S.No	Name	Work Done	DOI	Journal	Year Published	Dataset URL	No. of Images	Advantages	Limitations	Results
1	Transfer Learning with Convolutional Neural Networks for Diabetic Retinopathy Image Classification. A Review	The novelty of this study is the use of support vector machine (SVM) for the classification of diabetic retinopathy (DR) images. SVM is a machine learning algorithm that has been widely used in various applications, but its application in DR image classification is relatively new.	https://doi.org/10.3390/app10062021	MDPI	2021	None	-	SVM's robustness in handling complex patterns and versatility in different applications can lead to accurate DR image classification.	SVM may require careful feature engineering, struggle with large datasets, and not capture deep image features as effectively as deep learning.	The study achieved a higher accuracy of 93% using the trained SVM on three benchmark datasets
2	Deep convolutional neural networks for diabetic retinopathy detection by image classification	The novelty of this study is the use of deep convolutional neural networks (DCNN) for the detection of diabetic retinopathy (DR) through image classification. DCNNs have been proven to be effective in various image classification tasks, and this study explores their application in DR detection.	https://doi.org/10.1016/j.compeleceng.2018.07.042	Elsevier	2018	Private Dataset	35126	DCNNs excel at learning intricate image features, promising high accuracy in DR detection, with transferable knowledge from other tasks.	DCNNs require substantial data, computational resources, and may lack interpretability in medical diagnosis.	The study demonstrates the effectiveness of DCNNs in DR detection and achieves promising results
3	Convolutional Neural Networks for Diabetic Retinopathy	The novelty of this study is the use of convolutional neural networks (CNN) for the classification of diabetic retinopathy (DR) images. CNNs have been widely used in image classification tasks, but their application in DR classification is relatively new.	https://doi.org/10.1016/j.procs.2016.07.014	Elsevier	2016	https://www.kaggle.com/c/diabetic-retinopathy-detection/data	80000	CNNs excel at feature extraction, promising high accuracy in DR classification.	Data and computational resources may be demanding.	The study shows that CNNs can achieve high accuracy in DR classification and outperform traditional machine learning algorithms
4	Automated detection and classification of fundus diabetic retinopathy images using synergic deep learning model	The novelty of this study is the development of an automated detection and classification model for fundus diabetic retinopathy (DR) images using a synergic deep learning model. The model combines multiple deep learning techniques to improve the accuracy of DR detection and classification.	https://doi.org/10.1016/j.patrec.2020.02.026	Elsevier	2020	https://www.adcis.net/en/third-party/messidor/	1200	Synergic deep learning combines techniques for enhanced accuracy.	Complex models may require substantial resources and extensive tuning.	The study demonstrates the effectiveness of the synergic deep learning model in detecting and classifying DR images, and it highlights the importance of early recognition and proper medication for DR patients
5	Diabetic Retinopathy Image Classification Using Support Vector Machine	The novelty of this study is the application of support vector machine (SVM) for the classification of diabetic retinopathy (DR) images. SVM is a machine learning algorithm that has been widely used in various applications	https://doi.org/10.1109/ICCSEA49143.2020.9132875	IEEE Xplore	2020	Not mentioned	0	Multiple techniques improve DR detection and classification accuracy.	Complex models can be computationally intensive.	The study evaluates the experimental outcome of the trained SVM on three benchmark datasets and achieves a higher accuracy of 93%
6	Hyperparameter Tuning Deep Learning for Diabetic Retinopathy Fundus Image Classification	The paper proposes a novel method for the segmentation and diagnosis of diabetic retinopathy using an improved U-NET network	https://doi.org/10.1109/ACCESS.2020.3005152	IEEE Xplore	2020	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	40	SVM is robust for complex data patterns. Limitations: May require careful feature engineering and struggle with large datasets.	Improved U-NET enhances diabetic retinopathy segmentation and diagnosis. Limitations: May need substantial labeled data for training.	The proposed method achieves high accuracy in segmenting retinal images and diagnosing diabetic retinopathy, demonstrating its potential for improving the efficiency and accuracy of diagnosis
7	Modified Alexnet architecture for classification of diabetic retinopathy images	The paper presents a modified AlexNet architecture for the classification of diabetic retinopathy images	https://doi.org/10.1016/j.compeleceng.2019.03.004	Elsevier	2019	https://www.adcis.net/en/third-party/messidor/	1200	Modified AlexNet is specialized for image classification	May not capture deep features as effectively as newer architectures.	The modified AlexNet architecture achieves high accuracy in classifying diabetic retinopathy images, demonstrating its effectiveness in automated diagnosis
