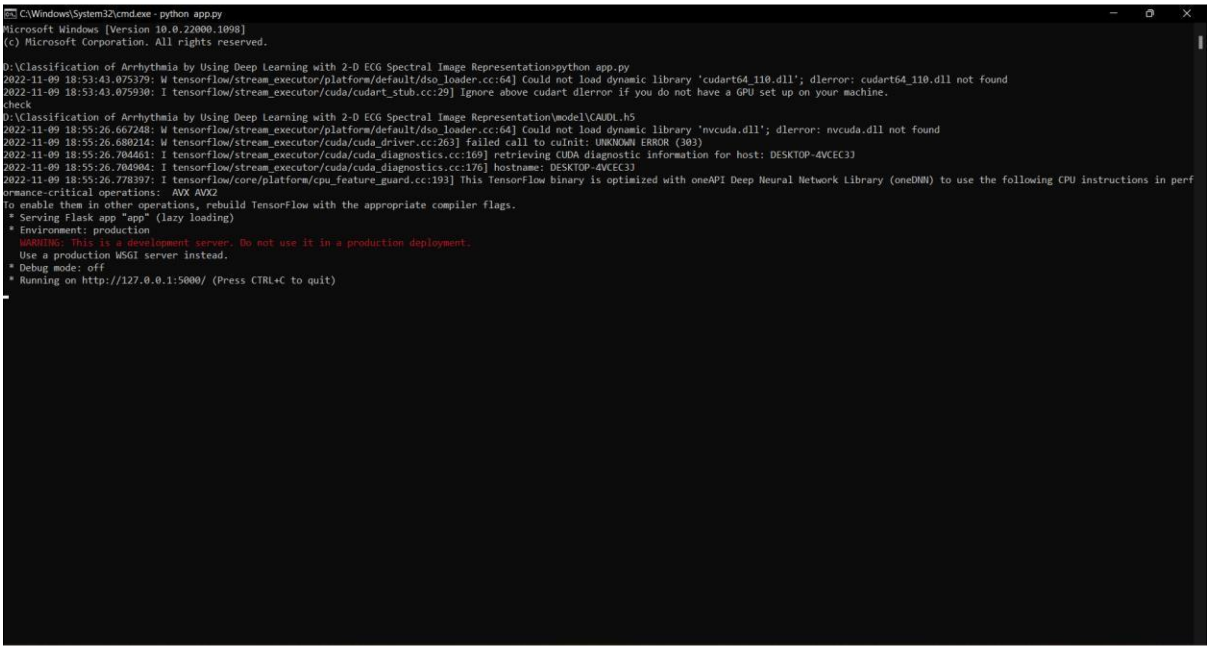
Project Development
Phase Delivery of Sprint 3

Date	**November 11**
Team ID	**PNT2022TMID10109**
Project Name	Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation

Local Deployment:



```
Microsoft Windows [Version 10.0.22000.1098]
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D:\Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation>python app.py
2022-11-09 18:53:43.075379: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'cudart64_110.dll'; dlerror: cudart64_110.dll not found
2022-11-09 18:53:43.075930: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlerror if you do not have a GPU set up on your machine.
check
D:\Classification of Arrhythmia by Using Deep Learning with 2-D ECG Spectral Image Representation\model\CAUDL.h5
2022-11-09 18:55:26.667248: W tensorflow/stream_executor/platform/default/dso_loader.cc:64] Could not load dynamic library 'nvcuda.dll'; dlerror: nvcuda.dll not found
2022-11-09 18:55:26.680214: W tensorflow/stream_executor/cuda/cuda_driver.cc:263] failed call to cuInit: UNKNOWN ERROR (303)
2022-11-09 18:55:26.704461: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:169] retrieving CUDA diagnostic information for host: DESKTOP-4VCEC3J
2022-11-09 18:55:26.704904: I tensorflow/stream_executor/cuda/cuda_diagnostics.cc:176] hostname: DESKTOP-4VCEC3J
2022-11-09 18:55:26.778397: I tensorflow/core/platform/cpu_feature_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the following CPU instructions in perf
ormance-critical operations:  AVX AVX2
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
 * Serving Flask app "app" (lazy loading)
 * Environment: production
   WARNING: This is a development server. Do not use it in a production deployment.
