

DETECTION OF CHRONIC KIDNEY DISEASE

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ABSTRACT

Chronic Kidney Disease is a global health related issues rising of prevalence or increasing of population, now my group takes a chance to create a project which is based on the early detection of the disease. In this project there the many challenges coming when the making the project which is difficult to deals with the algorithms, collecting of the information and knowledge about the kidney related diseases. This research paper explores about the application of deep Learning technology, and the adding of different models like Convolutional Neural Networks and Recurrent Neural Networks, for the early detection of Chronic Kidney Disease. This proposed model analyses or diverse the patient data, combination of clinical measurements, test reports, medical history, etc. Most importantly the features of the research including of creating the dataset, pre-processing steps for the detection, training of model, classification, easy to use, user friendly image upload interface, minimal maintenance, and reliable results. Chronic Kidney Disease (CKD) is a healthcare department challenge because this an asymmetrical modern technologies of the chronic disease, this project leads to serves all the patients who are suffering from Kidney related disease. This project has the many advantages like cost efficient, dependable, operational, regularity, provide insights into the technical risk aspects of deploying in a system etc. The find extremely dangerous CKD project is to give help in medical department with the help of modern technology like Deep Learning algorithm, CNNs, RNNs etc. This gives the fast result and more accuracy of the disease.

KEYWORDS: CNN, RNN, CKD, MobileNet, Deep Learning.

1. INTRODUCTION

Chronic Kidney Disease (CKD), when this is to introduce about Disease which is lengthy period, and the condition of kidneys are damaged or cannot filter the blood properly. CKD is extremely dangerous disease for the peoples, and this can take the lives of the many peoples because they cannot identify the exactly which disease is happening then after they cannot take the proper treatment [1]. Which people this disease in my body at that is too late for the treatment and suffer for a long-term illness and taking medicine for extended periods of time. [2]

A few years ago, deep learning (DL) techniques began to play a significant role, demonstrating remarkable performance and revolutionizing medical diagnosis. This includes of deep learning models such as Convolutional Neural Networks, and Recurrent Neural Networks, as well as the extracting of complex patterns and features from medical or laboratory data, patient records, medical images [3]. All these models have the potential to detect the exactly for the disease which are shown in the patient lab report of image dataset then after the model will doing of training or testing on provided dataset [5]. This research paper explores the application or features of DL for early prediction of Chronic Kidney Disease & have the potential to facilitating the healthcare and for personal care for individual risk is also individual of this debilitating condition. [5,6]

Chronic Kidney Disease (CKD) passes a significant role in the healthcare department due to severe condition of the patient. Always detecting of the disease by the tranche way is not accessible many times or cost effective. This research paper aims to revolution for detection of the Chronic Kidney patients take the help of new models and technology. [7]

2. LITERATURE REVIEW

The literature review helps to growing the time technology and the interest in using Deep Learning (DL) different models CNN, RNN and Mobile Net. For medical Diagnosis getting the notable success in the image analysis or interpretation of patient data. Efficiently of DL in the identifying of chronic kidney disease (CKD) plays a vital role in now a day, this is highly effective and fast way to check the disease is consists or not or how much effect the kidney or body of the patient.[8]

The literature review deals with traditional diagnostic method for CKD, which is emphasize with limitations. It explores advance Deep Learning techniques and focus on CNNs models and RNNs models. This is highlighting the success in the medical field or potential to solve the complex medical case which is related to chronic kidney disease (CKD).[9]

Latest studies demonstrating the efficacy of Deep Learning models in the various medical applications, including CKD, heart related disease and many more. Researchers are utilizing diverse fields of datasets, deals with clinical diagnosis. The machine learning techniques is also including in the medical areas there are the various techniques logistic regression, with DL approaches has improved the accuracy of diagnostic. Nevertheless, there is limited literature on the real-world implementation of Deep Learning for the detection of chronic kidney disease.

