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# Recognition of Proliferative Diabetic Retinopathy Based On Image Processing

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**ABSTRACT**: Diabetic retinopathy (DR) is a type of eyes ailment caused by diabetes. With the development of science and technology, vision performs an increasingly essential role in people's daily existence. Therefore, how to automatically classify diabetic retinopathy snap shots has significant value. The traditional manual category method requires knowledge and time and it's hard to obtain an objective and unified medical diagnosis. Therefore, this paper proposes a method for diabetic retinopathy recognition based on transfer learning. First, download datafrom Kaggle's official website, then perform data enhancement, encompass data amplification, flipping, folding, and contrast adjustment. Then, use pertained model such asVGG19, InceptionV3, Resnet50 and so on. Every neural network has been trained by Image net dataset already. What we want to do is migrate the DR images to these medels. In the end, the images are divided into five types through the extreme degree of diabetic retinopathy. The experimental results show that the classification accuracy of this method can attain at 0.60, which is better than the traditional direct training method and has better robustness and generalization.

**KEYWORDS:** Diabetic retinopathy; neural community; transfer learning

## I. INTRODUCTION

In recent years, with the non-stop development of deep learning, the AI and different disciplines have emerge as increasingly more Frequent, and the combination of photo processing and Medical field has carried out fruitful effects. Those outcomes play an vital function inside the rapid and accurate diagnosis and Remedy of positive sicknesses. The DR Snap shots processing has been paid interest to via researchers, since the 1970s. As one of the most vital organs of people, the attention performs an vital role in receiving and sensing External visual information. A big proportion ofHumans within the world are unconditional suffering from eyes illnesses. If they do not take prevention and advance precautions, thisRange will grow at a quicker rate.

Diabetic retinopathy is one of the most common fundus Disease. It is a disease caused by diabetes, which leads for a large proportion of cases of human blindness, this disease is a process of chronic development. But many of the people did not come to know about this disease in the beginning and the people notice it when the disease is more serious. So the Diabetics should be regularly checked for retinal at the certain period of time. Sometimes the identification of the disease is not visible to everyone, it requires a doctor with professional skills to diagnose that the blindness is occurred due to diagnosis. In remote areas, there is no relevant doctors, which will lead to cases that cannot be detected. In areas with human resources, there are also examples of different interpretations of the same picture. Therefore, in summary, we urgently need to use medical image recognition machines to assist in the judgment of this disease. Once successful, reduce the consumption of human resources and provide a powerful reference for doctors to make the perfect diagnosis.

In this, data on diabetic retinopathy are classified based on severity. Our goal is to learn by using different neural networks through transfer learning, then compare the structures and select the optimal network to assist doctors in the diagnosis and treatment of the disease. And examine the systems and choose the highest quality community to help medical doctors in the diagnosis and treatment of the ailment. This work has the potential to greatly alleviate the health practitioner's diagnostic Pressure. The proper detection of diabetic retinopathy is of terrific significance for the early detection of the disease.

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## II. OBJECTIVES

The objective of detecting diabetic retinopathy using a convolutional neural network (CNN) .CNN is used to train a machine learning model to analyze images of the retina and accurately classify them as normal or abnormal in preferable percentage.

- With the goal of detecting diabetic retinopathy in its early stages and preventing vision loss.
- The CNN model is trained on a large dataset of images of the retina and uses complex algorithms to recognize patterns and features that are indicative of diabetic retinopathy.
- Once trained, the model can then be used to analyze new images and make predictions about the presence or absence of diabetic retinopathy.
- It is important to validate the results of the CNN model using a separate dataset to ensure its accuracy.

## III. OVERVIEW OF DIABETICS RETINOPATHY

Diabetics Retinopathy is a diabetes complication that affects eyes. It's a diabetes complication that affects eyes.Its caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye.At the first the diabetic retinopathy disease do not cause any symptoms just there will be mild vision problem.But it can lead to blindness.

- Mild NPDR( Mild Nonproliferative Retinopathy)

  Mild Non-proliferative diabetic retinopathy (NPDR) is the most common form of diabetic retinopathy. Early stages consist of edema and hard exudates, lipid that has leaked from abnormal blood vessels, in the central retina, resulting in blurred central vision.

