KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science campus, Bengaluru

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FORMAT FOR STUDENT PROJECT PROPOSAL FOR THE

47th SERIES OF STUDENT PROJECT PROGRAMME

(Handwritten proposals will not be accepted, please fill all the details in this MS word file, insert images / diagrams wherever necessary. Convert to a pdf file, get it approved from the project guide / head of the department and principal of your institution. Keep ready the scanned pdf file of 1) Declaration and Endorsement 2) details of processing fees made and fill-up the Google Form.

https://forms.gle/mE8Q4pM2nwZQuHbi9

1.	**Name of the College:** PES Institute of Technology and Management
2.	**Project Title:** Maculopathy Detection and Diagnosis Using ML
3.	**Branch:** Computer Science and Engineering
4.	**Theme (as per KSCST poster):** Machine Learning
5.	**Name(s) of project guide(s):** 1. **Name: Dr. Arjun U** **Email id: hodcse@pestrust.edu.in** **Contact No.: 9742237212** 2. **Name: Mr.SunilKumar H R** **Email id: sunilhr@pestrust.edu.in** **Contact No.: 9663883993**
6.	**Name of Team Members (Strictly not more than four students in a batch):** **Name: GAGANA D B** **USN No.: 4PM20CS034** **Email id: gaganadb17@gmail.com** **Mobile No: 9482207163** 

	Name: SANJANA K M **USN No.: 4PM20CS084** **Email id: sanjanakm213@gmail.com** **Mobile No.: 9916903002**  **Name: SINCHANA S** **USN No.: 4PM20CS103** **Email id: sinchanas6846@gmail.com** **Mobile No.: 7019915026**  **Name: SNEHAC M** **USN No.: 4PM20CS106** **Email id: sm1531860@gmail.com** **Mobile No.: 7795351581** 
7.	**Team Leader of the Project:** **Name: GAGANA D B** **USN No.: 4PM20CS034** **Email id: gaganadb17@gmail.com** **Mobile No.: 9482207163**
8.	**Processing Fee Details (Through Online Payment only):** **(processing fee of Rs. 1000/-)** **Please furnish the payment details in the format provided in the last page of the proposal.**
9.	**Date of commencement of the Project:** **19th November 2023**
10.	**Probable date of completion of the project:** **31st March 2024**
11.	**Scope / Objectives of the project:** 1. To collect a large dataset of Optical Coherence Tomography (OCT) images. 2. To develop a machine learning model to classify and detect CNV, DME and Drusen from normal retina in OCT images with high accuracy. 3. To gain the knowledge on patients medical history, treatment outcomes, previous treatment responses to have a knowledge base before recommending. 4. To recommend the appropriate treatment option for the maculopathy condition detected.