   Use a production WSGI server instead.
 * Debug mode: off
 * Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```
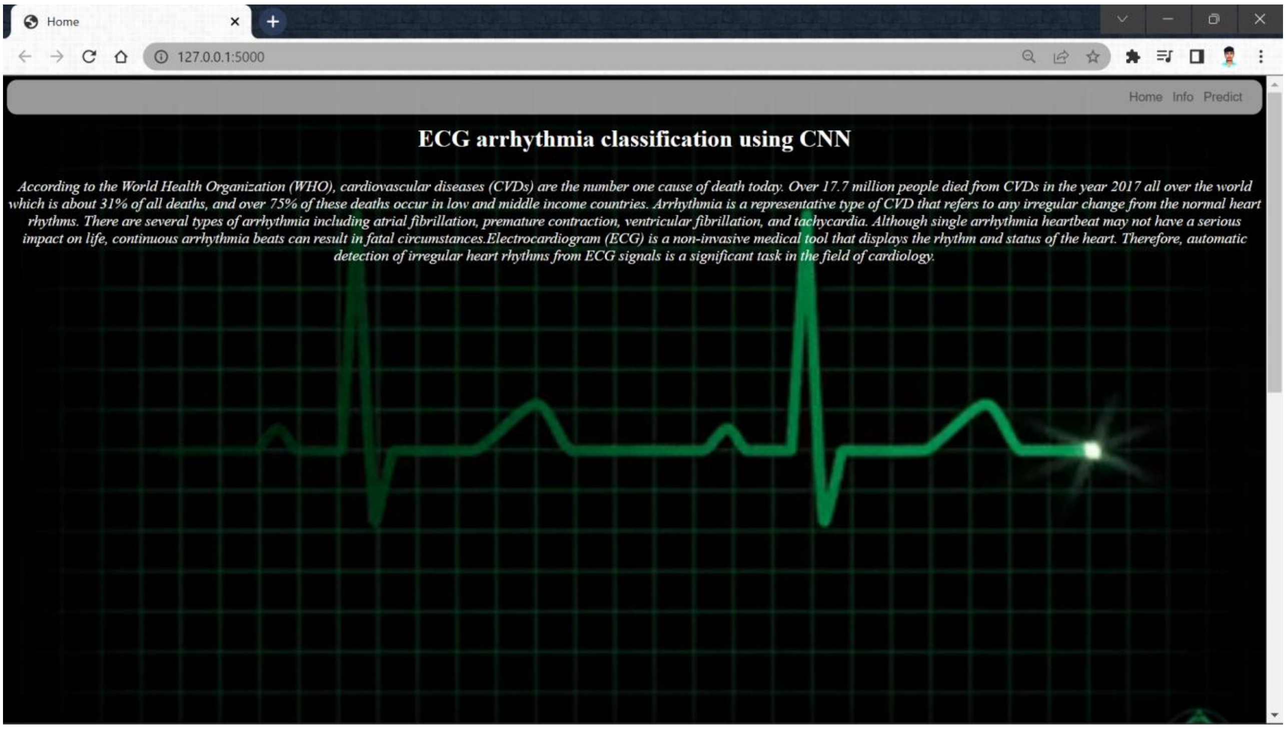
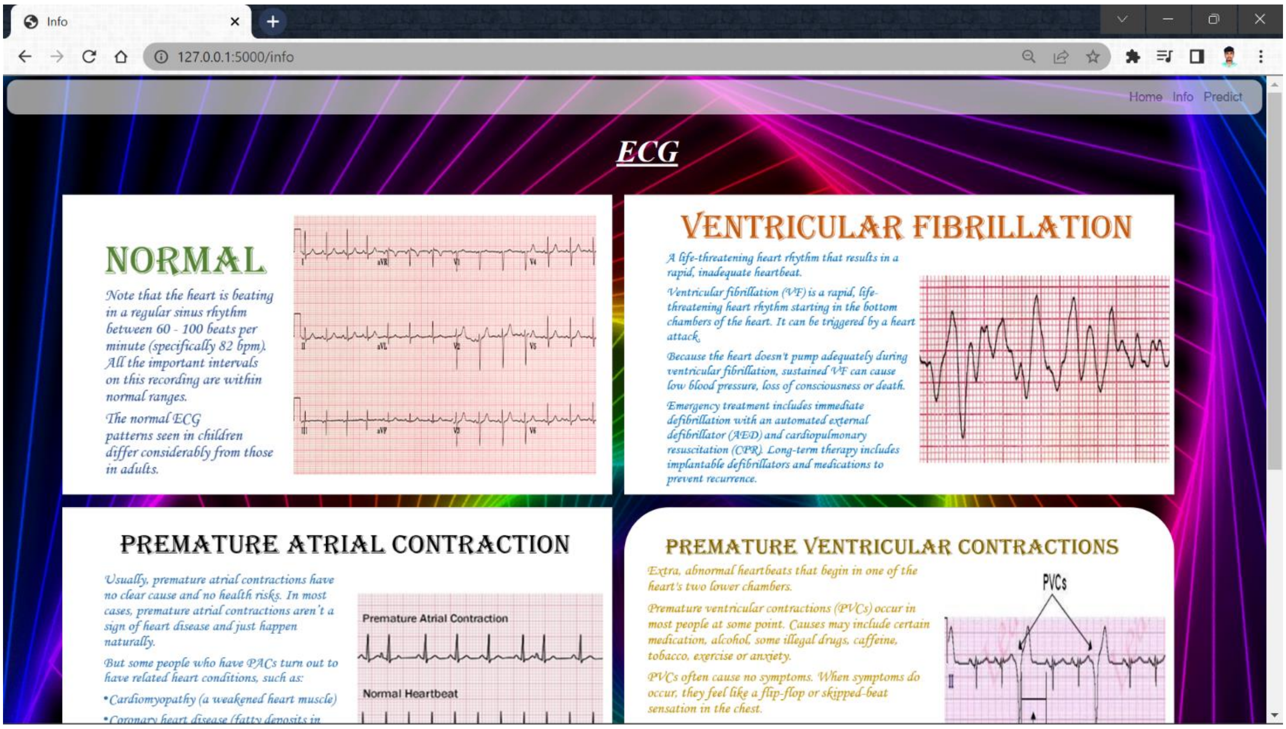

(Running App ! – Flask)



ECG arrhythmia classification using CNN

According to the World Health Organization (WHO), cardiovascular diseases (CVDs) are the number one cause of death today. Over 17.7 million people died from CVDs in the year 2017 all over the world which is about 31% of all deaths, and over 75% of these deaths occur in low and middle income countries. Arrhythmia is a representative type of CVD that refers to any irregular change from the normal heart rhythms. There are several types of arrhythmia including atrial fibrillation, premature contraction, ventricular fibrillation, and tachycardia. Although single arrhythmia heartbeat may not have a serious impact on life, continuous arrhythmia beats can result in fatal circumstances.Electrocardiogram (ECG) is a non-invasive medical tool that displays the rhythm and status of the heart. Therefore, automatic detection of irregular heart rhythms from ECG signals is a significant task in the field of cardiology.

(UI Application Opens Successfully..)



ECG

NORMAL

Note that the heart is beating in a regular sinus rhythm between 60 - 100 beats per minute (specifically 82 bpm). All the important intervals on this recording are within normal ranges.

The normal ECG patterns seen in children differ considerably from those in adults.

VENTRICULAR FIBRILLATION

A life-threatening heart rhythm that results in a rapid, inadequate heartbeat.

Ventricular fibrillation (VF) is a rapid, life-threatening heart rhythm starting in the bottom chambers of the heart. It can be triggered by a heart attack.

Because the heart doesn't pump adequately during ventricular fibrillation, sustained VF can cause low blood pressure, loss of consciousness or death.

Emergency treatment includes immediate defibrillation with an automated external defibrillator (AED) and cardiopulmonary resuscitation (CPR). Long-term therapy includes implantable defibrillators and medications to prevent recurrence.