8	Classification of Diabetic Retinopathy Images Based on Customised CNN Architecture	The paper proposes a customized CNN architecture for the classification of diabetic retinopathy images	https://doi.org/10.1109/AICAI.2019.8701231	IEEE Xplore	2019	Private	0	Tailored CNN enhances DR classification accuracy. Can adapt to specific dataset characteristics.	Requires labeled data and can be computationally intensive.	The customized CNN architecture achieves high accuracy in classifying diabetic retinopathy images, showing its potential for automated diagnosis
9	An Intelligent Segmentation and Diagnosis Method for Diabetic Retinopathy Based on Improved U-NET Network	The paper presents an intelligent segmentation and diagnosis method for diabetic retinopathy based on an improved U-NET network	https://doi.org/10.1007/s10916-019-1432-0	Springer	2019	Private dataset	0	Enhanced U-NET improves segmentation and diagnosis accuracy. Useful for precise localization.	Relies on substantial labeled data and may require complex model tuning.	The proposed method achieves accurate segmentation and diagnosis of diabetic retinopathy, demonstrating its potential for improving the efficiency and accuracy of diagnosis
10	IDRiD: Diabetic Retinopathy – Segmentation and Grading Challenge	The paper outlines the IDRiD challenge, which focuses on the segmentation and grading of diabetic retinopathy	https://doi.org/10.1016/j.media.2019.101561	Elsevier	2019	https://www.kaggle.com/datasets/aryapatel98/indian-diabetic-retinopathy-image-dataset	1488	Offers standardized datasets for DR research. Fosters competition and benchmarking.	Limited to specific dataset challenges, may not cover all real-world scenarios.	The top performing approaches in the challenge utilize a combination of clinical information, data augmentation, and ensemble models, leading to improved performance in retinal image analysis and diagnosis

11	Diabetic Retinopathy: Present and Past	The paper provides an overview of the present and past techniques used in the diagnosis and management of diabetic retinopathy	https://doi.org/10.1016/j.procs.2018.05.074	Elsevier	2018	https://www.kaggle.com/datasets/vidheeshnacode/stare-dataset + https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	20+20	Provides historical context and insights into DR. Useful for understanding the evolution of DR diagnosis.	Lacks technical specifics for current research.	The paper discusses the advancements in image processing techniques and their application in diabetic retinopathy diagnosis, highlighting the importance of early detection and treatment
12	Algorithms for digital image processing in diabetic retinopathy	The paper presents algorithms for digital image processing specifically designed for diabetic retinopathy	https://doi.org/10.1016/j.compmedimag.2009.06.003	Elsevier	2009	None	0	Offers image processing techniques for DR. May be valuable for preprocessing.	May not capture complex features automatically.	The algorithms proposed in the paper demonstrate their effectiveness in detecting and analyzing retinal images for the diagnosis of diabetic retinopathy
13	Diabetic retinopathy detection through deep learning techniques: A review	The paper provides a comprehensive review of deep learning techniques used for the detection of diabetic retinopathy	https://doi.org/10.1016/j.imu.2020.100377	Elsevier	2020	None	0	Summarizes deep learning techniques for DR. Provides insights for researchers.	May lack specific implementation details.	The review highlights the potential of deep learning techniques in achieving high accuracy and efficiency in the detection and classification of diabetic retinopathy from retinal images
14	DRNet: Segmentation and localization of optic disc and Fovea from diabetic retinopathy image	The paper proposes a deep learning architecture called DRNet for the segmentation and localization of the optic disc and fovea in diabetic retinopathy images	https://doi.org/10.1016/j.artmed.2020.102001	Elsevier	2020	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	20	DRNet aids in localizing key structures. Essential for diagnosis.	Requires labeled data and computational resources.	The DRNet architecture achieves accurate segmentation and localization of the optic disc and fovea, which are important landmarks for diagnosing and monitoring diabetic retinopathy
15	Deep learning architecture based on segmented fundus image features for classification of diabetic retinopathy	The paper presents a deep learning architecture based on segmented fundus image features for the classification of diabetic retinopathy	https://doi.org/10.1016/j.bspc.2021.102600	Elsevier	2021	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Utilizes segmented images for DR classification. Can improve feature extraction.	May require substantial data for segmentation.	The proposed architecture achieves high accuracy in classifying diabetic retinopathy, demonstrating the potential of using segmented fundus image features for automated diagnosis
16	Diagnostic assessment of deep learning algorithms for diabetic retinopathy screening	The novelty of this study is the diagnostic assessment of deep learning algorithms for diabetic retinopathy screening.	https://doi.org/10.1016/j.ins.2019.06.011	Elsevier	2019	https://www.kaggle.com/datasets/mariaherrerot/ddrdataset	13673	Asses deep learning algorithms for DR screening. Crucial for evaluating clinical readiness.	Findings may be specific to the assessment methodology.	The study evaluates the performance of deep learning algorithms in diagnosing diabetic retinopathy using retinal fundus images. The results show that the deep learning algorithms achieve high accuracy in detecting diabetic retinopathy, making them a promising tool for screening and diagnosis
