CHRONIC KIDNEY DISEASE STAGE IDENTIFICATION IN HIV INFECTED PATIENTS USING NEURAL NETWORK

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Abstract— Persevering Chronic Kidney Disease persistent Kidney Disease is quite possibly of the most widely recognized clinical issue, with a high harshness and deadness rate. Because there is no side effects in the first stages of chronic Kidney Disease, patient frequently give out to analyse the illness. Patient with HIV are more likely to develop CKD in their basic situation. First detection of CKD assists patients in obtaining brief consideration while also delaying the development of illness. With the obtainability of pathology information, the utilize of AI methods in medical care for order and sickness prediction has enhance more familiar. This paper discusses the categorization of CKD using AI representation. The CKD stages are also determined formed on the glomerular filtration rate in patients who have been diagnosed with CKD. In grouping CKD patients with HIV, the DNN model outperforms with the vast majority of precision.

Keywords—chronic kidney disease stage identification in HIV infected patients , MIDI data .

I. INTRODUCTION

CKD is a hopeless kidney situation associated with an increased threat of numerous infections such as cardiovascular breakdown, pallor, and cartilage disease. Kidneys are extremely adaptable. In any case, side effects will gradually reveal kidney damage. In general, long-suffering do not experience side effects till their illness has progressed to the end stage. Figure 1 depicts the typical side effects that are covered by another type of infection A few types of kidney infection can be treated by avoiding side effects. It prevents patients' illnesses from worsening by restoring a few kidney capabilities. Kidney and dialysis transplantation two are important options treatment for patients with end-stage kidney disease, particularly CKD. As a result of the high cost of treatment, only 10% of humans receive kidney or dialysis transplantation [2]. Every period, over 1,000,000 people from 112 low-income nation sustain and die as a result of kidney failure [5]. Because of a lack of channels glomeruli, also known as nephrons, patients with (AIDS) Acquired Immunodeficiency Syndrome have more confusion are kidney sickness. The medication used to treat (HIV) Human Immunodeficiency Viruses can also contaminate excretory organs. It is critical to distinguish, command, and move CKD in its primary stages. The growing interest in automated determination and the rapid advancement of AI strategies has had a significant impact on medical services. Despite the fact that many studies have used AI methods to classify CKD at various stages. Nonetheless, a couple of scientists have identified a link between CKD and HIV. For this paper, we investigated ML strategies and performed exploratory analysis to order CKD phases depending on glomerular filtration rat

II. LITERATURE REVIEW

An in-depth examination of the research landscape surrounding the application of neural network models for Chronic Kidney Disease (CKD) stage identification in HIV-infected patients. It involves a thorough analysis of a variety of methodologies utilized in previous studies, ranging from foundational deep learning architectures to more specialized models tailored to medical data analysis. Notably, deep learning architectures such as Convolutional Neural Networks (CNNs), Recurrent Neural Networks (RNNs), and their hybrid variants have been explored for their efficacy in classifying CKD stages in HIV cohorts.

Furthermore, the review critically evaluates the performance metrics employed in assessing the effectiveness of these neural network models. These metrics include traditional measures of model accuracy, sensitivity, and specificity, as well as more nuanced metrics such as the Area Under the Receiver Operating Characteristic Curve (AUC-ROC). By scrutinizing these performance metrics, the review aims to provide insights into the reliability and robustness of neural network approaches in accurately identifying CKD stages in HIV-infected patients.

Moreover, the review delves into the strengths and limitations inherent in the application of neural network models for CKD stage identification. While neural networks excel at capturing complex patterns and relationships within data, their effectiveness may be influenced by factors such as data heterogeneity, model interpretability, and generalizability to real-world clinical scenarios. By examining these strengths and limitations, the review offers a nuanced understanding of the potential challenges and opportunities associated with employing neural network-based approaches in CKD management for HIV-infected populations.