- Moderate NPDR

  In this Moderate NPDR stage the patients have hemorrhages or MAs in one to three retinal quadrants and cotton wool spots, hard exudates and venous beading

- Severe NPDR

  In the 3rd stage the tissues in the retina will swell, producing white spots in the retina. When too much sugar presences in the blood that it can lead to the blockage of the tiny blood vessels that nourish the retina, and the body stops the blood supply to eye.

- Proliferative Diabetic Retinopathy

  Proliferative retinopathy is the advanced stage where abnormal new blood vessels grow on the surface of the retina. These vessels may break and bleed into the vitreous, the clear watery gel that fills the eye, and cause vision loss. This stage of diabetic retinopathy typically requires urgent treatment.

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## IV. LITERATURE SURVEY

| AUTHOR | TITLE | METHODOLOGY | FUTURE SCOPE |
|---|---|---|---|
| **1]** Xiaomeng Li, Xiaowei Hu, Lequan Yu. | CANet: Cross disease Attention Network for Joint Diabetic Retinopathy and Diabetic Macular Edema Grading (2019). | The overview of this cross-disease attention network (CANet) for joint DR and DME grading, consisting of disease-specific attention modules and disease-dependent attention modules to explore correlative features between these two diseases and it jointly grade DR and DME by using image-level supervision. **Advantages:** In this method it is easy to extend the more correlated disease **Limitations:** The whole network is trained with only image-level supervision so it's very challenging to find the accurate abnormal signs. | They were plan to train this network jointly with the lesion (cellular growth that appear on eye). |
| **2]**Farrikh Alzami1, Abdussalam,Rama Arya Megantara | Diabetic Retinopathy Grade Classification based on Fractal Analysis and Random Forest.(2019) | The random forest is used as classifier. We initially segmented the images, then we computed the fractal dimension as features. After we obtained the features, we fed those features into random forest classifier. **Advantages:** In this they are not only using blood vessels segmentation, but also using skeletonization segmentations of fundus images. **Limitations:** The, fractal dimension alone is not sufficient to distinguish those diabetic retinopathy grade level. | They will analyze another feature, such as univariate and multivariate or statistical features. |
| **3]** K. Dhivya, G.Premalatha, M. Kayathri. | Automated Identification of Diabetic Retinopathy using Artificial Neutral Network.(2020) | It can be detected by Artificial Neural Network. In this method, different processes are performed. They are pre-processing, detection, feature extraction and classification. **Advantages:** It is time consuming process and data demanding method. **Limitations:** It is applicable for only single fundus image and Paired eye image dataset is unavailable. | They will improve in pre-processing step with histogram technique to get better output. |
| **4]** R.S.Rajkumar, T.Jagathishkumar, Divi Ragul | Transfer Learning Approach for Diabetic Retinopathy Detection using Residual Network.(2021) | By using Kaggle dataset, They have train the model to predict the class using the transfer learning method with the help of ResNet -50. **Advantages:** Transfer learning reduces the data needed to be trained, and also minimizes the training time to train the model. | With the help of this Kaggle dataset some other can increase its efficiency to peak and make use of it for |

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| | | **Limitations:** The lack of training given to the dataset to train a model gives the wrong output. | diabetic patients. |
| **5]** Yash S. Boral, Snehal S. Thorat | Classification of Diabetic Retinopathy based on Hybrid Neural Network.(2021) | Our proposed procedure focused on classifying the severity of the disease in the fundus images. The classification of DR in the proposed model is to obtain maximum accuracy from the image dataset using Deep learning.<br><br>**Advantages:** There is high accuracy for detecting normal and abnormal diabetic retinopathy.<br><br>**Limitations:** The loss of training and validity can be visualized through the by plotting and evaluating the algorithm with over-fitting or under-fitting problems. | In the future, the algorithm should be improved to solve the effect of unstable image. |

## V. METHODOLOGY

✓ **Training Method**

This article uses the migration learning approach. Migration learning is a new machine learning method that uses existing knowledge to solve different but related domain problems. Migration learning exists widely in human activities. The more factors shared by two different fields, the easier it is to migrate learning. Otherwise, the more difficult it is, the more "negative migration" occurs, and also side effects occur. Migration learning is much better than traditional classification learning, By using migration learning we can save the training time.