12. **Methodology:**

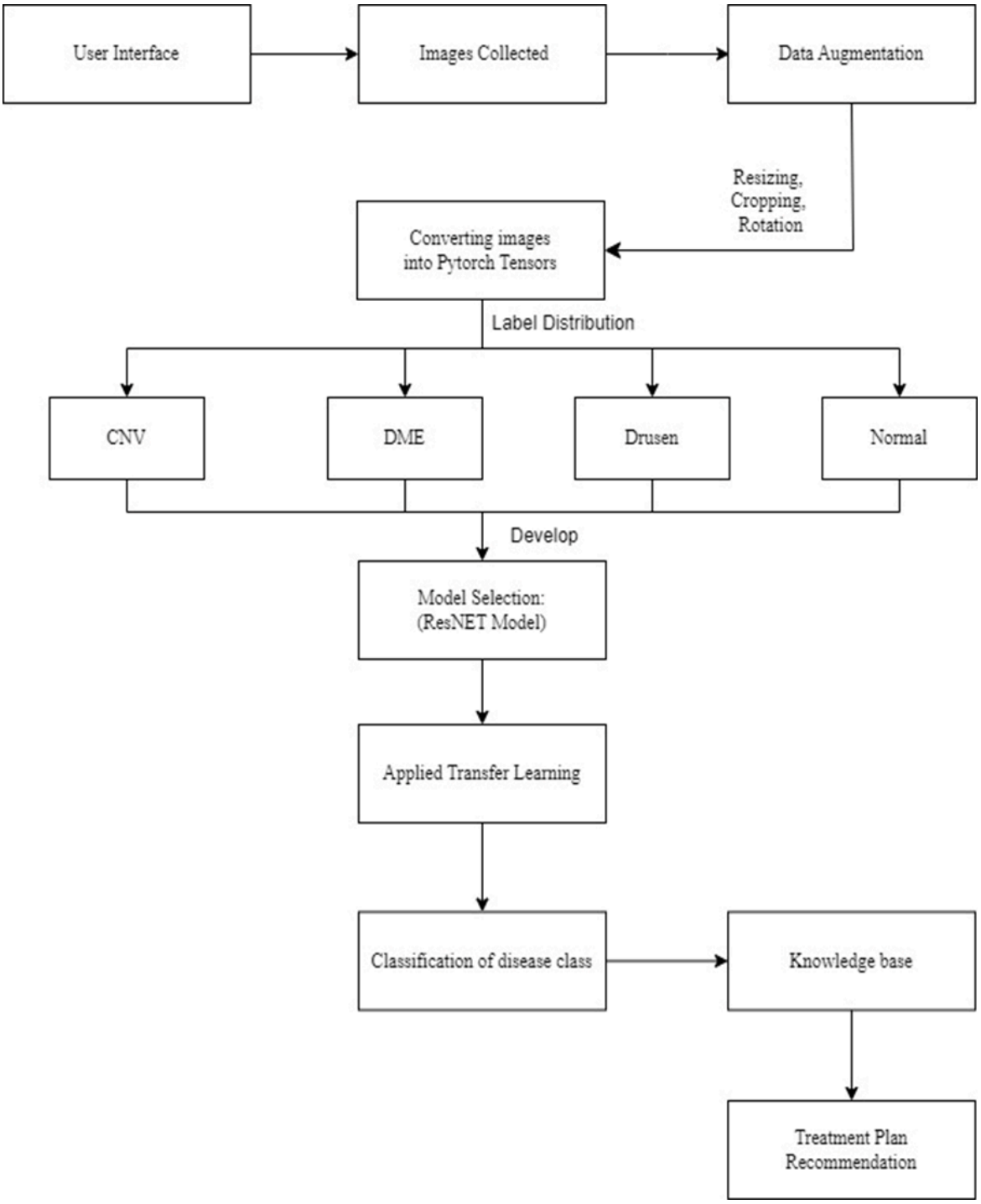

Figure 1: Detailed Workflow

The various stages in the maculopathy diagnosis include data loading, data augmentation, data inspection and imbalance, choosing the right model, transfer learning, training and testing the model. After evaluating the model with appropriate metrics we can deploy it in real life with an application.

1. Data Acquisition:

We acquired retinal OCT images from relevant databases after identifying the data

source. And we load the images into the designated environment for preprocessing and further analysis.

2. Data Augmentation:

Augmenting the data to increase the size and diversity of the dataset through techniques like flipping images horizontally or vertically, rotating images, introducing random noise or variations in brightness and contrast or cropping or resizing images. This helps prevent model overfitting and improves generalization.

3. Data Inspection and Data Imbalance:

Here we examine the dataset for inconsistencies, errors, or missing values. And address any imbalances in the distribution of classes (e.g., more images of one maculopathy type than others). Resampling techniques are used to balance the dataset.

4. Model Selection:

Choose a suitable deep learning model architecture for image classification, such as Convolutional Neural Networks (CNNs) or pre-trained models (e.g., ResNet, VGG) with transfer learning.

5. Transfer Learning:

Leveraging knowledge from a pre-trained model on a large collected dataset to improve performance and reduce training time. And this helps to adapt the pre-trained model's last layers to the specific task of maculopathy classification.

6. Training the Model from Prepared Dataset:

Now, we train the selected model on the augmented and balanced dataset. Using appropriate optimization algorithms as Adam, SGD and loss functions as categorical cross-entropy.