17	A method to assist in the diagnosis of early diabetic retinopathy: Image processing applied to detection of microaneurysms in fundus images	The novelty of this study is the method proposed for the detection of microaneurysms in fundus images using image processing techniques.	https://doi.org/10.1016/j.compmedimag.2015.07.001	Elsevier	2015	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Detects microaneurysms using image processing. Early diagnosis potential.	Limited to microaneurysm detection, may require further techniques for full DR diagnosis.	The study presents a method for the detection of microaneurysms, which are early signs of diabetic retinopathy, in fundus images. The method involves preprocessing, candidate extraction, and classification stages. The results show that the proposed method achieves high sensitivity and specificity in detecting microaneurysms, making it a valuable tool for early diagnosis of diabetic retinopathy
18	A Benchmark for Studying Diabetic Retinopathy: Segmentation, Grading, and Transferability	The novelty of this study is the benchmark for studying diabetic retinopathy, including segmentation, grading, and transferability.	https://doi.org/10.1109/TMI.2020.3037771	IEEE Xplore	2020	https://csyizhou.github.io/FGADR/	2842	Provides standardized benchmarks for DR research. Encourages benchmarking efforts.	Focuses on specific challenges, may not cover all aspects of DR diagnosis.	The study presents a benchmark for studying diabetic retinopathy, which includes tasks such as segmentation and grading of retinal images. The benchmark evaluates the performance of different algorithms and models in these tasks. The results provide insights into the effectiveness and transferability of different approaches in diagnosing and grading diabetic retinopathy

19	A survey on medical image analysis in diabetic retinopathy	The novelty of this study is the survey on medical image analysis in diabetic retinopathy.	https://doi.org/10.1016/j.media.2020.101742	Elsevier	2020	https://www.kaggle.com/datasets/vidheeshnacode/stare-dataset + https://projects.ics.forth.gr/cvrl/fire/	400+ 129	Offers a comprehensive overview of medical image analysis in DR. Useful for understanding the landscape.	May lack specific implementation details and depth in individual techniques.	The study provides a comprehensive survey on medical image analysis techniques for diabetic retinopathy. It covers various aspects such as image preprocessing, lesion detection, feature extraction, and classification. The survey discusses the strengths and limitations of different approaches and highlights the challenges and future directions in this field
20	Adaptive machine learning classification for diabetic retinopathy	The novelty of this study is the adaptive machine learning classification for diabetic retinopathy.	https://doi.org/10.1007/s11042-020-09793-7	Springer	2020	https://www.kaggle.com/datasets/mariaherrerot/eyepacspreprocess	88702	Adapts to varying data patterns, potentially enhancing DR classification. Versatile for different datasets.	May require substantial labeled data and extensive tuning.	The study proposes an adaptive machine learning classification approach for diabetic retinopathy. The approach combines multiple machine learning algorithms to improve the accuracy of classification. The results show that the proposed approach achieves high accuracy in diagnosing diabetic retinopathy, making it a promising tool for clinical applications
21	Multithreshold Image Segmentation Technique Using Remora Optimization Algorithm for Diabetic Retinopathy Detection from Fundus Images	The novelty of this study is the proposed framework for diabetic retinopathy detection and classification using a multithreshold image segmentation technique.	https://doi.org/10.1007/s11063-021-10734-0	Springer	2022	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	40	Optimizes segmentation with Remora algorithm. May improve accuracy in DR detection.	Algorithm-specific, may not generalize to all DR datasets.	The study presents a framework for diabetic retinopathy detection and classification, which includes pre-processing, segmentation, feature extraction, and classification stages. The proposed multithreshold image segmentation technique improves the accuracy of segmentation and contributes to the overall performance of the system
22	Image structure clustering for image quality verification of color retina images in diabetic retinopathy screening	The novelty of this study is the use of image structure clustering for image quality verification of color retina images in diabetic retinopathy screening.	https://doi.org/10.1016/j.media.2006.09.006	Elsevier	2006	Not publicly available	2000	Ensures image quality for DR screening. Can enhance reliability.	Focused on quality verification, not DR classification.	The study proposes a method for image quality verification of color retina images in diabetic retinopathy screening using image structure clustering. The results show that the proposed method effectively identifies images with poor quality, which is crucial for reliable diagnosis and screening
23	High-Resolution Diabetic Retinopathy Image Synthesis Manipulated by Grading and Lesions	The novelty of this study is the synthesis of high-resolution diabetic retinopathy images manipulated by grading and lesions.	https://doi.org/10.1007/978-3-030-32239-7_56	Springer	2019	https://www.kaggle.com/datasets/mariaherrerot/eyepacspreprocess	88702	Generates high-resolution DR images for grading and lesion analysis.	May rely on synthetic data, may not fully capture real-world variations.	The study presents a method for synthesizing high-resolution diabetic retinopathy images by manipulating grading and lesions. The synthesized images can be used for training and evaluating image analysis algorithms for diabetic retinopathy. The results demonstrate the effectiveness of the proposed method in generating realistic and diverse images
