ECG ARRHYTHMIA CLASSIFICATION

TEAM-26:

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INTRODUCTION:

- In this days the necessity of advanced medical care was increased.People has become more dependend on Doctors and
medical equipment was increasing day by day.
- It has become a big problem now a days to take care of all people
with limited resoures.
- Electrocardiogram (ECG) was one of the equipment in medical field which has more significance and not available to many people.

DESCRIPTION :

- 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. For example, prolonged premature ventricular contraction (PVCs) beats occasionally turn into a ventricular tachycardia (VT) or ventricular fibrillation (VF) beats which can immediately lead to heart failure. Thus, it is important to periodically monitor the heart rhythms to manage and prevent the CVDs.

THEN WHAT IS THE SOLUTION?

- In this project, we propose an effective electrocardiogram (ECG) arrhythmia classification method using a deep two-dimensional convolutional neural network (CNN), in which we classify ECG into 5 categories, one being normal and the other four being different types of arrhythmia using deep two-dimensional CNN .
- We are creating a web application where the user selects the image which is to be classified. The image is fed in to the model that is trained and predicted class will be displayed on web page.

OUR CNN CODE WAS AS FOLLOWS

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localhost:8888/notebooks/ECG-%20Arrhythmia%20Classification%20Using%20CNN.ipynb

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Run Code

In [1]:
```
import pandas as pd
import numpy as np
from sklearn.preprocessing import StandardScaler
import biosppy
import warnings
import matplotlib.pyplot as plt
import cv2
warnings.filterwarnings('ignore')
```

In [2]:
```
from keras.models import Sequential
from keras.layers import Dense
from keras.layers import Convolution2D
from keras.layers import MaxPooling2D
from keras.layers import Flatten
```

```
Using TensorFlow backend.
```

In [3]:
```
from keras.preprocessing.image import ImageDataGenerator
train_datagen=ImageDataGenerator(rescale=1./255,shear_range=0.2,zoom_range=0.2,horizontal_flip=True)
test_datagen=ImageDataGenerator(rescale=1./255)
```

In [4]:
```
x_test=test_datagen.flow_from_directory(r"C:\Users\LOHIT\Desktop\project materials\data\test",target_size=(64,64),batch_
x_train=train_datagen.flow_from_directory(r"C:\Users\LOHIT\Desktop\project materials\data\train",target_size=(64,64),bat
```

```
Found 21890 images belonging to 5 classes.
Found 87555 images belonging to 5 classes.
```

In [5]:
```
print(x_train.class_indices)
```

```
{'F': 0, 'N': 1, 'Q': 2, 'S': 3, 'V': 4}
```

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Run Code

In [6]:
```
1 model=Sequential()
```

```
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:74: The name tf.get_default_graph is deprecated. Please use tf.compat.v1.get_default_graph instead.
```

In [7]:
```
1 model.add(Convolution2D(64, (3,3),strides = (1,1), input_shape = (64,64,3),activation='relu'))
```

```
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:517: The name tf.placeholder is deprecated. Please use tf.compat.v1.placeholder instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:4138: The name tf.random_uniform is deprecated. Please use tf.random.uniform instead.
```

In [8]:
```
1 model.add(MaxPooling2D(pool_size = (2,2)))
```

```
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:3976: The name tf.nn.max_pool is deprecated. Please use tf.nn.max_pool2d instead.
```

In [9]:
```
1 model.add(Flatten())
```

In [10]:
```
1 model.add(Dense(units = 128,init = "random_uniform",activation='relu'))
```

In [11]:
```
1 model.add(Dense(units = 128,init = "random_uniform",activation='relu'))
```

In [12]:
```
1 model.add(Dense(units = 256,init = "random_uniform",activation='relu'))
```

In [13]:
```
1 model.add(Dense(units = 64,init = "random_uniform",activation='relu'))
```

In [14]:
```
1 model.add(Dense(units = 5,init = "random_uniform",activation='softmax'))
```

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Run Code

In [14]:
```
model.add(Dense(units = 5,init = "random_uniform",activation='softmax'))
```

In [15]:
```
model.compile(loss='categorical_crossentropy',optimizer='adam',metrics=["accuracy"])
```

```
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\optimizers.py:790: The name tf.train.Optimizer is d
eprecated. Please use tf.compat.v1.train.Optimizer instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:3295: The name tf.log
is deprecated. Please use tf.math.log instead.
```

In [ ]:
```
model.fit_generator(x_train,steps_per_epoch = 685, epochs =10,validation_data= x_test, validation_steps =172)
```

```
Instructions for updating:
Use tf.where in 2.0, which has the same broadcast rule as np.where
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:986: The name tf.a
ssign_add is deprecated. Please use tf.compat.v1.assign_add instead.

Epoch 1/10
685/685 [==============================] - 1019s 1s/step - loss: 0.5910 - acc: 0.8394 - val_loss: 0.9253 - val_acc: 0.810
9
Epoch 2/10
685/685 [==============================] - 931s 1s/step - loss: 0.3038 - acc: 0.9232 - val_loss: 0.8639 - val_acc: 0.7663
Epoch 3/10
685/685 [==============================] - 870s 1s/step - loss: 0.2109 - acc: 0.9456 - val_loss: 1.0687 - val_acc: 0.7418
Epoch 4/10
685/685 [==============================] - 724s 1s/step - loss: 0.1462 - acc: 0.9632 - val_loss: 1.6601 - val_acc: 0.6731
Epoch 5/10
685/685 [==============================] - 554s 809ms/step - loss: 0.1287 - acc: 0.9665 - val_loss: 1.6140 - val_acc: 0.6
889
Epoch 6/10
685/685 [==============================] - 592s 865ms/step - loss: 0.1160 - acc: 0.9689 - val_loss: 1.7679 - val_acc: 0.6
785
```

