



Council Of Science & Technology U.P.

Vigyan Bhawan 9,Nabiullah Road,Lucknow-226018

17/10/2024

CST UP Engineering Student's Project Grant Scheme

Applicant No	:: 202420251595
Project Category :	:: Computer Science
Title of Project	:: Interpretable Alzheimer Detection Using Vision Transformers
Objectives of Project	<p>:: The objective of this project is to develop a deep learning model utilizing Vision Transformers (ViT) to detect Alzheimer's disease from MRI brain scans. By capturing both local and global image features, the model enhances diagnostic accuracy, especially in early-stage detection. The project integrates Explainable AI (XAI) techniques, such as Grad-CAM and LIME, to make predictions interpretable by medical professionals, promoting trust and usability. This non-invasive, scalable tool aims to provide accessible and accurate Alzheimer's diagnosis, improving patient care and reducing the need for expensive diagnostic procedures.</p>
Name of Guide(s)	:: Dr. Nikhil Govil
Name of College	:: GLA University
Address of College	:: 17km Stone, NH-19, Mathura-Delhi Road, Chaumuhan, Bharthia, Uttar Pradesh 281406
College Contact No.	:: 9927064017
College Email ID	:: sonal.mittal_cs.aiml21@gla.ac.in
Brief Description Of Project	<p>:: This project aims to develop an advanced AI model for detecting Alzheimer's disease from MRI brain scans, leveraging Vision Transformers (ViT) for precise and scalable early diagnosis. Vision Transformers, a cutting-edge deep learning architecture, capture both local and global image patterns, improving detection accuracy over traditional methods like Convolutional Neural Networks (CNNs). The project also integrates Explainable AI (XAI) techniques such as Grad-CAM and LIME to provide interpretable visual explanations of the model's decisions, ensuring that predictions are understandable and actionable for healthcare professionals.</p> <p>By using non-invasive MRI scans, this AI-driven tool reduces the need for expensive, invasive diagnostic procedures, making Alzheimer's detection more accessible, especially in underserved regions. The goal is to support early intervention, helping to slow disease progression and enhance patient care. This approach represents a significant innovation in medical imaging, combining cutting-edge technology with practical, interpretable solutions for improving Alzheimer's diagnosis.</p>
Brief detail of the problem	<p>:: Yes, this project addresses a local problem by focusing on underserved areas where access to advanced medical diagnostics is limited. Alzheimer's disease is often underdiagnosed in such regions due to the high costs and invasiveness of current diagnostic methods like PET scans. By leveraging MRI brain scans and an AI-driven model, the project offers a non-invasive, scalable, and cost-effective solution for early Alzheimer's detection. This can significantly improve diagnostic accessibility and patient care, especially in rural or resource-limited areas with minimal healthcare infrastructure.</p>
Commercial Application Utility	<p>:: This AI-driven model for Alzheimer's detection from MRI scans has significant commercial potential in the healthcare industry. It can be implemented in diagnostic tools used by hospitals and clinics, offering a scalable, non-invasive, and cost-effective solution for early detection, particularly benefiting areas with limited medical infrastructure.</p>

Remarks	:: The project not only provides a novel application of Vision Transformers in medical imaging but also advances the field by making AI more transparent through Explainable AI techniques. This ensures trust and usability in clinical settings, empowering healthcare professionals with interpretable insights and offering a practical solution for early Alzheimer's diagnosis.		
DETAILS OF GROUP LEADER			
Group Leader	:	Sonal Mittal	Group Leader Email :: sonalmittal140103@gmail.com
Account Number	:	215310100041156	Account Type :: Saving
Branch	:	Ashiyana	IFSC Code :: UBIN0821535

Name Of Students(Co-Applicant/s)	Enrollment Number
Aman Bajpai	2115500015
Arihant Vinayak Shukla	2115500027
Harsh Verma	2115500067
Sonal Mittal	2115500140

Engineering Student's Program Details

Member Type :: GroupMember

Applicant's Name :: Aman Bajpai

Father's Name :: Rajiv Kumar Bajpai

Correspondence Address with :: 28, Himcity Colony, Sitapur road, Madiyaon, Lucknow, 226021 (226021)

Permanent Address with :: 28, Himcity Colony, Sitapur road, Madiyaon, Lucknow, 226021 (226021)

Mobile Number :: 9265962843

Email ID :: amanbajpai2206@gmail.com

Enrollment :: 2115500015

Percentage till 3rd Year :: 72.30

Branch :: Computer Science Engineering

Appearing Year :: 2021

Percentage Marks :: I 78.70 II Year: 73.30 III 72.30

DECLARATION :-

I hereby solemnly affirm and state that the above project has/have been conceived by me and it is not a repetition of previous work.