24	Improving Lesion Segmentation for Diabetic Retinopathy Using Adversarial Learning	The novelty of this study is the improvement of lesion segmentation for diabetic retinopathy using adversarial learning.	https://doi.org/10.1007/978-3-030-27272-2_29	Springer	2019	https://www.kaggle.com/datasets/aryapatel98/indian-diabetic-retinopathy-image-dataset	1488	Enhances lesion segmentation accuracy using adversarial techniques.	Requires labeled data for adversarial training.	The study proposes an adversarial learning approach to improve the segmentation of lesions in diabetic retinopathy images. The results show that the proposed method outperforms traditional edge detection algorithms and patch-based methods in terms of accuracy and speed
25	Detection and classification of diabetic retinopathy using retinal images	The novelty of this study is the segmentation and detection of diabetic retinopathy exudates.	https://doi.org/10.1109/ICMCS.2014.6911368	IEEE Xplore	2014	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Combines detection and classification in one step. Simplifies workflow.	Accuracy may vary based on model complexity.	The study presents a method for the segmentation and detection of exudates in diabetic retinopathy images. The proposed method combines color and sharp edge features to accurately identify exudates. The results demonstrate the effectiveness of the method in detecting exudates, which are important indicators of diabetic retinopathy

26	Segmentation and detection of diabetic retinopathy exudates	The paper presents an automated method for the detection of exudates in retinal color fundus images using the HSI model, graph cuts algorithm, and neural network classifier	https://doi.org/10.1109/ICMCS.2014.6911368	IEEE Xplore	2014	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Incorporates morphological operations for improved DR diagnosis.	May require substantial preprocessing.	The method achieves high accuracy in the detection of exudates, which are important indicators of diabetic retinopathy
27	An Efficiency way to analyse Diabetic Retinopathy Detection and Classification using Deep Learning Techniques	The paper proposes an efficient way to analyze diabetic retinopathy detection and classification using deep learning techniques	https://doi.org/10.1109/ICACITE57410.2023.10182642	IEEE Xplore	2023	Not specified	0	Focuses on exudate detection, a crucial DR aspect.	Limited to exudate-related diagnosis.	The proposed method achieves accurate detection and classification of diabetic retinopathy using deep learning techniques
28	Diabetic Retinopathy Using Deep Learning	The paper presents a method based on mathematical morphology for the automated detection of exudates from low contrast digital images of retinopathy patients	https://doi.org/10.1109/CISES58720.2023.10183562	IEEE Xplore	2023	https://www.kaggle.com/c/aptos2019-blindness-detection	3662	Utilizes deep learning techniques for efficient DR analysis.	May require substantial computational resources.	The method utilizes the lightness of the Luv color space for improved detection of exudates
29	A lightweight CNN for Diabetic Retinopathy classification from fundus images	The paper proposes a lightweight convolutional neural network (CNN) for the classification of diabetic retinopathy from fundus images	https://doi.org/10.1016/j.bspc.2020.102115	Elsevier	2020	https://www.adcis.net/en/third-party/messidor/	1200	Applies deep learning for DR detection. Potential for high accuracy.	May need substantial labeled data.	The proposed CNN achieves accurate classification of diabetic retinopathy with a lightweight architecture
30	Detecting diabetic retinopathy using embedded computer vision	Artificial Intelligence With Deep Learning Technology Looks Into Diabetic Retinopathy Screening	https://doi.org/10.3390/app10207274	MDPI	2020	https://www.kaggle.com/datasets/mariaherrerot/eyepacspreprocess	88702	Offers efficient classification with a lightweight CNN model.	May trade off some accuracy for efficiency.	The study explores the use of artificial intelligence (AI) with deep learning technology for diabetic retinopathy (DR) screening. The AI system achieved high accuracy in detecting DR from retinal images, showing its potential as a tool for improving DR screening and diagnosis
31	Performance Evaluation of Binary Classification of Diabetic Retinopathy through Deep Learning Techniques using Texture Feature	A deep learning ensemble approach for diabetic retinopathy detection	https://doi.org/10.1016/j.procs.2020.12.012	Elsevier	2021	Not specified	0	Embeds computer vision for DR detection. Can improve accuracy.	May require computational resources.	The study proposes a deep learning ensemble approach for the detection of diabetic retinopathy (DR). The approach utilizes five deep convolutional neural network (CNN) models and achieves high accuracy in classifying different stages of DR. The results demonstrate the effectiveness of the ensemble model in DR detection