PREMATURE ATRIAL CONTRACTION

Usually, premature atrial contractions have no clear cause and no health risks. In most cases, premature atrial contractions aren't a sign of heart disease and just happen naturally.

But some people who have PACs turn out to have related heart conditions, such as:

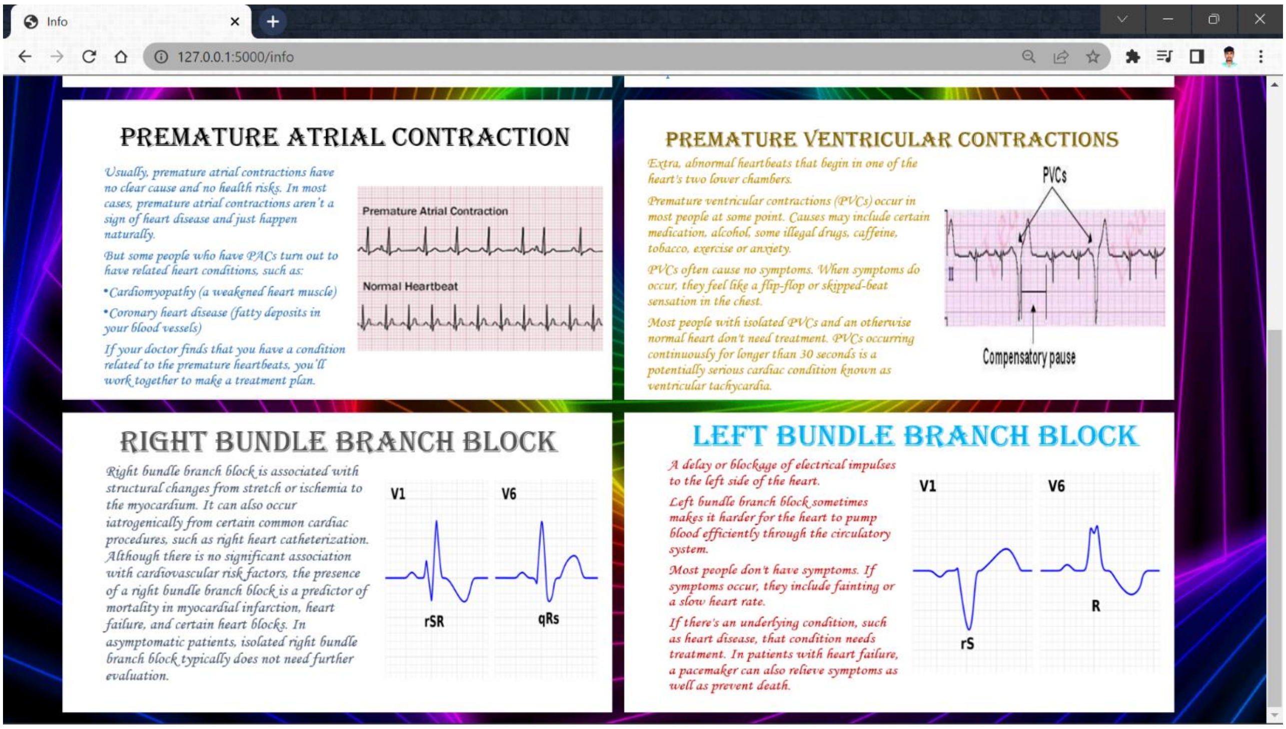
- Cardiomyopathy (a weakened heart muscle)
- Coronary heart disease (fatty deposits in

PREMATURE VENTRICULAR CONTRACTIONS

Extra, abnormal heartbeats that begin in one of the heart's two lower chambers.

Premature ventricular contractions (PVCs) occur in most people at some point. Causes may include certain medication, alcohol, some illegal drugs, caffeine, tobacco, exercise or anxiety.

PVCs often cause no symptoms. When symptoms do occur, they feel like a flip-flop or skipped-beat sensation in the chest.



PREMATURE ATRIAL CONTRACTION

Usually, premature atrial contractions have no clear cause and no health risks. In most cases, premature atrial contractions aren't a sign of heart disease and just happen naturally.

