Courtesy / Reference: <http://www.acm.org/about/code-of-ethics>)

Computers have a central and growing role in commerce, industry, government, medicine, education, entertainment and society at large. Software engineers are those who contribute by direct participation or by teaching, to the analysis, specification, design, development, certification, maintenance and testing of software systems. Because of their roles in developing software systems, software engineers have significant opportunities to do good or cause harm, to enable others to do good or cause harm, or to influence others to do good or cause harm. To ensure, as much as possible, that their efforts will be used for good, software engineers must commit themselves to making software engineering a beneficial and respected profession. In accordance with that commitment, software engineers shall adhere to the following Code of Ethics and Professional Practice.

The Code contains eight Principles related to the behavior of and decisions made by professional software engineers, including practitioners, educators, managers, supervisors and policy makers, as well as trainees and students of the profession. The Principles identify the ethically responsible relationships in which individuals, groups, and organizations participate and the primary obligations within these relationships. The Clauses of each Principle are illustrations of some of the obligations included in these relationships. These obligations are founded in the software engineer's humanity, in special care owed to people affected by the work of software engineers, and the unique elements of the practice of software engineering. The Code prescribes these as obligations of anyone claiming to be or aspiring to be a software engineer. Software engineers shall commit themselves to making the analysis, specification, design, development, testing and maintenance of software a beneficial and respected profession. In accordance with their commitment to the health, safety and welfare of the public, software engineers shall adhere to the following Eight Principles:

1. PUBLIC - Software engineers shall act consistently with the public interest.
2. CLIENT AND EMPLOYER - Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.
3. PRODUCT - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.
4. JUDGMENT - Software engineers shall maintain integrity and independence in their professional judgment.
5. MANAGEMENT - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.
6. PROFESSION - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.
7. COLLEAGUES - Software engineers shall be fair to and supportive of their colleagues.
8. SELF - Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.

Environment and Computing-

Information and communication technologies (ICTs) have been contributing to environmental problems: computers, electronic devices and ICT infrastructure consume significant amounts of electricity, placing a heavy burden on our electric grids and contributing to greenhouse gas emissions. In 2007, the total footprint of the ICT sector – including personal computers (PCs) and