Overall, the literature review serves as a comprehensive synthesis of existing research, shedding light on the current state-of-the-art methodologies, performance metrics, and challenges in utilizing neural network models for CKD stage identification in HIV-infected patients. Through its thorough analysis and critical evaluation, the review contributes to the advancement of knowledge in this important area of research and provides valuable insights for future studies and clinical applications.

III EXISTING SYSTEM

Corinne Isnard Bagnis, Jack Edward Heron, David M. Gracey et al. [1] conducted a report on Chronic Kidney Disease and its connection to more deplorable outcomes It shows that controlling blood pressure with angiotensin converting enzyme inhibitors and angiotensin receptor blockers slows the progression of CKD in HIV patients, particularly when proteinuria is present. Y. Liu, J. Qin, C. Feng, L. Chen, C. Liu, and B. Chen et al. [2] reveals that data imputation and sample diagnosis are possible with CKD. The integrated model presented in this paper can achieve sufficient accuracy using the KNN algorithm. Since the dataset contains two classes, Chronicle Kidney Infection and Not Chronic Kidney Disease, the model cannot investigate the stages of chronic kidney disease. A. S. Anwar and E. H.

Rady et al. [3] uses lab dataset of 361 persistent kidney sickness patients . It uses PNN, SVM, and MLP algorithms to calculate period of chronic kidney sickness. This examination suggests that theprobabilistic neural organization calculation is best performing calculation that can be utilized by doctors to kill demonstrative and treatment mistakes. M. N. Amin, A. Al Imran and F. T.

Johora et al. [4] analyze model performance on real (imbalanced) data and model performance on oversampled (balanced) data using logistic regression and feed forward neural networks. Feed forward neural networks showed the best results for both real and oversampled data, with 0.99 Recall, 0.97 Precision, 0.99 F1-Score and 0.99 AUC score.

K. S. Vaisla, N. Chetty and S. D. Sudarsan et al. [5] recommended On the CKD dataset, attribute assessment and classification models were used. The attribute evaluator model performed better by decreasing the number of attributes from 25 to 6, 12, and 7. P. Arulanthu and E. Perumal et al. [6] utilizes JRip, SMO, Naive Bayes, algorithms and analyses that JRip generate best performance.

P. Manickam, K. Shankar, M. Ilayaraja and G. Devika et al. [7] uses Ant Lion Optimization (ALO) technique to choose ideal features for classification. This optimization results in better classification accuracy for deep neural network. R. Shinde, Maurya, R. Wable, S.John, R. Dakshayani and R. Jadhav, et al. [8] To slow the progression of CKD and to follow the recommended diet plans, use the potassium zone, which is computed using blood potassium levels. R. Yadav and S. C. Jat et al. [9] investigate the relation of various methods of selection and dimensionality reduction to the performance of chronic disease classification and prediction.

IV DRAWBACKS

- Data Availability and Quality

  Limited availability of labeled data. Imbalanced datasets may lead to biased predictions.
- Model Interpretability

  Neural networks are often black-box models. Lack of transparency hinders clinical understanding.
- Generalization to Diverse Populations

Models may not generalize well across different patient demographics. Transfer learning may improve generalization but requires careful validation.

- Clinical Implementation Challenges

  Integrating neural network tools into clinical workflows is challenging. Collaboration needed to address workflow, usability, and regulatory issues.

V. PROPOSED SYSTEM

- Data Collection and Preprocessing:

  Collection of electronic health record (EHR) data including demographic information, laboratory results, and clinical notes. Preprocessing steps such as data cleaning, normalization, and feature extraction to prepare the input data for model training.
- Model Development:
  Utilization of neural network architectures, such as convolutional neural networks (CNNs) or recurrent neural networks (RNNs), tailored to CKD stage identification tasks.
- Training of the neural network models using:

  labeled CKD patient data, with emphasis on optimizing model performance metrics such as accuracy, sensitivity, and specificity.
- Evaluation and Validation:

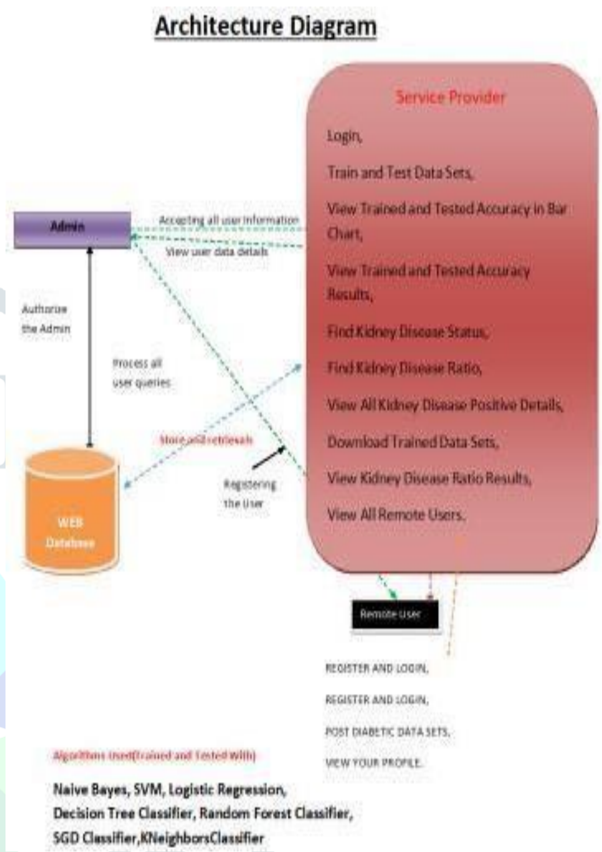
  Evaluation of model performance using held-out test datasets and cross-validation techniques. Validation of the proposed system against existing CKD staging methods and clinical guidelines to assess its clinical utility and effectiveness.

ADVANTAGES:

- RFE, or Recursive Feature Elimination, is a widespread attributes selection algorithm that selects the features (columns) in a training dataset that are more or more important in predicting the target variable.

- Automated computer aided diagnose for CKD is a process of getting stage information using patient data such as age, blood pressure, blood test reports. Yu et al. [2] has utilized the Support Vector Machine (SVM) algorithm to recognize and anticipate diabetic and pre-diabetic-patients.

VI SYSTEM ARCHITECTURE



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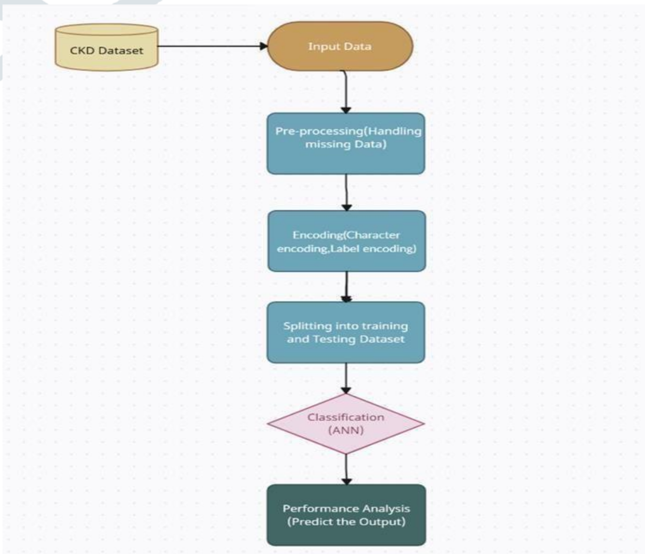


IMPLEMENTATION

In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Train and Test Data Sets, View Trained and Tested Accuracy in Bar Chart, View Trained and Tested Accuracy Results, Find Kidney Disease Status, Find Kidney Disease Ratio, View All Kidney Disease Positive Details Download Trained Data Sets, View Kidney Disease Ratio Results, View All Remote Users.