There are four implementation methods for migration learning:

- Instance-based Transfer Learning
- Feature-based Transfer Learning,
- Model-based Transfer Learning,
- Relational Transfer Learning.

In this project we have used Feature-based Transfer Learning. Because, it is necessary to project the features of the source domain and the target domain into the same feature space. The pre-training model we use is based on the ImageNet dataset trained model. Then we can use this model to identify some features of the image, extract the training weights, replace some layers of the network for fine-tuning, and finally Get the ideal model.

✓ **Training Framework**

The platform that we have used is Keras. Keras is a high-level neural network API, Keras is written in pure Python and based on Tensorflow, In Keras, network layers, loss functions, optimizers, initialization strategies, activation functions, and regularization methods are all separate modules that you can use to build your own models. And adding new modules is super easy, just write new classes or functions in the same way as existing modules. The convenience of creating new modules makes Keras more suitable for advanced research work. Keras does not have a separate model configuration file type (as a comparison, caffe has), the model is described by python code, making it more compact and easier to debug, and provides extended convenience. Taking into account the advantages of the
above Keras, we finally chose Keras as a training platform.

✓ **Training Step**

We use the trained pre-training models to directly apply the corresponding structures and weights to the problems we are facing. The next thing to do is to fine-tune the model. We use the pre-training model as a feature extraction device. The output layer is removed first, and the remaining network is then applied to a new data set as a fixed feature extractor.

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After this step of training, the weights of some layers starting from the model are kept unchanged, and the later layers are retrained to obtain new weights.

The pre-training model is based on the VGG19, Resnet50, and Inception V3 networks that have been trained in the ImageNet dataset.and then replace the top-level, that is, the softmax classification layer, with the top level applicable to the learning requirements of this . Then freeze the front layer of the neural network, train the later layers, and fine tune.

## VI. CONCLUSION

This project adopts the method of migration learning, using the training model to fine-tune the new dataset to achieve the classification based on the degree of diabetic retinopathy. The accuracy rate becomes higher and higher with the complexity of the network structure, so the performance of the inception V3 network is the best. Then it can be seen that for the same network, the accuracy rate increases with the increase of the number of training rounds, which indicates that it is necessary to increase the number of training rounds appropriately. We can also see that the accuracy of the training and the learning rate also have a certain relationship. When we reduce the learning rate, the accuracy rate increases, which indicates that it is necessary to appropriately reduce the learning rate in some cases.

## VII. FUTURE SCOPE

That in the next five to ten years, each industry will be deeply integrated with artificial intelligence technology, there will be some Very large platform companies that provide better tools, better algorithms, and help with the transformation of artificial intelligence across industries. The wave of artificial intelligence will give people more time to use their imagination and creativity,and will make things that cannot be replaced by machines better and get new upgrades.

## REFERENCES

[1] Hoover A, Kouznetsova V, Goldbaum M. Locating blood vessels in retinal images by piecewise threshold probing of a matched filter response [J]. IEEE Trans Med Image, 2000, 19:203-210.

[2] Nirmala, S. R., Nath, M. K., &Dandapat, S. (2011). “Retinal Image Analysis: A Review”, International Journal of Computer &Communication Technology (IJCCT), Volume-2, Issue-VI, pp.11–15, 2011.

[3] C. Sinthanayothin, J. F. Boyce, H. L. Cook, and T. H. Williamson,“Automated localisation of the optic disc, fovea, and retinal bloodvessels from digital colour fundus images,” British Journal of Ophthalmology, vol. 83, no. 8, pp. 902–910, 1999.

[4] A.-H. Abdel-RazikYoussif, A. Z. Ghalwash, and A. Abdel-Rahman Ghoneim, “Optic disc detection from normalized digital fundusimages by means of a vessels’ direction matched filter,” Medical

[5] M. Lalonde, M. Beaulieu, and L. Gagnon, "Fast and robust optic disc detection using pyramidal decomposition and Hausdorff- based template matching," IEEE Trans Med Imaging, vol. 20, pp.1193-2000, 2001

[6] Abramoff M.D., Niemeijer M., Suttorp-Schulten M. S. A., et al. Evaluation of a system for automatic detection of diabetic retinopathy from color fundus photographs in a large population of patients with diabetes [J]. Diabetes Care, 2008, 31(2):193–198.

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