32	Detecting lesion characteristics of diabetic retinopathy using machine learning and computer vision	A review on deep learning techniques for diabetic retinopathy detection	https://doi.org/10.6025/jes/2020/10/1/23-33	Journal of Elctronic Systems	2020	Not available	0	Evaluates DR binary classification with texture features.	Limited to binary classification evaluation.	The study provides a comprehensive review of deep learning techniques for diabetic retinopathy (DR) detection. It discusses various CNN architectures and their performance in DR classification. The review highlights the potential of deep learning in improving the accuracy and efficiency of DR screening
33	Diagnosis of diabetic retinopathy using machine learning classification algorithm	A novel approach for diabetic retinopathy detection using image processing techniques	10.1109/NGCT.2016.7877439	IEEExplore	2017	Not specified	0	Focuses on lesion characteristics using ML and CV.	May not cover the full DR diagnosis.	The study presents a novel approach for diabetic retinopathy (DR) detection using image processing techniques. The approach involves preprocessing of retinal images, feature extraction, and classification using a support vector machine (SVM) classifier. The results demonstrate the effectiveness of the proposed approach in DR detection
34	Development and validation of a deep learning algorithm for detection of diabetic retinopathy in retinal fundus photographs	Diabetic retinopathy as a leading cause of blindness in working-aged adults	10.1001/jama.2016.17216	JAMA	2016	Not specified	0	Utilizes ML for diagnosis. Can handle various datasets.	Model accuracy depends on data quality.	The study highlights the significance of diabetic retinopathy (DR) as a leading cause of blindness in working-aged adults. It emphasizes the global impact of diabetes and the need for effective screening and management strategies to address DR and prevent vision loss

35	A deep learning ensemble approach for diabetic retinopathy detection	A deep learning ensemble approach for diabetic retinopathy detection	10.1109/ACCESS.2019.2947484	IEEExplore	2019	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	20	Develops and validates a deep learning algorithm for DR detection.	Requires a substantial amount of labeled data.	The study proposes a deep learning ensemble approach for the detection of diabetic retinopathy (DR). The approach utilizes five deep convolutional neural network (CNN) models and achieves high accuracy in classifying different stages of DR. The results demonstrate the effectiveness of the ensemble model in DR detection
36	Artificial intelligence with deep learning technology looks into diabetic retinopathy screening	Diabetes as a global public health disease and the impact of diabetic retinopathy	10.1001/jama.2016.17563	JAMA	2014	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Ensembles deep learning models for enhanced DR detection.	May be computationally intensive.	The study highlights the global impact of diabetes as a public health disease and emphasizes the prevalence of diabetic retinopathy (DR) as a leading cause of blindness. It emphasizes the need for effective screening and management strategies to address this public health issue
37	Deep learning based computer-aided diagnosis systems for diabetic retinopathy: A survey	Automated detection of diabetic retinopathy using deep learning techniques	https://doi.org/10.1016/j.artmed.2019.07.009	Elsevier	2014	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Applies deep learning for DR screening. Offers automation potential.	May require substantial computational resources.	The study focuses on the automated detection of diabetic retinopathy (DR) using deep learning techniques. It discusses the use of deep convolutional neural networks (CNNs) for feature extraction and classification of retinal images. The results demonstrate the potential of deep learning in improving the accuracy and efficiency of DR detection
38	Deep learning approach to diabetic retinopathy detection	A comprehensive survey on deep learning techniques for diabetic retinopathy detection	https://doi.org/10.48550/arXiv.2003.02261	arXiv	2023	Not specified	0	Surveys deep learning-based CAD systems for DR. Provides an overview.	May not delve into specific techniques.	The study provides a comprehensive survey of deep learning techniques for diabetic retinopathy (DR) detection. It discusses various CNN architectures, preprocessing techniques, and evaluation metrics used in DR classification. The survey highlights the potential of deep learning in improving the accuracy and efficiency of DR screening
39	Classification of diabetic retinopathy images by using deep learning models	The paper presents a modified AlexNet architecture for the classification of diabetic retinopathy images .	10.14257/ijgdc.2018.11.1.09	International Journal of Grid and Distributed Computing	2023	https://www.kaggle.com/c/aptos2019-blindness-detection	3662	Utilizes deep learning for DR detection. Potential for high accuracy.	May require substantial labeled data.	The proposed model achieved high accuracy in classifying diabetic retinopathy images, demonstrating its effectiveness in diagnosing the disease
40	A critical review on diagnosis of diabetic retinopathy using machine learning and deep learning	The paper provides a critical review on the diagnosis of diabetic retinopathy using machine learning and deep learning	https://doi.org/10.1007/s11042-022-12642-4	Springer	2022	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Classifies DR images using deep learning models.	Accuracy may vary based on model complexity.	The review discusses various techniques and models used for the detection and classification of diabetic retinopathy, highlighting the advancements and challenges in the field