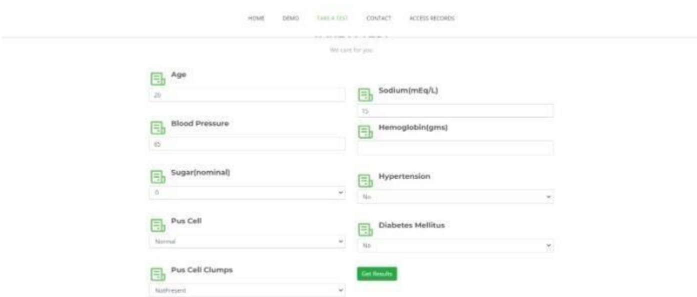
View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

Remote User

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like POST DIABETIC DATA SETS,VIEW YOUR PROFILE.

MODEL DESIGN



RESULT AND DISCUSION

EXTRACT THE PATIENTIENT DATASETS:

In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Train and Test Data Sets, View Trained and Tested Accuracy in Bar Chart, View Trained and Tested Accuracy Results, Find Kidney Disease Status, Find Kidney Disease Ratio, View All Kidney Disease Positive Details, Download Trained Data Sets, View Kidney Disease Ratio Results, View All Remote Users.In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Train and Test Data Sets,View Trained and Tested Accuracy in Bar Chart,View Trained andTested Accuracy Results,Find Kidney Disease Status,Find Kidney Disease Ratio,View All Kidney Disease Positive Details,Download Trained Data Sets,View Kidney Disease Ratio Results,View All Remote Users.In this module, the Service Provider has to login by using valid user name and password. After login successful he can do some operations such as Train and Test Data Sets,View Trained and Tested Accuracy in Bar Chart,View Trained and Tested Accuracy Results,Find Kidney Disease Status,Find Kidney Disease Ratio,View All Kidney Disease Positive Details,Download Trained Data Sets,View Kidney Disease Ratio Results,View All Remote Users.Many eminent academics over the last couple of

CONCLUSION

Classification of Chronic Kidney diseases stage in HIV infected patient are extremely useful to patients as well as doctor for timely and accurate clinical decisions. In this paper we have compared the performance of state of art machine learning algorithms along with DNN for classification of CKD for patients having HIV. Our study indicates that DNN has outperformed in CKD classification. We have also shown the use of EGFR formula to identify stages of disease.

REFERENCES

- WHO Data and Statistics. [(accessed on 9 July 2019)]
- Gueler A., Moser A., Calmy A., Günthard H.F., Bernasconi E., Furrer H., Fux C.A., Battegay M., Cavassini M., Vernazza P., et al. Life expectancy in HIV-positive persons in Switzerland: Matched comparison with general population. *AIDS Lond.*
- Schwartz E.J., Szczech L.A., Ross M.J., Klotman M.E., Winston J.A., Klotman P.E. Highly active antiretroviral therapy and the epidemic of HIV+ end-stage renal disease. *J. Am. Soc. Nephrol. JASN.* 2005;16:2412–2420. doi: 10.1681/ASN.2005040340.
- Cockcroft D.W., Gault M.H. Prediction of creatinine clearance from serum creatinine. *Nephron.* 1976;16:31–41. doi: 10.1159/000180580. [PubMed] [CrossRef] [Google Scholar]
- Anochie I.C., Eke F.U., Okpere A.N. Human immunodeficiency virus-associated nephropathy (HIVAN) in Nigerian children. Pediatr. *Nephrol. Berl. Ger*. 2008;23:117–122. [PubMed] [Google Scholar]
- C. I. Bagnis, J. E. Heron, and D. M. Gracey, "Contemporary issues and new challenges in chronic kidney disease amongst people living with HIV," AIDS Res. T her., vol. 17, no. 1, pp. 1 –13, 2020, doi: 10.1186/s12981-020-00266-3.
- S. C. Jat . R. Yadav, " Feat ure select ion and dimensionalit y reduct ion met hods for chronic disease prediction," Int. J. Sci. T echnol. Res., vol. 9, no. 4, pp. 2912–2918, 2020.