**LITERATURE SURVEY**

**Problem Statement**:

Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy.

**1**.The study and analysis of various machine learning techniques that have been deployed such as Fuzzy C-means Clustering ,MLP and ELM, Neural Network, meta-SVM, SVM, NB Classifier, Probabilistic Classifier, Geometric Classifier, KNN Classifier and tree-based classifier , Bayesian Classifier, Mahalanobis classifier , KNN Classifier, Gaussian Bayes Classifier , Genetic Algorithm, AlexNet DNN, Convolutional Neural Network and various other Machine Learning techniques to model systems for early DR detection and classification .

**2.** Automated detection of lesions in retinal images can assist in early diagnosis and screening of a common disease: Diabetic Retinopathy. A robust and computationally efficient approach for the localization of the different features and lesions in a fundus retinal image is presented in this paper. Since many features have common intensity properties, geometric features and correlations are used to distinguish between them.

**3.** A neural network, with CNN architecture, identifies exudates, microaneurysms and hemorrhages in the retina image, by training with labeled samples provided by EyePACS, a free platform for retinopathy detection. The database consists of 35126 high-resolution retinal images taken under a variety of conditions. After training, the network shows a specificity of 93.65% and an accuracy of 83.68% on validation process.

**4.** The loss function is calculated across all data items during an epoch and guaranteed to give the quantitative loss measure at that epoch. However, plotting the curve over iterations only shows the loss for a subset of the entire dataset as shown.The final results show that the model outperformed with 84 percent validation accuracy.

**5.** The ophthalmic fundus images are used in this automatic process . The preprocessing stage includes few issues such as image blurriness, non- clarity or problems related to image size. In the initial step, the image is resized and then the color space conversion and image restoration steps are performed further. The final stage includes the enhancement of image

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| **S.No** | **Title** | **Authors** | **Description** | **Advantages** |
| 1. | A deep learning system for detecting diabetic retinopathy across the disease spectrum Published on: 28 May 2021 | Ling Dei, liang Wu, Chun Cai | To facilitate diabetic screening process, the paper proposes a deep learning model named DeepDR, that can detect early-to-late stages of diabetic retinopathy | Improved Data sources and network design, Performance of the DeepDR system, External validation, Real-time image quality feedback compared other models. |
| 2. | Real Time Analysis of Diabetic Retinopathy Lesions by Employing Deep Learning and Machine Learning Algorithms using Color Fundus Data | S. Gupta, A. Panwar, A. Kapruwan, N. Chaube and M. Chauhan. | The color fundus dataset scans after processing are passed to multiple Deep Learning (DL) models employed to learn characteristics. | The extracted result shows very eye-catching performance. This enables experts to create architecture that fully addresses the problem of classifying unidentified scans into the right class or category |
| 3. | Diabetic Retinopathy detection through deep learning techniques: A review Published on: 20 June 2020 | Wejdan L. Alyoubi, Wafaa M. Shalash, Maysooon F. Abulkhair | The paper reviews and analyses the recent state-of-the-art methods of DR color fundus images detection and classification using deep learning techniques. | The paper has reviewed 33 research papers on DR color fundus image detection and has provided valuable analysis about different methods used. |
| 4. | Predicting the risk of developing diabetic retinopathy using deep learning Published on: 03 September 2019 | Ashish Bora, Siva Balasubramanian, Boris Babenko, Sunny Virmani, Subashini Venugopalan | The paper aims on creating a deep learning system to predict the risk of patients with diabetes developing diabetic retinopathy within 2 years. | Created and validated two versions of DL systems to predict the development of diabetic retinopathy in patients with diabetes who had telertinal diabetic retinopathy screening in a primary care setting. |
| 5. | Automated Detection of Diabetic Retinopathy using Deep Learning Published on: 18 May 2018 | Carson Lam, Darvin Yi, Margaret Guo, Tony Lindsey | The paper demonstrates the use of convolutional neural networks (CNNs) on color fundus images for the recognition task of diabetic retinopathy staging. | The network model developed here achieved test metric performance comparable to baseline literature results, with validation sensitivity of 95%. |