

Performance Comparison of different molecular data in the identification of diabetic retinopathy

ANNOTATED BIBLIOGRAPHY

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Submitted by:

Chandrasiri H.V.B.L. [2019/E/023]

Ashfa A.G.F. [2019/E/011]

DEPARTMENT OF COMPUTER ENGINEERING

FACULTY OF ENGINEERING

UNIVERSITY OF JAFFNA

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ARTICLE 1

2019/E/023

Week 1

[1] Z.-W. Yu *et al.*, “<p>High Serum Neuron-Specific Enolase Level Is Associated with Mild Cognitive Impairment in Patients with Diabetic Retinopathy</p>,” *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy*, pp. 1359–1365, Apr. 2020, doi: 10.2147/dmso.s249126.

[2] The article discussed how diabetic retinopathy [DR] can increase the risk of mild cognitive impairment [MCI], which was confirmed by previous researches. [3] This study aims to investigate the relationship between neuron-specific enolase [NSE] and MCI in patients with DR. [4] Patients with DR, a common microvascular complication of type 2 diabetes mellitus [T2DM], and its association with cognitive impairment were the focus of the study. [5] This study could be helpful for our research as it discussed a potential biomarker [NSE] for MCI in DR patients, which could be exercised in our study too. [6] One limitation of this study is that it is a cross-sectional study. Thus, it cannot establish a cause-effect relationship between NSE and MCI in patients with DR. [7] This study concluded that a High Serum Neuron-Specific Enolase level is an independent risk factor for MCI in DR patients and is expected to be a potential biomarker in DR patients with MCI. [8] This work could fit into our research as it provided information about a potential biomarker [NSE] for MCI in DR patients and the connection between them and diabetic retinopathy.

ARTICLE 2

2019/E/023

Week 2

[1] Y. Sun, H. Zou, X. Li, S. Xu, and C. Liu, "Plasma metabolomics reveals metabolic profiling for diabetic retinopathy and disease progression," *Frontiers*, 29-Sep-2021. [Online]. Available: <https://www.frontiersin.org/articles/10.3389/fendo.2021.757088/full>. [Accessed: 26-Apr-2023].

[2] Diabetic retinopathy [DR] is the main retinal vascular complication of diabetes mellitus [DM], that is the leading cause of visual impairment and blindness among working-age people worldwide. [3] This study aimed to investigate the differences in plasma metabolic profiles in patients with DR to better understand the disease's mechanism and disease progression. [4] The scope of this study is to use ultrahigh-performance liquid chromatography-mass spectrometry [UHPLC-MS] to analyze plasma metabolic profiles of patients with DR. [5] The paper described the metabolic changes that occur in the blood of diabetic retinopathy patients, that can be used in the development of new molecular biomarkers of disease diagnosis and progression. [6] The study has limitations such as a relatively small sample size, lack of validation in an independent cohort and lacking in the usage of few potential confounding factors which need to be considered while interpreting the results. [7] This study provided evidence that plasma metabolomics could be used as a biomarker for early diagnosis and monitoring of DR. [8] This study provides plasma metabolomics as a molecular data source for identifying DR, thereby providing insights on our research.

ARTICLE 3

2019/E/023

Week 3

[1] M. Bader Alazzam, F. Alassery, and A. Almulihi, "Identification of diabetic retinopathy through machine learning," *Mobile Information Systems*, 26-Nov-2021. [Online]. Available: <https://www.hindawi.com/journals/misy/2021/1155116/>. [Accessed: 02-May-2023].

[2] This study focused on analyzing patients with suspected diabetic retinopathy using specialized retinal images and classifying them using machine learning models named OPF and RBM. [3] This study aimed to compare the performance of two different image analysis machine learning models in the automatic detection of DR. [4] The objective of this study is to assess the efficacy of two machine learning models, OPF and RBM, in the identification of diabetic retinopathy using retinal images. [5] This study is helpful for our research as it uses two machine-learning models in identifying diabetic retinopathy. [6] Limitation includes using fewer retinographs in the analysis than planned and unbalanced data used in the study. [7] The study concluded that the RBM-1000 model performed best in terms of diagnostic accuracy [89.47 ± 2.64] and that automatic disease detection model could be used in practice. [8] As this work also compares performance between different molecular data in identifying DR using two machine learning models, it is similar to us.

ARTICLE 4

2019/E/023

Week 4

[1] G. L. D’Adamo, J. T. Widdop, and E. M. Giles, “The future is now? clinical and translational aspects of ‘OMICS’ technologies,” *Immunology & Cell Biology*, vol. 99, no. 2, pp. 168–176, 2020.

