IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# A MACHINE LEARNING METHODOLOGY FOR DIAGNOSING CHRONIC KIDNEY DISEASE

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## 1. INTRODUCTION

In the current digital world nearly ten percent of the world population suffers from Chronic Kidney Diseases undergoing very expensive dialysis process and drug administration. To overcome this we automated the CKD prediction using Deep Learning methods. Deep learning is a subset of machine learning technique consists of many deep hidden layers to produce a better results and it mainly used in Medical Field.These advances of Deep Learning technique could help the society for life saving Medical diagnostics methods by earlier detection. Such a detection could lead to early therapy and move towards better monitoring to save the major organs like kidney, heart, etc.

## 2. LITERATURE SURVEY

[1] People with diabetes and chronic kidney disease (CKD) [1]are at high risk for kidney failure, CKD The International Diabetes Federation estimates that 537 million people were living with diabetes in 2021, with an expected increase to 784 million by the year 2045.

[2] The most common type of kidney stone is calcium oxalate formed at Randall's plaque on the renal papillary surfaces. The mechanism of stone formation is a complex process which results from several physicochemical events including supersaturation, nucleation, growth, aggregation, and retention of urinary stone constituents within tubular cells.

[3] We propose a novel deep neural network, the 3D Multi-Scale Residual Fully Convolutional Neural Network (3D-MS-RFCNN) to improve segmentation in extremely large-sized kidney tumors.

## 3. EXISTING SYSTEM AND ITS LIMITATIONS

In existing System, random forest and j48 classification algorithms does not improve the accuracy results. It provides the results with the accuracy of 85.5%. Thendecision tree, K -nearest neighbor and logistic regression model are used to predict chronic kidney disease but it is not to produce the accurate results and F1 score is very less for this model. RDA(Residual-Dense-Attention) -UNET, a new segmentation model based on deep learning, used to segment CT images of renal cysts only. It does not classify the normal, Renal stone and tumor.

### LIMITATIONS

- It does not improve the accuracy results
- Time consuming
- RDA -UNET are only used to identify the renal cyst
- U-Net style architectures is that learning may slow down in the middle layers of deeper models

### PROPOSED SYSTEM AND ITS ADVANTAGES

In the proposed system, a Deep Learning model [3] is used for the early detection and diagnosis of Chronic Kidney Diseases. It can be implemented by using several algorithms to solve complicated issues in large data and it also helps to identify each level of CKD and give suggestions for each level. with the help of BiLSTM, DCNN and RPN based on the Deep Learning model to predict whether the person is affected by CKD or not and it also improves the accuracy of the model.

### ADVANTAGES:

- Predict the tumor types accurately
- CNN method is a segmentation free approach
- Less execution times
- Improve the classification performance
- Handling large dataset efficiently
- Provide accurate prediction results

## 4. METHOD OF DETECTION

### Home

The home page contains the links for admin and user.

### Admin

The admin page requires the login. If the admin gives the correct id and password then it will redirect to the next page else it give an error message.

**Chronic kidney disease prediction**

In this module admin training with the lab test and ct images of the patients are analyzed using algorithms.

**Lab test**

In lab test, the data was taken over a two months period in India with 25 features

( e.g. red blood cell count, white blood cell count, etc). The target output is the 'classification', which is either 'ckd' or 'notckd' (ckd=chronic kidney disease).The classification algorithm is applied here.

**CT image**

In CT images pre-processing steps are applied then it predicts whether it is tumor, stone, normal or cyst deep learning algorithms.[4]

**User**

In this module new patient test results will be uploaded by the doctor by entering username and password.

**New user**

In this module is for new user. The new user has to register them by giving unique username, password, mail id, phone number and address.

**Lab test**

User enter the values of the lab test and predict whether the patient suffers from ckd or not and also identifies the stage of an ckd and make suggestion for it.

**CT image**

User have to uploaded the CT image to predict it is a tumor, stone, cyst or stone using deep learning algorithm.