But some people who have PACs turn out to have related heart conditions, such as:

- Cardiomyopathy (a weakened heart muscle)
- Coronary heart disease (fatty deposits in your blood vessels)

If your doctor finds that you have a condition related to the premature heartbeats, you'll work together to make a treatment plan.

PREMATURE VENTRICULAR CONTRACTIONS

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Premature ventricular contractions (PVCs) occur in most people at some point. Causes may include certain medication, alcohol, some illegal drugs, caffeine, tobacco, exercise or anxiety.

PVCs often cause no symptoms. When symptoms do occur, they feel like a flip-flop or skipped-beat sensation in the chest.

Most people with isolated PVCs and an otherwise normal heart don't need treatment. PVCs occurring continuously for longer than 30 seconds is a potentially serious cardiac condition known as ventricular tachycardia.

RIGHT BUNDLE BRANCH BLOCK

Right bundle branch block is associated with structural changes from stretch or ischemia to the myocardium. It can also occur iatrogenically from certain common cardiac procedures, such as right heart catheterization. Although there is no significant association with cardiovascular risk factors, the presence of a right bundle branch block is a predictor of mortality in myocardial infarction, heart failure, and certain heart blocks. In asymptomatic patients, isolated right bundle branch block typically does not need further evaluation.

LEFT BUNDLE BRANCH BLOCK

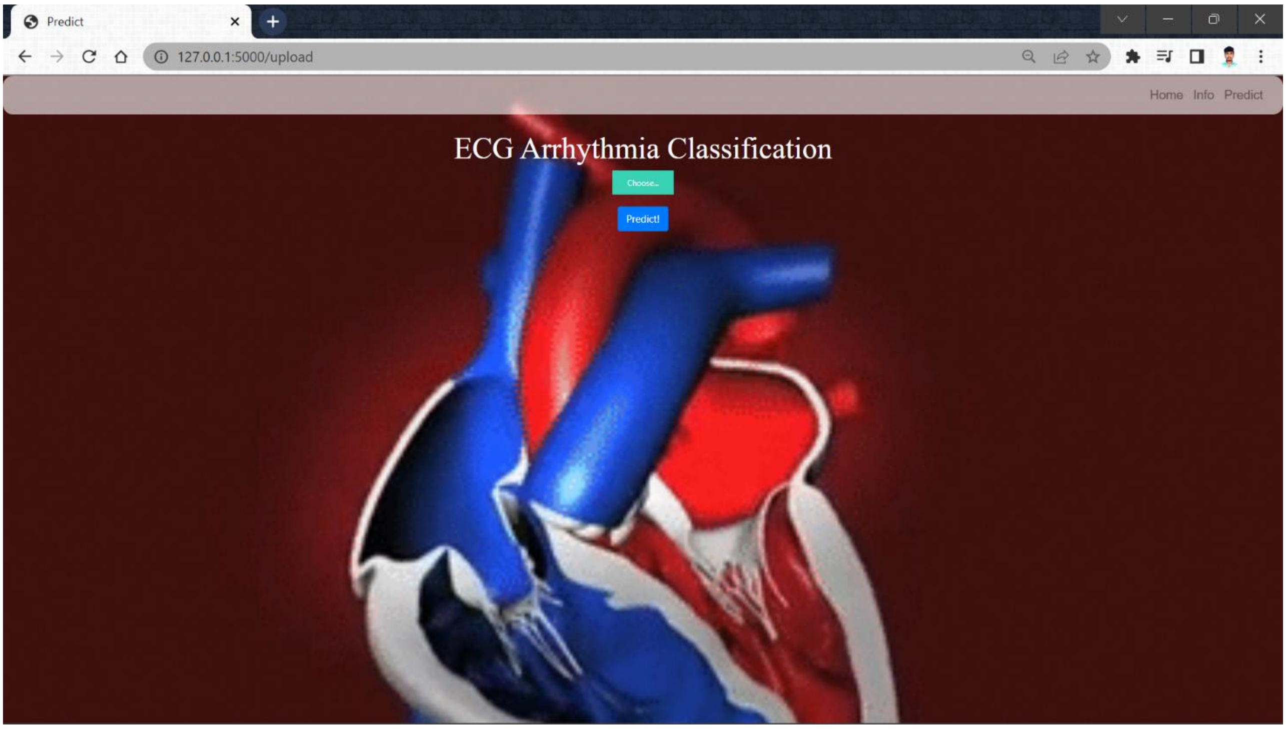
A delay or blockage of electrical impulses to the left side of the heart.