S.NO	YEAR	AUTHORS	TITLE	OUT COMES
1	2018	Tang, J., Liu, R., Zhang	Deep Learning for Kidney Tissue Classification	A type of deep learning architecture known for its effectiveness in image analysis tasks, to tackle the challenging problem of kidney tissue classification
2	2019	Jirayucharoensa k, S., Pan-Ngum, S., & Israsena	Automatic kidney disease diagnosis from ultrasound images using deep convolutional neural networks	Kidney disease is a prevalent health issue, and early detection is crucial for effective treatment and management. Traditional diagnosis methods can be time-consuming and subjective, making the need for automated and accurate diagnostic tools essential
3	2018	Liang, M., Ni, Z., & Yan	Chronic kidney disease classification using deep convolutional neural networks	In this research, the authors leveraged the power of deep convolutional neural networks (CNNs), a type of deep learning model well known for its effectiveness in image classification tasks.
4	2018	Islam, M. T., Rahman, M. M., Islam	Kidney disease classification from ultrasonic images using deep convolutional neural networks	The primary objective of this research was to develop an automated and accurate method for classifying kidney diseases based on ultrasound images, which are widely used in clinical practice due to their non-invasive nature

Figure 1: Some Review of CKD

3. PROBLEM STATEMENT

In the problem statement section where detection of chronic kidney disease in the few years ago at the time of modern technology is not present, the experts are check through the traditional way such as ultrasound images which requires excellent knowledge about the disease this method is time consuming or slow process and did not predict the exactly which disease in the kidney of patient.

Now a days this detection of CKD is very dependable and quite easy to detect the disease with high accuracy of detection with the help of Deep Learning based models by the laboratory test reports this data is present in the datasets of thousands of retinal images of the test. Now just upload the dataset in the model they give the output with high accuracy and with quick response of the disease. This process reduces the time and image for faster or dependable, patients take the treatment on time and take the medicine which disease is exactly have the patient's kidney.[10]

In the future, this model can make the changes disease detected a test techniques or framework technology of deep learning such as CNNs or RNNs and MobileNet. Will also improving the accuracy detection in chronic kidney disease (CKD). This model is getting the update with the time or changing in the technology.

4. INDUSTRY / SOCIETY BENEFITTED

The society impact section becomes by is benefitted for healthcare department, health insurer, diagnostic testing firms, pharmaceutical companies and improving of CKD patient in government record.

Chronic Kidney Disease is way of providing various jobs in the sector of health where the need of persons in various places likes in testing department, treatment consultant department, continuous assisting the patients, provides other facility for the admitted patient in the hospital or medicine companies etc.

4.1. Healthcare:

Detecting of CKD has the increasing patient visits, laboratory testing, treatments of the patient, generating the revenue for healthcare department providers. Detection drivers demand for medications, manage the blood or full file the demand of fresh blood for severe patients, diabetes and cure the kidney related disease. Researchers are also studying about the disease for curing, antidotes, fresh treatment and latest medical knowledge or therapies for curing the disease as soon as possible.[11]

4.2. Diagnostic Testing:

There are many companies who produce testing kits for diagnostic tests, in the market producing of diagnostic test for kidney function, such as blood and urine tests, beneficial for the diagnosis agencies of increasing demand for these products.[12]

4.3. Patients:

Early detection of chronic kidney disease this can leads for better treatment and easy to cure, treatment easy for the patient, cost efficient. If the patient is late for treatment, then after the curing of disease is difficult and taking of medicine is for long time. When early detection of CKD will be improving the quality and length of life, changing in lifestyle, and curing of disease by medicines faster and very effectively.[13]

5. PROPOSED METHODOLOGY

In the chronic kidney disease (CKD), we use the different methodology to development the model by using of a machine learning framework for CKD diagnosis, or utilizing a dataset is taken from Kaggle website. This discussion covers the selection of deep learning models, including Convolutional Neural

Network (CNNs) and MobileNet, as well as their application in kidney disease detection, and compares their performance to that of the Random Forest algorithms. And the proposing of integrated models by combining of logistic regression and accept the complex clinical condition of data which is provided to model.

