Detection of Liver Cancer Using Image Processing Techniques

Mini Project Report

Submitted by

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Submitted in partial fulfillment of the requirements for the award of the degree of

Master of Computer Applications
Of
A P J Abdul Kalam Technological University

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)®
ANGAMALY-683577, ERNAKULAM(DIST)
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DECLARATION

I, **Kiran Karthikeyan** hereby declare that the report of this project work, submitted to the Department of Computer Applications, Federal Institute of Science and Technology (**FISAT**), Angamaly in partial fulfillment of the award of the degree of Master of Computer Application is an authentic record of our original work.

The report has not been submitted for the award of any degree of this university or any other university.

Date :

Place: Angamaly

FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY (FISAT)®

ANGAMALY, ERNAKULAM-683577

DEPARTMENT OF COMPUTER APPLICATIONS

CERTIFICATE

This is to certify that the project report titled **"Detection of Liver Cancer Using Image Processing Techniques "** submitted by **Kiran Karthikeyan** towards partial fulfillment of the requirements for the award of the degree of Master of Computer Applications is a record of bonafide work carried out by them during the year 2022.

Project Guide **Head of the Department**

Submitted for the viva-voice held on ..... at .....

ACKNOWLEDGEMENT

We are deeply grateful to **Dr.Manoj George** , Principal, FISAT, Angamaly for providing us with adequate facilities, way and means by which we were able to complete our mini project work and I express my sincere thanks to **Dr. C. Sheela** ,Vice Principal FISAT, Angamaly.

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Finally we express our thanks to all my friends who gave me wealth of suggestion for successful completion of this project.

ABSTRACT

Image processing is a processing technique with the help of mathematical operations. It uses any of the form of signal processing. Here the input is an image or video and the output is also an image or a set of image. This technique is also used in medical applications for various detection and treatment.

The use of this project can detect the liver cancer at the early stage by using the scanning image of the patient.Doctors can also benefit from the use of this approach as it can help their work easier and start the treatment process at the early stage and save many lives.Machine learning approach will lead medical industry to a new approach.

Contents

Chapter 1

Introduction

Detection of liver cancer is an important matter in the medical industry. Liver cancer is cancer that begins in the cells of your liver. Your liver is a football-sized organ that sits in the upper right portion of your abdomen, beneath your diaphragm and above your stomach. For this project we used the scanning image of liver means an abdomen part by preprocessing the image and using algorithm we can predict that patience having cancer or notThere are several other factors that leads to cancer. Genetic issues and daily life behavior are some of the factor.We cant able to predict accurately that this person have cancer only by the scanning report also needs so blood sample result.

Proposed model for the detection of liver cancer based on deep learning technique. According to the findings, deep learning-based models have an extraordinary capacity to offer an accurate and efficient system for the detection of liver cancer.

Chapter 2

PROOF OF CONCEPT

Cancer is the abnormal growth of the tissue in an organ. Liver cancer is a type of cancer which affects the largest organ of the abdomen, liver. In the medical field it is very useful to the doctor to detect the cancer using this process.The early stage cancer detection will save so many lives.The main advantage of rather the another cancer the possibility of person to survive is more. So if they can able to find this in early stage that's help more.

In this work, we propose the use of liver scanning image to detect the patient have cancer or not. This may be useful in medical industry so they can able to detect before doing the another test the patient have a healthy liver or having cancer. As per the new surveys the method of treatment will change with the innovation of Artificial intelligence

We present Detection of Liver cancer model using image processing techniques by the use of Support vector machine algorithm. By the available dataset , our model gives 90.90% accuracy for the Cancer prediction. We significantly improve upon the results of Detection of cancer in the same dataset.

Chapter 3

IMPLEMENTATION

The primary step of this research is a SVM is designed to train the model.First step is to collect the useful data in this project that is scanning image of the liver.Collect the both image that having cancer and not.SVM will classify the yes and no sections.

In SVM model the image will be resized into a certain frame pass that into an separate array.By using flatten the image will convert into one dimension.To create model from sklearn import the model function GridSearchCV . It helps to loop through predefined hyperparameters and fit the model on your training set. So, in the end, you can select the best parameters from the listed hyperparameters

3.1 System Architecture

3.2 Dataset

Different Liver scanning images data sets were used in this model,The dataset was created by the help of Manipal College of Health Professions(MCHP). The datasets are classified into two classes having cancer and not having cancer. from this dataset we train our models and choose one with maximum accuracy

3.3 Modules

3.3.1 IMAGE SEPARATION

For the classification task, data were divided into a train (80%), and test (20%) partitions

3.3.2 PREPOSSESSING

As the images come from several area with different image sizes, a prepossessing step is applied to reduce or remove effects on the performance of the models due to data variability.