Left bundle branch block sometimes makes it harder for the heart to pump blood efficiently through the circulatory system.

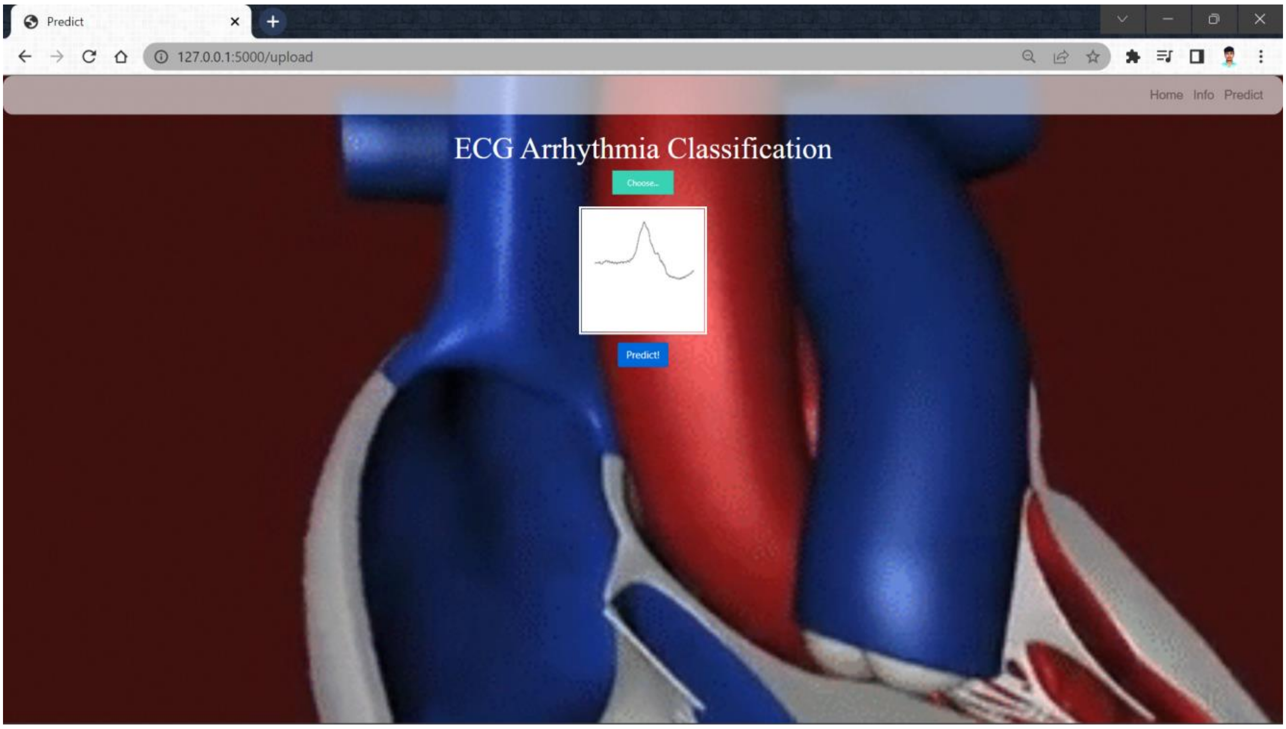
Most people don't have symptoms. If symptoms occur, they include fainting or a slow heart rate.

If there's an underlying condition, such as heart disease, that condition needs treatment. In patients with heart failure, a pacemaker can also relieve symptoms as well as prevent death.