41	Automatic screening and classification of diabetic retinopathy and maculopathy using fuzzy image processing	The paper presents a novel automatic detection system for diabetic retinopathy and maculopathy using fuzzy image processing	https://doi.org/10.1007/s40708-016-0045-3	Springer	2020	https://www.kaggle.com/datasets/mariaherrerot/eyepacspreprocess	88702	Fuzzy image processing aids in screening and classification. Potential for accurate diagnosis.	Fuzzy processing may require careful tuning, and the model's complexity may affect performance	The proposed system effectively detects and classifies diabetic retinopathy and maculopathy, providing a reliable screening method for these diseases
42	A contribution of image processing to the diagnosis of diabetic retinopathy-detection of exudates in color fundus images of the human retina	The paper presents a new algorithm for the detection of exudates in color fundus images of the human retina	10.1109/TMI.2002.806290	IEEE	2021	Not specified	0	Detects exudates in color fundus images. Can aid in early diagnosis.	May require extensive preprocessing, and sensitivity may vary with image quality.	The algorithm successfully detects exudates, which are important indicators of diabetic macular edema, with high sensitivity
43	Modified Alexnet architecture for classification of diabetic retinopathy images	The paper proposes a modified AlexNet architecture for the classification of diabetic retinopathy images	https://doi.org/10.1016/j.compeleceng.2019.03.004	Elsevier	2018	Private Dataset	35126	Utilizes modified AlexNet for image classification. Known for its effectiveness.	May not capture deep features as effectively as newer architectures.	The proposed model achieves high accuracy in classifying diabetic retinopathy images, demonstrating its potential for automated diagnosis

44	Diagnosis of diabetic retinopathy by using image processing and convolutional neural network	Diagnosis of Diabetic Retinopathy by Using Image Processing and Convolutional Neural Network	10.1109/ISMSIT.2018.8567055	IEEExplore	2016	https://www.kaggle.com/c/diabetic-retinopathy-detection/data	80000	Combines image processing with CNN for diagnosis. Potential for high accuracy.	equires labeled data and computational resources.	The authors propose a method for diagnosing diabetic retinopathy using image processing techniques and convolutional neural networks. They use a dataset of retinal images and apply preprocessing techniques to enhance the images. Then, they extract features from the images and train a convolutional neural network to classify the images into different stages of diabetic retinopathy. The results show that the proposed method achieves high accuracy in diagnosing diabetic retinopathy.
45	An Improved Model for Analysis of Diabetic Retinopathy Related Imagery	An Improved Model for Analysis of Diabetic Retinopathy Related Imagery	10.17485/ijst/2016/v9i44/105298	Indian Journal of Science and Technology	2020	https://www.adcis.net/en/third-party/messidor/	1200	Offers an improved model for DR-related image analysis. Can enhance accuracy.	Model's performance may depend on data quality and size.	The authors present an improved model for analyzing diabetic retinopathy-related imagery. They propose a method that combines image processing techniques and machine learning algorithms to detect and classify lesions associated with diabetic retinopathy. The method involves preprocessing the retinal images, extracting features, and training a machine learning model to classify the images. The results demonstrate the effectiveness of the proposed model in accurately detecting and classifying diabetic retinopathy lesions.
46	Simple methods for the lesion detection and severity grading of diabetic retinopathy by image processing and transfer learning	Simple methods for the lesion detection and severity grading of diabetic retinopathy by image processing and transfer learning	https://doi.org/10.1016/j.compbiomed.2021.104795	Elsevier	2020	Not mentioned	0	Simplifies lesion detection and grading with transfer learning. Efficient approach.	May not capture fine details compared to deep learning methods.	The authors propose simple methods for detecting and grading the severity of diabetic retinopathy lesions using image processing and transfer learning techniques. They preprocess the retinal images and extract features using convolutional neural networks. Then, they use transfer learning to fine-tune a pre-trained model for lesion detection and severity grading. The results show that the proposed methods achieve high accuracy in detecting and grading diabetic retinopathy lesions.
47	Using image processing methods for diagnosis diabetic retinopathy	Using image processing methods for diagnosis diabetic retinopathy	10.1109/ROMA.2014.7295879	IEEExplore	2020	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	40	Utilizes image processing for diagnosis. May aid in preprocessing.	May not capture complex features automatically.	The authors investigate the use of image processing methods for diagnosing diabetic retinopathy. They apply various image processing techniques, such as image enhancement and feature extraction, to retinal images. Then, they use machine learning algorithms to classify the images into different stages of diabetic retinopathy. The results demonstrate the potential of image processing methods in diagnosing diabetic retinopathy.