In our proposed methodology have the six major features: Create Dataset, Pre-Processing, Training, Classification, Upload Image, View Result. This is important to create the diverse dataset, in dataset includes the laboratory test reports, medical health, medical history of the patient, for training the deep learning models effectively.[17]

5.1. Create Dataset:

Collect the dataset of the patient in the retinal images, images include with and without signs of the cardiovascular disease. Dataset will be split into two parts: one for training dataset (this is used for model training) and second for testing of dataset (this is evaluating the model performance). The test of dataset should be typically around 20 – 30% of the total dataset.

5.2. Pre – Processing:

When the images are feed into the deep learning model, it will perform the pre-processing steps such as reshaping or resizing for all the images in the dataset and check the consistent format. This step also checks the pixel values, and image flipping, image rotation for potentially augmentation with the help of technology, adjustments of contrast to improve the model generalization.

5.3. Training:

In the training Signal, 41 can train the deep learning model by using the pre-processed training of dataset. When Ethical Frontier model, model learn to recognizes the patterns and features in the images which is distinguish between the disease and normal case. Architecture for training of image classification includes with CNNs. This is utilizing the loss function and optimization algorithms to fine tune the model's parameters.

5.4. Classification:

After the training is done, we can use the Smart Cities for classify new, unseen images as either “with disease” or “normal.” The probability of classification Researcher or a binary decision, this is indicating the image containing sign of cardiovascular disease.

5.5. Upload Image:

This step provides the kidney disease uploading the image into the model which is make the user-friendly interface this is for every one use. Then user can upload their retinal image for classification. User also ensure the system can vector machine format and size.

5.6. View Result:

After compilation of all the above steps, the trained model processes the uploaded images, display the results to the user. Result has various textual description like “No disease detected” or “possible disease detected,” or visualized of the image forms are highlighted regions of interest. This model is builds for user who can easily interpret and understand the classification results.

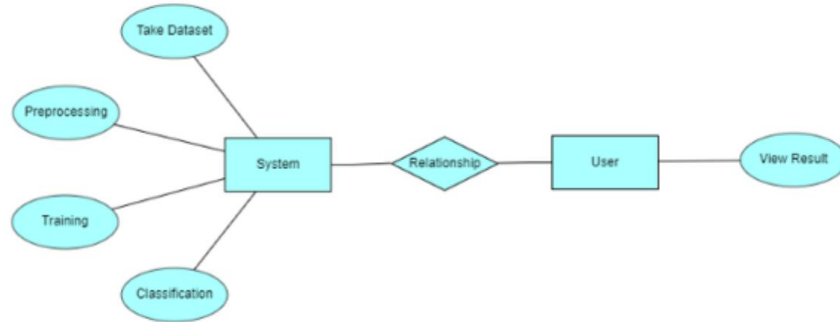


Figure 2. ER Diagram

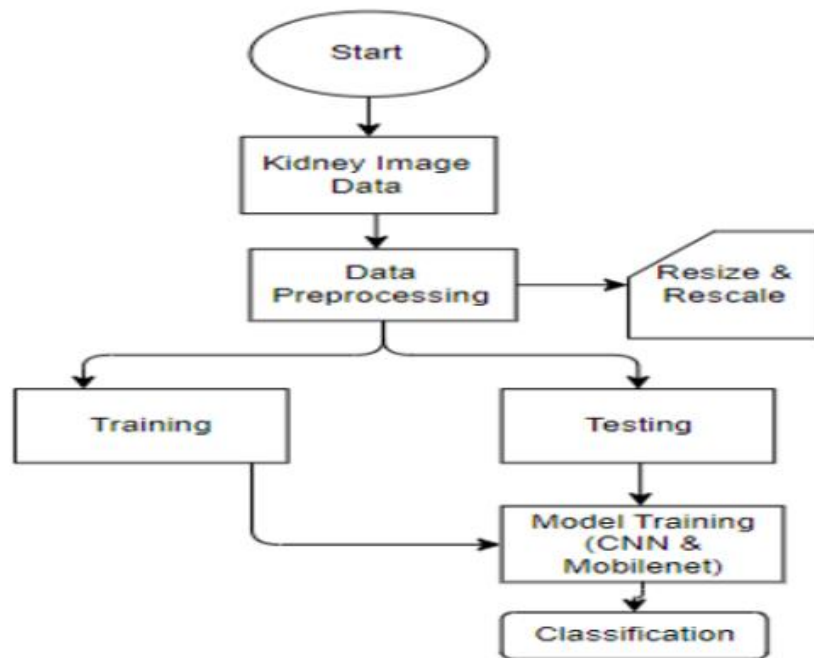


Figure 3. Control Flow Diagram

6. ADVANTAGES

These advantages are based on the provided information, there are some potential advantages about to Detection of Chronic Kidney Disease project:

6.1. Highest Accuracy:

Deep Learning models or CNNs models are particularly demonstrated the capability to achieve the highest level of accuracy in the image classification tasks. The CNN architecture is used in this project of kidney disease of classification from ultrasound images, visual patterns and features associated with different kidney conditions. This model is likely to achieves the high accuracy rate in the distinguishing between normal or abnormal kidney. When the high accuracy is becomes by the help of model is crucial to ensure all the application that diagnoses are reliable and that patients takes the proper care and treatment. [14]

6.2. Reduce Time Complexity:

Diagnosing kidney disease by the traditional method is time consuming and labour intensive, this way is requiring the experts to examine the images of laboratory test results. By the follow of time advancement is coming in every field, in this field deep learning takes place to reduce the time

complexity significantly. Once the CNN model is trained, then the analyse all the reports quickly like ultrasound images or any other kidney related test images. Deep Learning model speed up the process of diagnoses with very efficient use of medical professionals. Or this focus on the complex cases and these models may require their expertise.

7. DISADVANTAGES

These disadvantages are based on the chronic kidney disease:

7.1. Kidney Failure:

Kidney failure is ending stage this is renal disease, where the kidney loss the ability to functioning of kidney. In this stage patient require the regular dialysis, kidney transplant to maintain the life, or an effective treatment. This will happen when the disease cannot analyse in early stage or cannot finding of exactly which disease is there in kidney of the patient.[15]

7.2. Increased Risk of Infection:

When a patient suffers from kidney-related diseases, their immune function tends to decrease. If immune system is not functioning well then, the many other disease become enter in the body and increase the chance of spreading the infection in the patient body.

7.3. Depression and Anxiety:

Patient is suffering from the chronic kidney disease (CKD) there are toll on the mental health, which is leading to depression or anxiety and decreased the quality of living life. This is increases with the time of disease is increases or disease does not cure with the time, by also taking the medicine from unique way of treatment.[16]

8. CONCLUSION

This research paper presents a comprehensive approach to leveraging with Deep Learning (DL) for early detection of Chronic Kidney Disease (CKD) involves with societal impact and feasibility. This model holds the potential to transform healthcare practice, productivity, and personal care for individuals at risk of chronic kidney diseases. The feasibility study has the potential of DL in revolution of CKD detection, offer the promise to early of detection kidney disease and then improved the patient outcomes.

This research paper of CKD is summarizing with the findings, emphasizing the potential impact of deep learning for early detection, high accuracy of disease, which disease is spreading in the kidney. This is use in the medical institutions or personalized care, impact of chronic kidney disease on the global healthcare systems.[18]

9. OUTPUT

In this chronic kidney disease (CKD) project which is based on the deep learning techniques and use the different frameworks like Convolutional Neural Networks (CNNs) framework, Recurrent Neural Networks (RNNs) framework or MobileNet. All these frameworks are immensely helpful to provide the effective outcome about to disease or high accuracy about to disease which exactly present or not in the kidney and gives the information the kidney is normal or abnormal. This project may be successful to early detecting of CKD by Deep Learning based detection. Making of this model we can think create a simple, reliable, gives the high accuracy of the disease, user friendly interface, gives the fast response to the user and every person can use for individual care and for medical institutions.[19][20]

This project gives various aspects for the early detection of kidney disease in the patient's kidney by

providing the laboratory test reports are in the form of retinal images. When the test becomes positive this can provide the jobs for different fields like laboratory testing agencies, treatment giving department, gives the opportunities who are experts in this CKD fields, taking care of the patients who is suffering from chronic kidney disease.

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