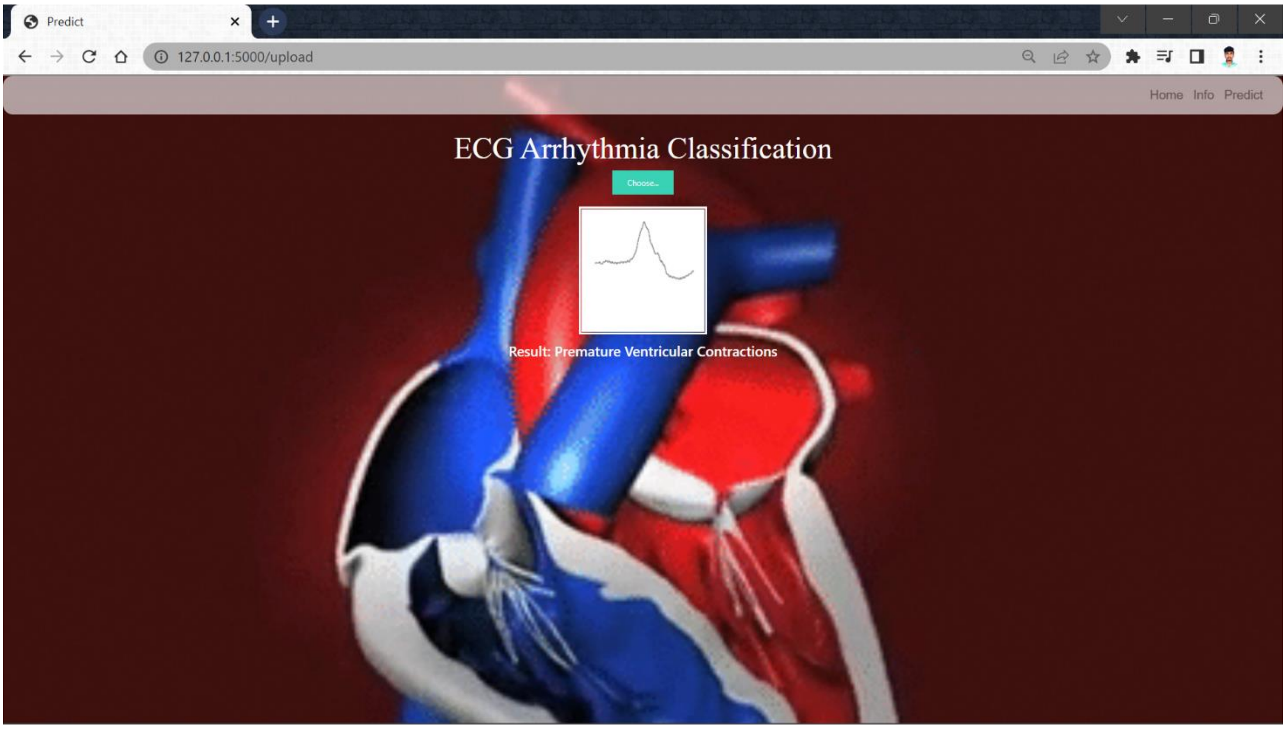
Information about the type of arrythmia



(The Image Is Uploaded – Click Predict Button To Predict)



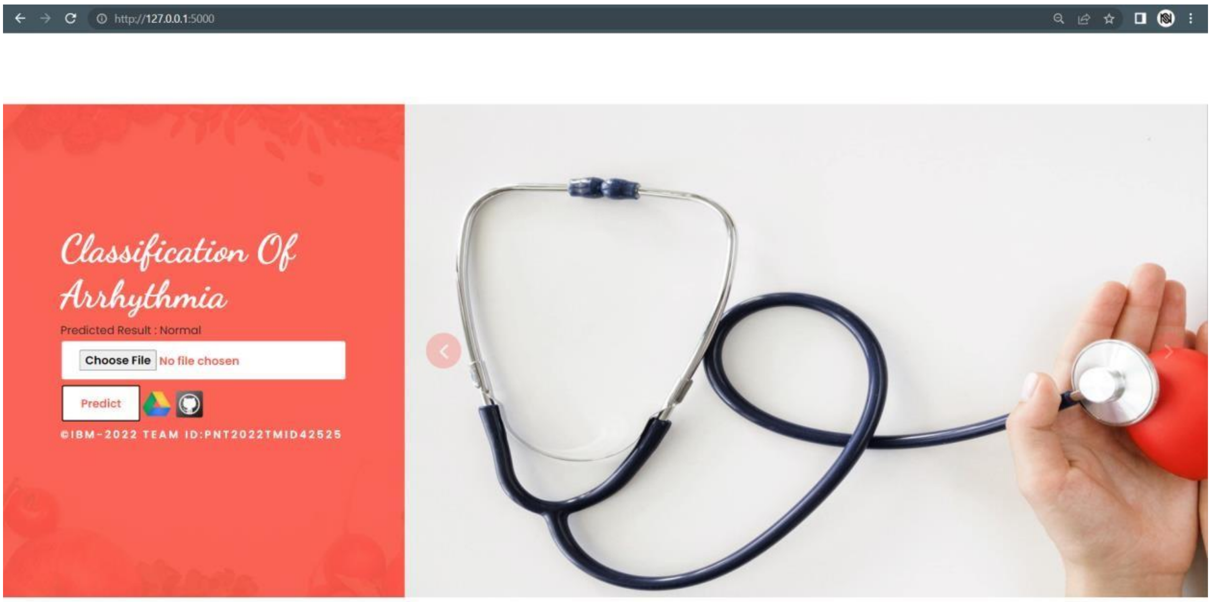
(The Uploaded Image Is Stored In The process !!)



ECG Arrhythmia Classification

Result: Premature Ventricular Contractions