[2] This review discussed the possibilities of integrating “omics” technologies with clinical practice and the potential for precision medicine. This review examined the possibility of integrating “omics” technologies with clinical practice and highlighted the potential of precision medicine in the context of a variety of diseases. [3] This review explored the areas of clinical medicine where omics and big data are already shaping clinical management or are on the cusp of doing so. [4] The review covered omics in oncology, complex diseases, microbiome research and the challenges ahead for clinicians and researchers. [5] This review provided an overview of how omics technologies are used in clinical practices and helped to understand how different molecular data can be used to identify diabetic retinopathy. [6] The review acknowledged practical and ethical challenges in implementing omics technologies in clinical practice. [7] The review concluded that while there is enormous potential for omics technologies in clinical medicine, there are significant challenges that policymakers, funders, and clinicians must address. [8] This work provides information on our topic by providing an overview of how omics technologies are utilized in clinical practices and their insight into how various molecular data can be used to identify diabetic retinopathy.

ARTICLE 5

2019/E/023

Week 5

[1] L. Adlung, Y. Cohen, U. Mor, and E. Elinav, “Machine learning in clinical decision making,” *Med*, vol. 2, no. 6, pp. 642–665, 2021. doi:10.1016/j.medj.2021.04.006

[2] Machine learning is increasingly being integrated into clinical practice, with its applications ranging from pre-clinical data processing to early warning, as part of primary and secondary prevention. [3] The article aimed to provide an overview of machine learning in clinical decision-making and discussed the challenges and pitfalls in their applications. [4] The scope of the article includes pre-clinical data processing, bedside diagnosis assistance, patient stratification, treatment decision-making and early warning as part of primary and secondary prevention. [5] This article provided a broad overview of machine learning in clinical decision-making and could help understand the potential applications of machine learning in identifying diabetic retinopathy. [6] The article discussed the technological, medical, and ethical challenges of integrating machine learning into clinical practice. [7] The article concluded that machine learning has the potential to revolutionize clinical decision-making, but challenges still need to be addressed. [8] This work provided a broad overview of machine learning in clinical decision-making. It could help understanding how machine learning could be applied in diabetic retinopathy diagnosis.

ARTICLE 06

2019/E/011

Week 01

[1] Kamble, Vaibhav V., and Rajendra D., “Automated diabetic retinopathy detection using radial basis function”, Procedia Computer Science, vol.167, no. , pp. 799-808, 2020. Available: 10.1016/j.procs.2020.03.429.

[2] This paper automatically separates retinal images as Non-Diabetic Retinopathy or Diabetic Retinopathy based on the radial basis function [RBF] neural network classifier. [3] Radial basis function [RBF] analysis of retinal images is one of the research approaches used in the paper to design an automated system for diagnosing diabetic retinopathy. [4] As stated in the title, the focus of this paper is on the creation and assessment of an automated system for diabetic retinopathy utilizing RBF. [5] Insights into one technique for detecting diabetic retinopathy are provided in this research, which can be contrasted with molecular data-based methods. [6] The absence of a thorough comparison with other diabetic retinopathy detection techniques and a potential lack of generalizability to different demographics or data sets could be considered the paper's limitation.[7] The system was tested using two datasets and achieved a sensitivity of 0.83 and 0.94, respectively. The researcher suggested incorporating multiple classifier systems [MCS] to improve the system's accuracy. [8] This research also used machine learning algorithms to separate DR and non-DR patients.

ARTICLE 07

2019/E/011

Week 02

[1] Das, D., Biswas, S.K. and Bandyopadhyay, S., “A critical review on the diagnosis of diabetic retinopathy using machine learning and deep learning”, *Multimedia Tools and Applications*, vol.81 [18], no., pp.25613-25655, 2022. Available: 10.1007/s11042-022-12642-4.

[2] This article reviewed the studies related to automatic diabetic retinopathy detection systems using deep learning methods and images. [3] The research methodologies used in this work involve a systematic evaluation and analysis of pertinent papers. The paper's objective is to critically examine the body of literature on the diagnosis of diabetic retinopathy using machine learning and deep learning. [4] The scope of this review is to provide a thorough evaluation and critical critique of the machine learning and deep learning methods used to diagnose diabetic retinopathy. [5] This review provides insights into cutting-edge machine learning and deep learning techniques that may be compared to those based on molecular data. [6] Potential biases in the studies that were chosen as examples and the lack of a direct comparison to identification techniques based on molecular data may be considered this paper's shortcomings. [7] ML and DL can improve the diagnosis of DR. These techniques are more accurate than traditional methods of DR diagnosis. [8] The paper discussed challenges such as data acquisition, preprocessing, and model constraints. These discussions and challenges are helpful for our research.