**Logout**

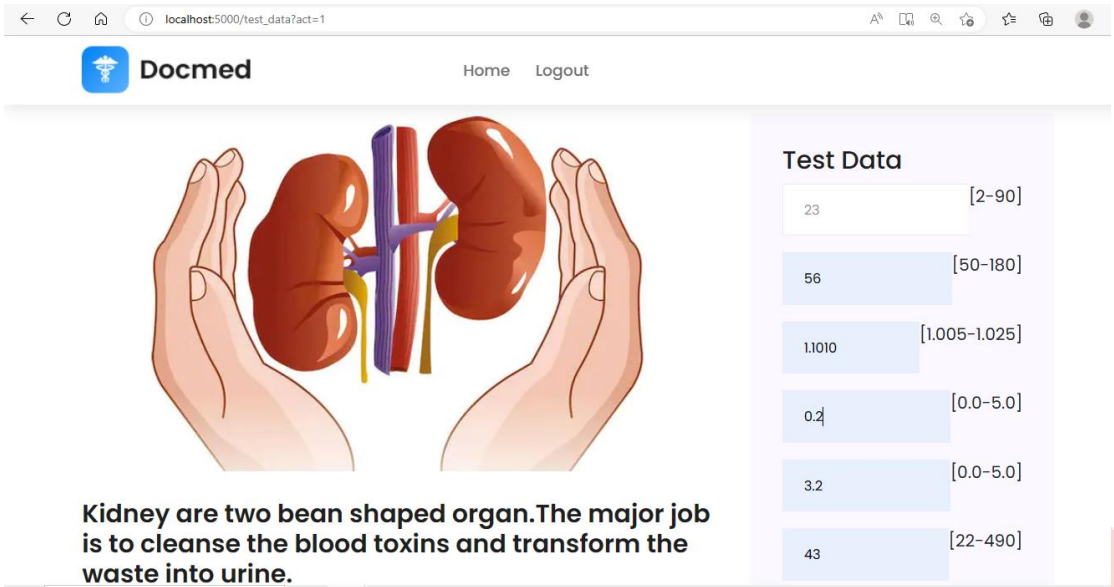
After uploading the results the admin or user logout and return to the home page.

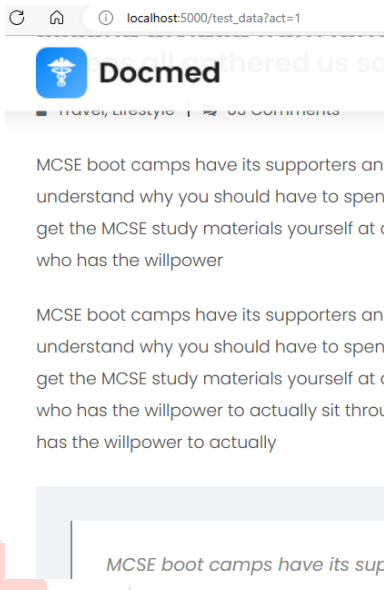
**5.IMPLEMENTATION (sample coding)**

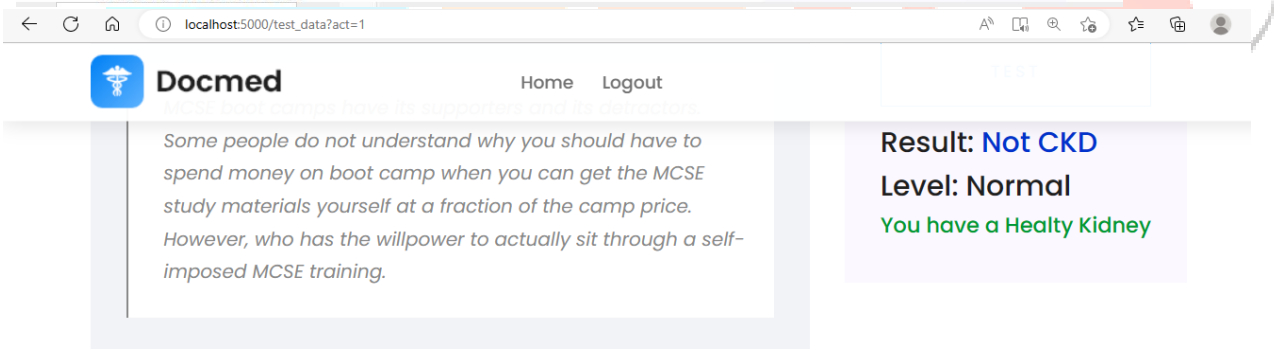
```
if request.method=='POST':
        age=request.form['age']
        bp=request.form['bp']
        sg=request.form['sg']
        al=request.form['al']
su=request.form['su']
bgr=request.form['bgr']
bu=request.form['bu']
sc=request.form['sc']
        sod=request.form['sod']
        pot=request.form['pot']
hemo=request.form['hemo']
      age=float(age)
        bp=float(bp)
        sg=float(sg)
        al=float(al)
su=float(su)
bgr=float(bgr)
bu=float(bu)
sc=float(sc)
        sod=float(sod)
        pot=float(pot)
hemo=float(hemo)
mycursor = mydb.cursor()
    sdata1=[]
    sdata2=[]
    sdata3=[]
    print("level")
    print(level)
    if level=="Mild":
mycursor.execute("SELECT * FROM suggestion WHERE level='Mild' order by rand() limit 0,3")
        sdata1 = mycursor.fetchall()
        print(sdata1)
elif level=="Moderate":
mycursor.execute("SELECT * FROM suggestion WHERE level='Moderate' order by rand() limit 0,3")
```