The Output is final verify



Classification Of Arrhythmia

Predicted Result : Normal

No file chosen

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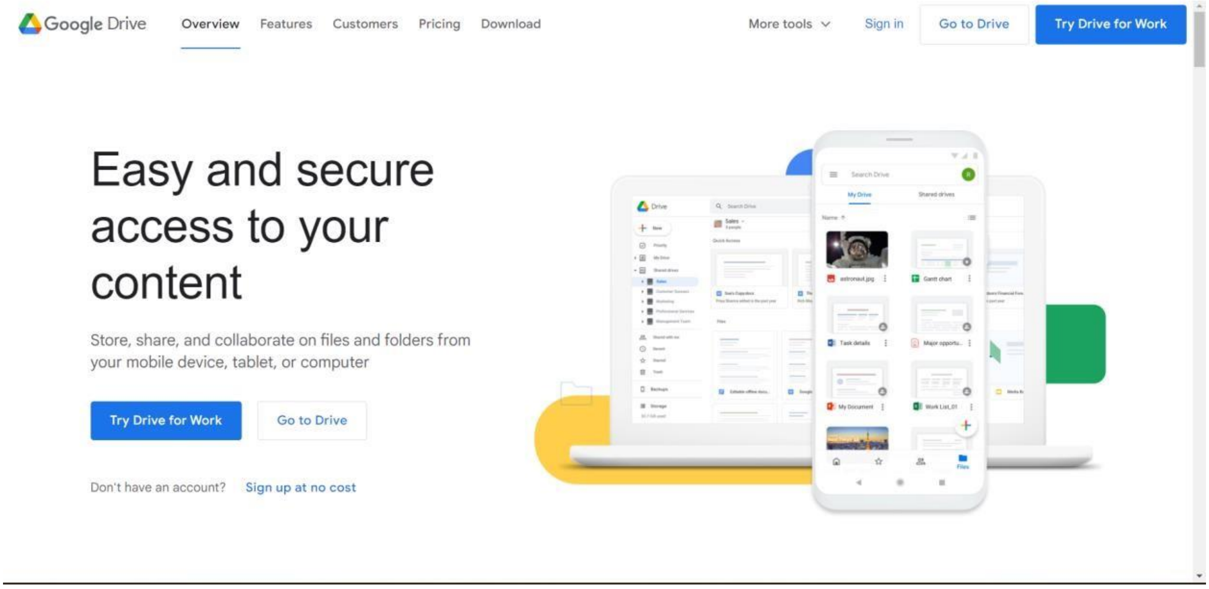
(Through "Predicted Result" The Image Classification Is Visible..)



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