ARTICLE 08

2019/E/011

Week 03

[1] Gupta, S., Thakur, S. and Gupta, A., “Optimized hybrid machine learning approach for smartphone based diabetic retinopathy detection”, *Multimedia Tools and Applications*, vol.81 [10], pp.14475-14501, 2022. Available: 10.1007/s11042-022-12103-y.

[2] This paper's introduction gives a general overview of the issue of diabetic retinopathy and proposes a hybrid machine learning approach that has been tailored for smartphone technology. [3] The aim of the research paper is to build and improve a hybrid machine learning strategy for the diagnosis of diabetic retinopathy utilizing data obtained from smartphone imaging. The research methodologies entail putting the suggested methodology into practice and evaluating it. [4] The scope of this study is to build and improve a hybrid machine learning approach that is designed exclusively for smartphone-based diabetic retinopathy identification. [5] This paper is helpful and interesting as it is using machine learning to detect diabetic retinopathy, particularly as it explores the potential of smartphone-based images. [6] The model was developed and evaluated using a small dataset of fundus images. Further studies are needed to confirm this paper's findings as the sample size is very small. [7] The optimized hybrid machine learning approach can accurately and efficiently detect diabetic retinopathy in a smartphone-based platform which can potentially improve healthcare access for diabetic patients. [8] This paper examines the performance of a machine learning strategy for smartphone-based DR detection.

ARTICLE 09

2019/E/011

Week 04

[1] Nomura, A., Noguchi, M., Kometani, M., Furukawa, K. and Yoneda, T., “Artificial intelligence in current diabetes management and prediction”, *Current Diabetes Reports*, vol.21[12], pp.61, 2021. Available: 10.1007/s11892-021-01423-2.

[2] Artificial Intelligence [AI] can potentially improve diabetes care by automating tasks, making personalized recommendations, and predicting future outcomes. [3] The research conducted a literature assessment on the application of AI to the prediction and management of diabetes. Additionally, it recognized the corresponding potential and difficulties. [4] In the paper, numerous AI applications for managing diabetes were discussed, including automated retinal screening, clinical decision support, population risk prediction, and patient self-management tools. [5] This paper provided a comprehensive overview of the current state of AI in diabetes care. [6] The paper focused on the opportunities and challenges of AI in diabetes management and prediction. Still, it did not provide a detailed discussion of specific implementation strategies or technical aspects of AI. [7] According to the paper's conclusion, the suggested optimized hybrid machine learning approach shows good results for smartphone-based diabetic retinopathy detection, indicating potential for widespread screening and early identification. [8] The authors found that AI-based models can outperform traditional methods in the detection of DR. AI could be a valuable tool for early diagnosis and treatment of this disease.

ARTICLE 10

2019/E/011

Week 05

[1] Miotto, R., Wang, F., Wang, S., Jiang, X., & Dudley, J. T., Deep learning for healthcare: review, opportunities and challenges, Briefings in bioinformatics, vol.19[6], pp.1236-1246, 2018. Available: 19/6/1236/3800524

[2] Deep learning is effective in various healthcare applications including disease diagnosis, prognosis, and treatment planning. [3] The current state of DL in healthcare was examined, along with the benefits and drawbacks of employing this technology, in this report. It also made suggestions for further research. [4] In relation to DL in healthcare, the paper discussed a number of subjects. [5] This paper is helpful for researchers in the field of healthcare and provides a comprehensive overview of the potential uses of deep learning in healthcare. [6] This paper may have some drawbacks, including a potential lack of precise methodology for molecular data analysis and a lack of special attention on the performance comparison of various molecular data in the detection of diabetic retinopathy. [7] The authors concluded that DL has the potential to revolutionize healthcare. However, they also alert us that several challenges must be addressed before applying this technology. [8]The authors discussed the potential of DL to improve the accuracy of disease diagnosis, which supports the scope of our study.

In summary, this response contains eight sentences covering the following aspects:

1. Citation
2. Introduction
3. Aims and Research methods
4. Scope
5. Usefulness to our research
6. Limitation
7. Conclusion
8. Reflection.