3.3.3 CLASSIFICATION

There are two classification tasks in this research, first to separate having cancer, and the second one to not having cancer

3.3.4 DEPLOYMENT

Model deployment is simply the engineering task of exposing an ML model to real use. The term is often used quite synonymously with making a model available via real-time APIs.

3.4 ALGORITHM

Understanding SVM

SVM is a very good algorithm for doing classification. It's a supervised learning algorithm that is mainly used to classify data into different classes. SVM trains on a set of label data. The main advantage of SVM is that it can be used for both classification and regression problems. SVM draws a decision boundary which is a hyperplane between any two classes in order to separate them or classify them. SVM also used in Object Detection and image classification.

SVM kernel if you have a large number of features because it is more likely that the data is linearly separable in high dimensional space. Also, you can use RBF but do not forget to cross-validate for its parameters to avoid over-fitting.

Gamma-Kernel coefficient for 'rbf', 'poly' and 'sigmoid'. Higher the value of gamma, will try to exact fit the as per training data set i.e. generalization error and cause over-fitting problem.

Chapter 4

RESULT ANALYSIS

The result of the proposed project Detection of Liver Cancer usingImage Processing Techniques C using Support vector machine lies in developing a handy web app that can successfully predict whether the patient have a healthy liver or not according to the data given by the user.

The proposed system takes user scanning image as input and output the same image that will predict that it is healthy liver or not.

Chapter 5

CONCLUSION AND FUTURE SCOPE

5.1 Conclusion

Liver cancer have possibility of recovery is high if we treat at early stage.After collecting of the dataset (scanning image) and preprocessing the image using different model the SVM model will give the best accuracy of 90.90 .It is assumed that the use of further images in the training stage may help us to improve the performance of model in the future

5.2 Future Scope

Liver cancer patient is increasing now a days by our lifestyle and genetic issue early treatment is the best solution for this.By collecting more images we can improve the model. Also it will be useful if we can able to classify the stages of cancer that will helps more in the medical industry

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Chapter 6

CODING

6.1 Training.ipynb

1. **Importing necessary libraries**

import pandas as pd
import os
from skimage.transform import resize
from skimage.io import imread
import numpy as np
import matplotlib.pyplot as plt
from sklearn import svm
from sklearn.model$_s$*electionimportGridSearchCV*
$from sklearn.model_selection import train_test_split$
$import pickle$
$import cv2$
$from sklearn.metrics import accuracy_score$
$from sklearn.metrics import confusion_matrix$

print('Library Importing Complete')

2. **Loading data**

datadir='C:/Users/Dell/OneDrive/Desktop/liver$_{d}ata1/train/'$

Training / Validation / Testing

$Categories = ['no','yes']$

$flat_{d}ata_{a}rr = []inputarray$
$target_{a}rr = []outputarray$
$foriinCategories:$
$print(f'loading...category:i')$

path=os.path.join(datadir,i)
for img in os.listdir(path):
img$_{a}rray = imread(os.path.join(path,img))$
$img_{r}esized = resize(img_{a}rray,(150,150,3))$
$flat_{d}ata_{a}rr.append(img_{r}esized.flatten())$
$target_{a}rr.append(Categories.index(i))$
$print(f'loadedcategory:isuccessfully')$
$flat_{d}ata = np.array(flat_{d}ata_{a}rr)$
$target = np.array(target_{a}rr)$
$df = pd.DataFrame(flat_{d}ata)dataframe$
$df['Target'] = target$
$x = df.iloc[:,:-1]inputdata$
$y = df.iloc[:,-1]outputdata$

param$_{g}rid = 'C':[0.1,1,10,100],'gamma':[0.0001,0.001,0.1,1],'kernel':['rbf','poly']$
$svc = svm.SVC(probability = True)$

$model = GridSearchCV(svc, param_grid)$

x$_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.20, random_state = 77, stratify = y)$

$print('Splitted Successfully')$

$model.fit(x_train, y_train)$

$print('The Model is trained well with the given images')$

filename = 'C:/Users/Dell/OneDrive/Desktop/liver$_data$1/$model.pkl'$

$pickle.dump(model, open(filename, 'wb'))$

loaded$_model = pickle.load(open('C:/Users/Dell/OneDrive/Desktop/liver_data1/model.pkl', 'rb'))$

3. Eveluate

y$_pred = model.predict(x_test)$

$print("The predicted Data is :")$

$print(y_pred)$

$print("The actual data is :")$

$print(np.array(y_test))$

$print(f"The model is accuracy_score(y_pred, y_test) * 100$

$acc_score = accuracy_score(y_pred, y_test)$

$print(confusion_matrix(y_test, y_pred))$

img=cv2.imread('C:/Users/Dell/OneDrive/Desktop/liver$_data$1/$test/no/1.jpg'$)

