|  |  |
| --- | --- |
| CSD 481: minor – mini project (2024-25) |  |
| **bucket: machine learning** |

TOPIC SUBMISSION FORM

**TEAM**

|  |  |  |  |
| --- | --- | --- | --- |
| Uty. Reg. No. | Name | Branch | Phone |
| KNR21EC076 | RITHIKA ANILKUMAR | EC A | 8078466282 |
| KNR21EC069 | NIRANJANA JAYARAM | EC A | 9778256822 |
| KNR21EC044 | HEMANT KRISHNAN | EC A | 6282121023 |
| KNR21EC043 | GOVIND K. A. | EC B | 7736802194 |
| KNR21EE057 | Saurav Sivaprasad | EEE | 7025666541 |

**GUIDE**: **SAJITH B**

**TITLE OF THE PROJECT: HYBRID MODEL FOR DIABETIC RETINOPATHY CLASSIFICATION FROM FUNDUS IMAGES USING DEEP LEARNING**

**OBJECTIVES OF THE PROJECT:**

1. **Develop a Hybrid Model:**

**Design and implement a hybrid deep learning model that integrates Convolutional Neural Networks (CNNs) with complementary techniques (such as attention mechanisms, transfer learning, or ensemble methods) to enhance the accuracy and generalization of diabetic retinopathy classification from fundus images.**

1. **Feature Extraction and Classification:**

**Employ the hybrid model to extract relevant features from fundus images and perform classification to identify different stages of diabetic retinopathy. Evaluate the model's ability to accurately categorize images into predefined classes and assess its effectiveness in distinguishing between varying severity levels.**

1. **Comparative Analysis:**

**Perform a comparative analysis of the hybrid model against existing standard and state-of-the-art models for diabetic retinopathy classification. Use metrics such as accuracy, precision, recall, F1-score, and AUC-ROC to benchmark the hybrid model's performance and identify its strengths and areas for improvement relative to other approaches.**

**ABSTRACT: Diabetic retinopathy (DR), a leading cause of vision impairment worldwide, demands advanced diagnostic tools for accurate detection. This project introduces a pioneering Hybrid Model for Diabetic Retinopathy Classification, which integrates Convolutional Neural Networks (CNNs) and Transformer models to enhance diagnostic accuracy and efficiency. CNNs effectively capture spatial dependencies in fundus images, essential for DR diagnosis, while Transformer models excel in identifying subtle features through their advanced attention mechanisms. By combining these strengths, our hybrid system achieves superior performance in metrics such as accuracy, precision, sensitivity, specificity, and F1-score. Extensive validation across diverse datasets demonstrates the model's robustness and reliability, surpassing traditional methods in effectiveness.**

**SIGNIFICANT LITERATURE SURVEYED:**

**[1] M. Feng, J. Wang, K. Wen and J. Sun, "Grading of diabetic retinopathy images**

**based on graph neural network" in IEEE Access, vol. 11, pp. 98391-98401,September 2023.**

**[2] G. Ali, A. Dastgir, M. W. Iqbal, M. Anwar and M. Faheem, "A hybrid convolutional**

**neural network model for automatic diabetic retinopathy classification from fundus images,"**

**in IEEE Journal of Translational Engineering in Health and Medicine, vol. 11, pp. 341-350,**

**June 2023**

**[3] S. Sundar and S. Sumathy, "Classification of diabetic retinopathy disease levels by**

**extracting topological features using graph neural networks," in IEEE Access, vol. 11, pp.**

**51435-51444, May 2023.**

**[4] F. Yan, B. Yan and M. Pei, "Dual transformer encoder model for medical image**

**classification," IEEE International Conference on Image Processing (ICIP), Kuala Lumpur,**

**Malaysia, 2023, pp. 690-694, September 2023.**

**APPROVAL OF THE GUIDE: Recommended**