7. Test the Algorithm and Model Evaluation:

We evaluate model performance on a separate, unseen test dataset. Selecting proper metrics like accuracy, precision, recall, F1-score.

8. Diagnosis:

To classify new OCT images based on the trained model's predictions. To identify the presence or absence of maculopathy and potentially the specific type.

9. Recommendation of Treatment Plan to User:

Providing appropriate treatment recommendations based on the model's diagnosis. This guidance can help healthcare professionals make informed clinical decisions.

13.	**Expected Outcome of the project:** The project Maculopathy detection and diagnosis using machine learning holds much promise in following potential outcomes: 1.Improved Early Detection 2.Increased Accessibility and Efficiency 3.Personalized Treatment Plans 4.Reduced Healthcare Costs 5.Research and Development Acceleration
14.	**Is the project proposed relevant to the Industry / Society or Institution?** **Yes / No: Yes** While the project benefits the specific groups within industry and institutions, its potential to improve the lives of many individuals struggling with maculopathy is unparalleled. The early detection and the personalized treatment can significantly improve the patient outcomes and quality of life, preventing vision loss and its associated challenges which enhances individual well-being. Machine learning solutions could address the shortage of ophthalmologists and geographical limitations, making screenings and care more accessible to underserved communities. Early intervention and efficient diagnosis can significantly reduce healthcare costs associated with advanced stages of maculopathy, benefiting both individuals and healthcare systems. The project serves as an example of how AI can be harnessed to address major health challenges, potentially inspiring further innovation and advancements in other areas.
15.	**Can the product or process developed in the project be taken up for filing a Patent?** **Yes / No: Yes** **Prior Art search done?** **Yes/No: No**

16. **Budget details (break-up details should be given):**

Note: KSCST will provide nominal grant support for carrying out the project by students if selected by the project selection committee.

Budget	Amount
a) Materials / Consumables (Please specify)	2500.00
b) Labor (Describe)	1000.00
c) Travel (Describe)	1000.00
e) Miscellaneous (Please specify)	500.00
Total	5000.00

17. **Any other technical details (Please specify):**

Anaconda navigator with Jupyter Notebook and powershell prompt is used for data preprocessing and visualization.

18. **SPP Coordinator (Identified by the college):**

Note: To be identified by the principal of the institution. The project proposals must be submitted to KSCST through the SPP coordinator designated by the principal.

Name: Dr. Vishnu V M
Email id: vishnu.vm7@pestrust.edu.in
Contact No.: 8088777789

Name of the Project Guide: Dr.Arjun U
Email id: hodcse@pestrust.edu.in
Contact No.: 9742237212

Name of the HOD: Dr.Arjun U
Email id:hodcse@pestrust.edu.in
Contact No.: 9742237212

DECLARATION

(From Project Students)

(To scan this page and enclose in the project proposal)

We, the project team hereby declare that the details enclosed in the project proposal (Title of the Project:: “Maculopathy Detection and Diagnosis” , Branch: Computer Science And Engineering , College: PES Institute of Technology and Management are true and correct to the best of our knowledge and belief and we undertake to inform KSCST of any changes therein in the project title, students name will be intimated immediately through project guide. In case any of the above information is found to be false or untrue or misleading, we are aware that we may be held liable for it. We hereby authorize sharing of the project information with this project proposal with the Karnataka State Council for Science and Technology, Bengaluru.

We are aware that the project team must exhibit / demonstrate the project in the nodal center and interact regarding the project with the experts and to exhibit the project in the State Level Seminar and Exhibition (if selected). If the student team fails to attend the evaluation in the nodal center or fails to attend the State Level Seminar and Exhibition, the supported project amount will be returned to KSCST.

We also hereby enclose the endorsement form to KSCST, Bengaluru.