$plt.imshow(img)$

$plt.show()$

$img_resize = cv2.resize(img, (150, 150))$

$l = [img_resize.flatten()]$

$probability = loaded_model.predict(l)$

$print("The predicted image is :" + Categories[model.predict(l)[0]])$

6.2 app.py

```
import pickle
import cv2
import time

from flask import Flask, redirect, url_for, request, render_template
from werkzeug.utils import secure_filename
from gevent.pywsgi import WSGIServer

app = Flask(__name__)

filename = 'model.pkl'
model = pickle.load(open(filename,'rb'))
print('model loaded')

def predict(img):
img=cv2.imread(img)
img_resize = cv2.resize(img,(150,150))
l = [img_resize.flatten()]
pre = model.predict(l)
return pre[0]

@app.route('/', methods=['GET'])
def index():
return render_template('index.html')

@app.route('/predict', methods=['GET','POST'])
def upload_image() :
if request.method == 'POST' :
try :
uploaded_file = request.files['file']
if uploaded_file.filename != '':
uploaded_file.save('static/input.jpg')
pre = predict('static/input.jpg')
```

$if pre == 1:$
$res = 'YouhaveLungCancer'$
$else:$
$res = 'YourLungisHealthy'$
$time.sleep(2)$
$returnrender_template('predict.html', pre = res)$
$except:$
$pass$
$else:$
$return 'someerror'$

if $_name_{=='_main_':app.run(debug=True)http_server=WSGIServer(('0.0.0.0',5000),app)http_server.serve_forever()}$

Chapter 7

SCREEN SHOTS

Here I add some sample screenshots of the proposed system which includes,

- Home Screen
- Liver Scanning Upload and Prediction Screen
- Generate Report Screen

Figure 7.1: Home Screen

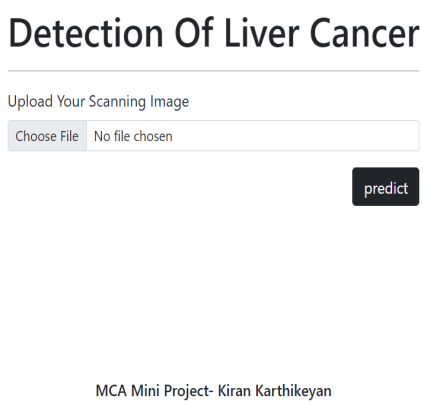


Figure 7.2: Uploading image

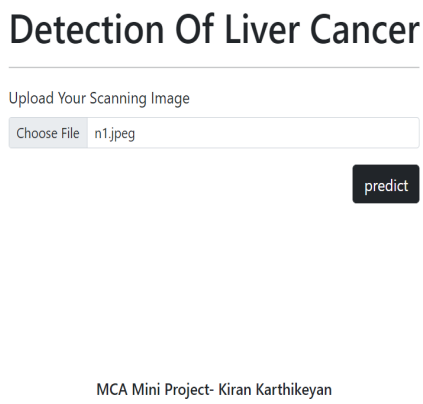


Figure 7.3: Upload and Prediction Screen(Healthy)

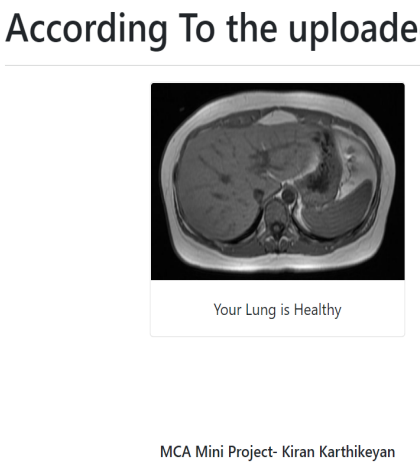
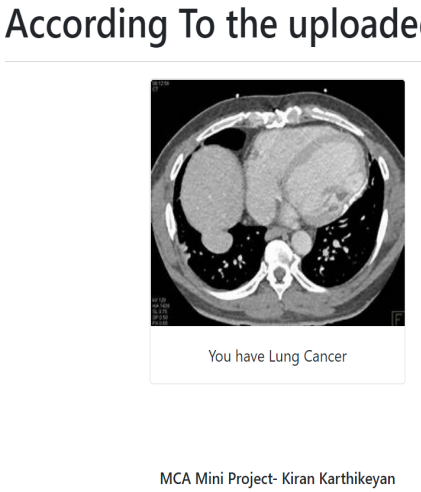


Figure 7.4: Upload and Prediction Screen(Not Healthy)



Chapter 8

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