Date : -


Place :-



Signature

**Signature with seal
Head of Department**



Member Type	::	GroupMember	
Applicant's Name	::	Arihant Vinayak Shukla	
Father's Name	::	Sanjay Kumar Shukla	
Correspondence Address with	::	72, siyaram colony, karanpur, Pratapgarh, po-pure narsingh bhan, Pratapgarh, Pratapgarh, Uttar Pradesh 230001	
Permanent Address with	::	72, siyaram colony, karanpur, Pratapgarh, po-pure narsingh bhan, Pratapgarh, Pratapgarh, Uttar Pradesh 230001	
Mobile Number	::	8953241600	
Email ID	::	shuklaarihant0@gmail.com	
Enrollment	::	2115500027	
Percentage till 3rd Year	::	78.40	
Branch	::	Computer Science Engineering	
Appearing Year	::	2021	
Percentage Marks	::	I 79.10	II Year: 79.20
			III 78.40

DECLARATION :-

I hereby solemnly affirm and state that the above project has/have been conceived by me and it is not a repetition of previous work.

Date : -

Place :-



Signature

**Signature with seal
Head of Department**

Member Type :: GroupMember

Applicant's Name :: Harsh Verma

Father's Name :: Munna verma

Correspondence Address with :: F-944 kamla nagar and 282004(282004)

Permanent Address with :: F-944 kamla nagar and 282004(282004)

Mobile Number :: 8433199105

Email ID :: harshverma8433@gmail.com

Enrollment :: 2115500067

Percentage till 3rd Year :: 81.20

Branch :: Computer Science Engineering

Appearing Year :: 2021

Percentage Marks :: I 86.00 II Year: 83.90 III 81.20



DECLARATION :-

I hereby solemnly affirm and state that the above project has/have been conceived by me and it is not a repetition of previous work.

Date : -

Place :-

Signature

**Signature with seal
Head of Department**

Member Type :: GroupLeader

Applicant's Name :: Sonal Mittal

Father's Name :: Arvind Mittal

Correspondence Address with :: MD-1 Sector-D L.D.A colony Kanpur road Lucknow 226012(226012)

Permanent Address with :: MD-1 Sector-D L.D.A colony Kanpur road Lucknow 226012(226012)

Mobile Number :: 706822955

Email ID :: sonalmittal140103@gmail.com

Enrollment :: 2115500140

Percentage till 3rd Year :: 75.80

Branch :: Computer Science Engineering

Appearing Year :: 2021

Percentage Marks :: I 73.80 II Year: 75.30 III 75.80

DECLARATION :-

I hereby solemnly affirm and state that the above project has/have been conceived by me and it is not a repetition of previous work.

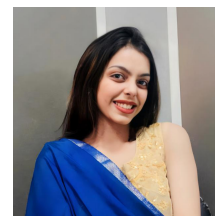
Date : -

Place :-



Signature

**Signature with seal
Head of Department**



CST, UP Engineering Students' Project Grant Scheme 2024-25

Undertaking of the Head of Department & Principal/Director

- 1- I/We do hereby solemnly affirm that the below mentioned applicant/s is/are bonafide student/s of our institute. The project submitted is not a repetition of previous work. This project has been reviewed primarily by me and is found appropriate to be submitted to CST, UP for consideration under CST, UP Engineering Students' Project Grant Scheme 2024-25. The project is novel and will be developed by him/her/them.

Group Leader Name Sonal Mittal

Group Member 1 Name Harish Verma

Group Member 2 Name Aman Bajpai

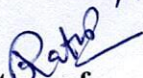
Group Member 3 Name Ashutosh Kumar Shukla

- 2- Name of the group leader (If the project is submitted by more than one students then grant shall be transferred in the account of group leader. The HOD/Head of the institution will nominate the Group Leader.) Sonal Mittal

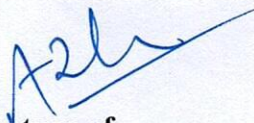
3. Guide Teacher Name & Email id : Nikhil Govil
nikhil.govil@gla.ac.in

Date: 10/10/24

Place: GLA University
Mathura


Signature of
Head of Department
(with seal)

Head of the Department
Computer Engineering & Application
Institute of Engineering & Technology
GLA University, Mathura


Signature of
Principal/Director
(with seal)

Dean
Computer Engineering & Application
Institute of Engineering & Technology
GLA University, Mathura

PROJECT TOPIC: Interpretable Alzheimer Detection Using Vision Transformer

Group No.: 14

Project Group Members:

1. Arihant Vinayak Shukla (Sec. R-8/ 2115500027)
2. Harsh Verma (Sec. R-21/2115500067)
3. Sonal Mittal (Sec. S-47/2115500140)
4. Aman Bajpai (Sec. S-4 / 2115500015)