Name of the students with USN No. **Signature with date**

1. Gagana D B [4PM20CS034]
2. Sanjana K M [4PM20CS084]
3. Sinchana S [4PM20CS103]
4. Sneha C M [4PM20CS106]

(Name & Signature of Project Guide with Seal)
Email id: hodcse@pestrust.edu.in
Contact No.: 9742237212

(Name & Signature of HOD with Seal)
Email id: hodcse@pestrust.edu.in
Contact No.: 9742237212

ENDORSEMENT

(From College, endorsement to be taken in the institution / Department Letter head)

(To scan this page and enclose in the project proposal)

This is to certify that 1) Mr. / Ms……....., 2) Mr. / Ms. …….....
3) Mr. / Ms. ……......, 4) Mr. / Ms. ……......, are bonafide student(s) of Department of ....., in the degree program of our institution. If the project proposal submitted by these students under the 47th series of Student Project Programme is selected by KSCST, we will provide the requisite laboratory / Computer / infrastructure support in our college / Institution. Further we also take necessary steps to see that the project team will exhibit / demonstrate their project in the nodal centre and in the State Level Seminar and Exhibition (if selected). If the student team fails to send the completed project report or fails to attend the evaluation in nodal centre or fails to attend the State Level Seminar and Exhibition, the supported project amount will be returned to KSCST.

(Name & Signature of Project Guide with Seal)	**(Signature of HOD with Seal)**	**(Signature of the Principal with Seal)**
Email id:	**Email id:**	**Email id:**
Contact No.:	**Contact No.:**	**Contact No.:**

DETAILS OF PROCESSING FEES MADE THROUGH NEFT / UPI PAYMENT

(**Note:** Include this page in the softcopy of the student project proposal. The student team shall furnish the details in the Google Form. It is informed to the students to 1) keep ready the softcopy of the project proposal and other documents and 2) Furnish the payment made details as processing fees and 3) update the details in the Google Form on the same day of payment made to KSCST by NEFT / UPI payment).

1. TITLE OF THE PROJECT	:	Maculopathy Detection and Diagnosis
2. NAME OF THE TEAM LEADER	:	Gagana D B
3. EMAIL ID	:	gaganadb17@gmail..com
4. CONTACT MOBILE NO.	:	9482207163

PAYMENT MADE DETAILS

5. BANK REF. NO. / UTR NO. / UPI No. (12 digits)	:	IDIBH24048487325
6. TRANSACTION ID	:	-
7. NAME OF THE SENDER / ACCOUNT HOLDER and CONTACT NUMBER	:	Manjunath K B
8. NAME OF THE BANK	:	Canara Bank
9. PROCESSING FEES	:	Rs. 1000/-
10. DATE OF PAYMENT MADE	:	17-02-2024
11. TIME	:	12:30 PM
12. MODE OF PAYMENT MADE (NEFT / UPI, PLEASE SPECIFY)	:	NEFT

(Name & Signature of the team leader)

(Name & Signature of Project Guide or HOD with Seal)

KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science campus, Bengaluru

47th SERIES OF STUDENT PROJECT PROGRAMME (SPP)

(Note: This page is for information about bank details of KSCST to the student team and college / institution and not to include this page in the project proposal softcopy)

BANK ACCOUNT DETAILS OF KSCST

Name and address of the Institution	Karnataka State Council for Science and Technology, IISc Campus, Bangalore -560012
Account holder's name / Designation	Secretary, Karnataka State Council for Science and Technology
Bank Account No. & Name of the bank	Current A/C No. 0683201000024 Canara Bank, IISc Campus Branch, Bangalore-560012
IFSC Code	CNRB0000683
MICR Code	560015023
Bank Branch Address	Canara Bank, Indian Institute of Science, Bangalore-560012

BANK DETAILS

Name of the Agency	Karnataka State Council for Science and Technology IISc Campus, Bangalore - 560012
Account holder's name / Designation	Secretary , Karnataka State Council for Science and Technology
Bank Account No. & Name of the bank	Current A/C No. 0683201000024 Canara Bank IISc Campus Branch Bangalore-560012
IFSC Code	CNRB0000683
MICR Code	560015023
Bank Branch Address	Canara Bank Indian Institute of Science Bangalore-560012