48	Image processing and machine learning techniques for diabetic retinopathy detection: a review	Image Processing and Machine Learning Techniques for Diabetic Retinopathy Detection: A Review	https://doi.org/10.1007/978-3-030-50402-1_9	Springer	2019	https://www.adcis.net/en/third-party/messidor/	1200	Provides an overview of image processing and ML techniques for DR. Informative for researchers.	May lack detailed implementation guidance.	The authors provide a comprehensive review of image processing and machine learning techniques for the detection of diabetic retinopathy. They discuss various methods and algorithms used for preprocessing retinal images, extracting features, and classifying the images. The review highlights the advancements in the field and the potential of these techniques in improving the diagnosis of diabetic retinopathy.

49	An ensemble-based system for automatic screening of diabetic retinopathy	In this paper, an ensemble-based method for the screening of diabetic retinopathy (DR) is proposed. This approach is based on features extracted from the output of several retinal image processing algorithms, such as image-level (quality assessment, pre-screening, AM/FM), lesion-specific (microaneurysm detection, exudate detection), and anatomical (optic disc and macula detection) algorithms	https://doi.org/10.1016/j.knosys.2013.12.023	Elsevier	2019	Private	0	Ensembles methods for DR screening, potentially enhancing accuracy.	Ensemble models may be computationally intensive.	The proposed ensemble-based method achieved high accuracy in the screening of diabetic retinopathy, with improved performance compared to individual algorithms. The method utilized various image processing techniques to extract features related to image quality, lesion detection, and anatomical structure detection, leading to accurate classification of retinal images
50	Identification of different stages of diabetic retinopathy using retinal optical images	This paper presents a method for the identification of different stages of diabetic retinopathy using retinal optical images. The method utilizes image processing techniques and machine learning algorithms to classify retinal images into different stages of diabetic retinopathy	https://doi.org/10.1016/j.ins.2007.07.020	Elsevier	2019	Private dataset	0	Uses optical images to identify DR stages. Non-invasive approach.	Accuracy may depend on image quality and variety.	The proposed method achieved high accuracy in the identification of different stages of diabetic retinopathy. By analyzing retinal optical images and extracting relevant features, the method was able to accurately classify retinal images into different stages of the disease, providing valuable information for diagnosis and treatment
51	Diagnosis of diabetic retinopathy by employing image processing technique to detect exudates in retinal images	This paper presents a computational intelligence-based approach for the detection of exudates in diabetic retinopathy images. The method utilizes computational intelligence techniques, such as fuzzy c-means clustering and neural networks, to automatically identify exudate pathologies in retinal images	https://doi.org/10.1049/iet-ipr.2013.0565	*IET Image processing*	2019	https://www.kaggle.com/datasets/aryapatel98/indian-diabetic-retinopathy-image-dataset	1488	Employs image processing to detect exudates in retinal images. May aid in early diagnosis.	*Sensitive to image quality and may require substantial preprocessing.*	The proposed approach achieved high accuracy in the detection of exudates in diabetic retinopathy images. By applying fuzzy c-means clustering and neural networks, the method was able to accurately identify exudate pathologies, providing valuable information for the diagnosis and management of diabetic retinopathy
52	Progress towards automated diabetic ocular screening: a review of image analysis and intelligent systems for diabetic retinopathy	This paper reviews the progress towards automated diabetic ocular screening, specifically focusing on image analysis and intelligent systems for diabetic retinopathy. The review discusses the use of automated analysis of reflectance images of the ocular fundus for diabetic retinopathy screening	https://doi.org/10.1007/BF02347689	Springer	2020	https://www.kaggle.com/datasets/andrewmvd/drive-digital-retinal-images-for-vessel-extraction	20	Reviews progress in automated screening. Provides insights for researchers.	May not delve into specific technical details.	The review highlights the importance of automated diabetic ocular screening and the potential of image analysis and intelligent systems for diabetic retinopathy. It discusses various approaches and techniques used in automated screening, emphasizing the need for accurate and efficient analysis of retinal images for early detection and management of diabetic retinopathy
53	A Deep Learning Method for the detection of Diabetic Retinopathy	This paper presents a deep learning method for the detection of diabetic retinopathy. The method utilizes deep learning techniques, specifically convolutional neural networks, to automatically detect diabetic retinopathy from retinal images	10.1109/UPCON.2018.8596839	IEEExplore	2021	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Utilizes deep learning for DR detection. Potential for high accuracy.	Requires substantial labeled data and computational resources.	The proposed deep learning method achieved high accuracy in the detection of diabetic retinopathy. By training convolutional neural networks on a large dataset of retinal images, the method was able to accurately classify retinal images as either normal or showing signs of diabetic retinopathy, providing a valuable tool for early diagnosis and treatment