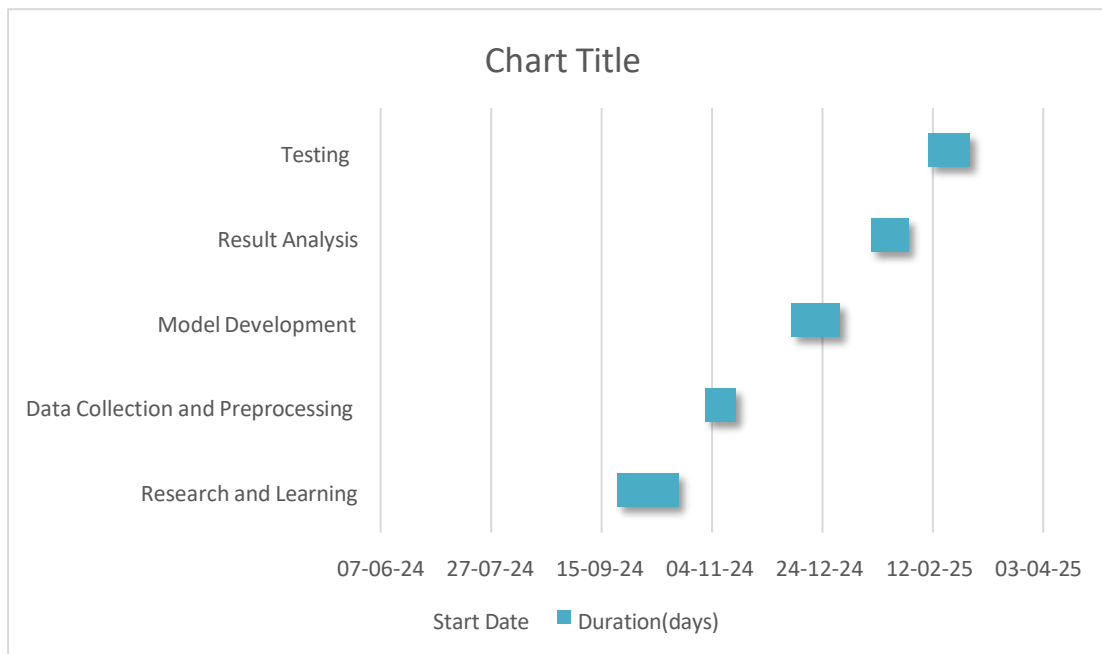
Project Supervisor: Dr. Nikhil Govil, Associate Professor

About the Project: This project focuses on the development of an advanced deep learning model to detect **Alzheimer's disease** from MRI brain scans. The core innovation is the use of **Vision Transformers (ViT)**, a state-of-the-art model capable of capturing both local and global image features. Additionally, the project integrates **Explainable AI (XAI)** techniques, such as **Grad-CAM** and **LIME**, to provide interpretable predictions, ensuring that the model's outputs are understandable by medical professionals. The goal is to create a non-invasive, scalable, and accurate tool for **early detection** of Alzheimer's, offering significant improvements in both patient care and diagnostic efficiency. The system leverages artificial intelligence to assist doctors in identifying early signs of Alzheimer's disease, enabling timely intervention and treatment. By utilizing MRI images, the model reduces the need for expensive and invasive diagnostic procedures, making it accessible even in areas with limited medical infrastructure.

Motivation: Alzheimer's disease is a major global health challenge, with over **55 million people** suffering from dementia-related conditions. Early detection is critical in managing and slowing the progression of the disease, but current diagnostic methods are expensive, invasive, and often inaccessible in underserved areas. This project aims to address these issues by providing a **non-invasive**, AI-driven solution that uses MRI scans for accurate diagnosis, particularly in the early stages of the disease.

Innovation: This project introduces the use of **Vision Transformers** for medical imaging, a novel application that has not been widely explored in the Alzheimer's detection field. Unlike traditional Convolutional Neural Networks (CNNs), which focus on local features, Vision Transformers can capture global patterns in brain structures, leading to more accurate early detection of subtle changes related to Alzheimer's disease. Additionally, the integration of **Explainable AI** tools like **Grad-CAM** offers visual explanations for the model's decisions, ensuring that predictions are interpretable and actionable by healthcare professionals.

Project Planning:



Tools required:

- **Hardware Requirements:** High-performance GPU (Cloud or Local) for model training, 256GB SSD, 8GB RAM, i5 Processor or better
- **Software Requirements:** Python (libraries: TensorFlow, PyTorch, Numpy, Pandas, Scikit-learn), Jupyter Notebook, Google Colab, Explainability libraries (Grad-CAM, LIME, SHAP)

Signature of Project Supervisor: _____