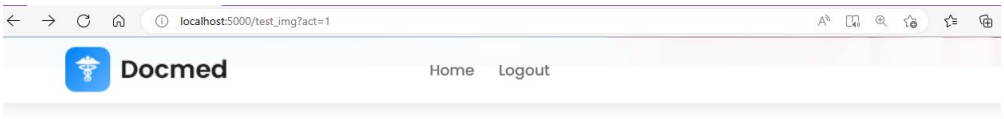
```
    sdata2 = mycursor.fetchall()
elif level=="Severe":
mycursor.execute("SELECT * FROM suggestion WHERE level='Severe' order by  rand() limit 0,1")
    sdata3 = mycursor.fetchall()
```

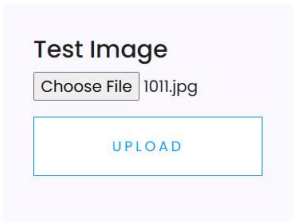
## 6. RESULTS AND SAMPLES FOR DISCUSSIONS




During treatment, it is difficult to accurately distinguish renal cysts, stone and tumor mass from small cystic renal cell carcinoma, which affects the formulation of appropriate treatment plans for patients. The previous studies did not take multiple CT scans for patients. One of the challenges that researchers faced was the availability of data. Usually, the data on medical images are few in terms of numbers, which leads to high

risks from overtraining and subsequently reduced performance. Some solutions that can help to mitigate this problem are using smaller models and augmenting the data. In addition, there is more than one study on the same data set, which affects the limitations of the studies; because of the challenges of collecting data and building data, it takes time and effort. It must be ensured that the data is structured correctly in continuous cooperation with specialists.

The intelligent diagnostic methods aim to perform better with less time and reduce the radiologist's workload. The wrong or inaccurate diagnosis may lead to some risk. Hence, finding a safe and reliable way to detect renal stone, cysts and mass is important for the treatment of patients. In clinical practice, X-rays, CT, and B-ultrasound are commonly used to diagnose patients with the kidney disease. CT scans a part of the human body with X-ray beams to obtain a cross-section or stereo image of the part being examined[3]. It can provide complete three-dimensional information of the part of the body being examined, clearly displaying the organs and structures, as well as the lesions. The biggest advantage is that it can be viewed in layers so that more organizational information can be displayed after calculation. Therefore, the application of CT in kidney examination is a hotspot of current research.

## 7. CONCLUSIONS

Deep Learning (DL)-based automated diagnosis opinion of disease from Medical images had become the latest area of research with DL algorithms blended with Medical Science. Deep Learning will continue to progress rapidly in future because it has numerous advantages over other imaging approaches. The directions for the proposed system revolves around using images and lab test from previous studies and diagnosing all aspects of kidney disease in one process by employing Deep Learning algorithms to produce multi-models that performs detection, classification, segmentation and other tasks. This helps the Medical researchers and doctors to diagnose the patient's condition with high accuracy from and which it leads to the selection of the applicable treatment method for the patient much earlier for saving the life.

## 8. REFERENCES

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