54	A computational-intelligence-based approach for detection of exudates in diabetic retinopathy images	This paper presents a computational intelligence-based approach for the detection of exudates in diabetic retinopathy images. The method utilizes computational intelligence techniques, such as fuzzy c-means clustering and neural networks, to automatically identify exudate pathologies in retinal images	10.1109/TITB.2008.2007493	IEEExplore	2019	https://www.kaggle.com/datasets/mariaherrerot/ddrdataset	13673	Employs computational intelligence for exudate detection. Can enhance accuracy.	Sensitive to data quality and may require complex model tuning.	The proposed approach achieved high accuracy in the detection of exudates in diabetic retinopathy images. By applying fuzzy c-means clustering and neural networks, the method was able to accurately identify exudate pathologies, providing valuable information for the diagnosis and management of diabetic retinopathy
55	An enhanced diabetic retinopathy detection and classification approach using deep convolutional neural network	An enhanced diabetic retinopathy detection and classification approach using deep convolutional neural network	https://doi.org/10.1007/s00521-018-03974-0	Springer	2015	https://www.kaggle.com/datasets/nguyenhung1903/diaretdb1-v21	806	Utilizes deep CNN for enhanced DR detection. Known for its effectiveness.	May require substantial computational resources.	The authors propose an enhanced approach for detecting and classifying diabetic retinopathy using a deep convolutional neural network. They preprocess the retinal fundus images and extract features using the deep convolutional neural network.

56	An effective image processing method for detection of diabetic retinopathy diseases from retinal fundus images	An effective image processing method for detection of diabetic retinopathy diseases from retinal fundus images	https://doi.org/10.1504/IJSISE.2018.093825	International Journal of Signal and Imaging Systems Engineering	2020	https://csyizhou.github.io/FGADR/	2842	Offers an effective image processing method for DR detection. Simplifies diagnosis.	May not capture complex features automatically.	The authors present an effective image processing method for detecting diabetic retinopathy diseases from retinal fundus images. They apply image processing techniques to preprocess the images and extract features. Then, they use machine learning algorithms to classify the images into different categories of diabetic retinopathy diseases.
57	Modified U-Net architecture for semantic segmentation of diabetic retinopathy images	Modified U-Net architecture for semantic segmentation of diabetic retinopathy images	https://doi.org/10.1016/j.bbe.2020.05.006	Elsevier	2020	https://www.kaggle.com/datasets/vidheeshnacode/stare-dataset + https://projects.ics.forth.gr/cvrl/fire/	400+ 129	Utilizes modified U-Net for semantic segmentation. Useful for precise localization.	Requires labeled data and may be sensitive to variations.	The authors propose a modified U-Net architecture for performing semantic segmentation of diabetic retinopathy images. They modify the original U-Net architecture to improve the accuracy of segmenting different structures in the retinal images.
58	Deep learning for detection and severity classification of diabetic retinopathy	Deep Learning for Detection and Severity Classification of Diabetic Retinopathy	10.1109/ICIICT1.2019.8741456	IEEExplore	2020	https://www.kaggle.com/datasets/mariaherrerot/eyepacspreprocess	88702	Combines deep learning for DR detection and severity classification. Enhances accuracy.	Computational resources and labeled data may be demanding.	The authors investigate the use of deep learning techniques for detecting and classifying the severity of diabetic retinopathy. They train deep learning models using retinal images and evaluate their performance in detecting and classifying different stages of diabetic retinopathy.
59	Automated identification of diabetic retinopathy stages using digital fundus images	Automated Identification of Diabetic Retinopathy Stages Using Digital Fundus Images	https://doi.org/10.1007/s10916-007-9113-9	Springer	2019	Private	0	Automates DR stage identification with digital fundus images. Non-invasive and efficient.	Accuracy may vary based on image quality and variety.	The authors propose a computer-based approach for automatically identifying the stages of diabetic retinopathy using digital fundus images. They apply image preprocessing, morphological processing techniques, and texture analysis methods to extract features from the fundus images.
60	Comparative study of imaging transforms on diabetic retinopathy images	Comparative study of imaging transforms on diabetic retinopathy images	10.1109/RTEICT.2016.7807795	IEEExplore	2019	Private dataset	0	Compares imaging transforms for DR analysis. Provides insights into technique effectiveness.	May not address real-world variations and specific DR diagnosis challenges.	The authors conduct a comparative study of different imaging transforms on diabetic retinopathy images. They evaluate the performance of various transforms in enhancing the features and improving the accuracy of diabetic retinopathy detection. The results provide insights into the effectiveness of different imaging transforms for diabetic retinopathy analysis.