In [ ]:
```
model.save("ECG.h5")
```

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PREDICTION PART OF THE CNN CODE WAS

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Run Code

In [1]:

```
from keras.models import load_model
from keras.preprocessing import image
import numpy as np
```

```
Using TensorFlow backend.
C:\Users\LOHIT\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:516: FutureWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint8 = np.dtype([("qint8", np.int8, 1)])
C:\Users\LOHIT\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:517: FutureWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint8 = np.dtype([("quint8", np.uint8, 1)])
C:\Users\LOHIT\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:518: FutureWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_qint16 = np.dtype([("qint16", np.int16, 1)])
C:\Users\LOHIT\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:519: FutureWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
  _np_quint16 = np.dtype([("quint16", np.uint16, 1)])
C:\Users\LOHIT\anaconda3\lib\site-packages\tensorflow\python\framework\dtypes.py:520: FutureWarning: Passing (type, 1) or '1type' as a synonym of type is deprecated; in a future version of numpy, it will be understood as (type, (1,)) / '(1,)type'.
```

In [2]:

```
model = load_model(r"C:\Users\LOHIT\Desktop\project materials\ECG.h6")
```

```
WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:517: The name tf.placeholder is deprecated. Please use tf.compat.v1.placeholder instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:4138: The name tf.random_uniform is deprecated. Please use tf.random.uniform instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:3976: The name tf.nn.max_pool is deprecated. Please use tf.nn.max_pool2d instead.
```

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Run Code

```
onfigProto is deprecated. Please use tf.compat.v1.ConfigProto instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\backend\tensorflow_backend.py:186: The name tf.S
ession is deprecated. Please use tf.compat.v1.Session instead.

WARNING:tensorflow:From C:\Users\LOHIT\anaconda3\lib\site-packages\keras\optimizers.py:790: The name tf.train.Optimizer i
s deprecated. Please use tf.compat.v1.train.Optimizer instead.
```

In [3]:
```
1 img = image.load_img(r"C:\Users\LOHIT\Desktop\project materials\premature_ecg.jpg",target_size=(64,64))
```

In [4]:
```
1 x = image.img_to_array(img)
```

In [5]:
```
1 x =np.expand_dims(x,axis =0)
```

In [6]:
```
1 x.shape
```

Out[6]: (1, 64, 64, 3)

In [7]:
```
1 pred = model.predict_classes(x)
```

In [9]:
```
1 pred
```

Out[9]: array([5], dtype=int64)

In [ ]:
```
1
```

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APPLICATION BULDING CODE

Spyder (Python 3.7)

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C:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\app.py

index.html | app.py

```
import numpy as np
import os
from keras.models import load_model
from keras.preprocessing import image
import tensorflow as tf
global graph
graph = tf.get_default_graph()
from flask import Flask , request, render_template
from werkzeug.utils import secure_filename
from gevent.pywsgi import WSGIServer

app = Flask(__name__)
model = load_model("ECG-1.h5")

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/predict',methods = ['GET','POST'])
def upload():
    if request.method == 'POST':
        f = request.files['image']
        print("current path")
        basepath = os.path.dirname(__file__)
        print("current path", basepath)
        filepath = os.path.join(basepath,'uploads',f.filename)
        print("upload folder is ", filepath)
        f.save(filepath)

        img = image.load_img(filepath,target_size = (64,64))
        x = image.img_to_array(img)
        x = np.expand_dims(x,axis =0)

        with graph.as_default():
            preds = model.predict_classes(x)
            4

            print("prediction",preds)

        index = ['Fusion Beat','Normal Beat','Unknown Beat','Supraventricular ectopic Beat','Ventricular ecto
```

Name	Date Modified
static	30-05-2020 05:03 PM
templates	30-05-2020 06:58 PM
uploads	01-06-2020 06:53 AM
app.py	30-05-2020 09:34 PM
ECG-1.h5	30-05-2020 10:36 AM

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Console 1/A

```
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.12.0 -- An enhanced Interactive Python.

In [1]:
```

IPython console | History

conda: base (Python 3.7.6) Line 1, Col 1 ASCII CRLF RW Mem 96%

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C:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN

C:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\app.py

index.html | app.py

```python
import numpy as np
import os
from keras.models import load_model
from keras.preprocessing import image
import tensorflow as tf
global graph
graph = tf.get_default_graph()
from flask import Flask , request, render_template
from werkzeug.utils import secure_filename
from gevent.pywsgi import WSGIServer

app = Flask(__name__)
model = load_model("ECG-1.h5")

@app.route('/')
def index():
    return render_template('index.html')

@app.route('/predict',methods = ['GET','POST'])
def upload():
    if request.method == 'POST':
        f = request.files['image']
        print("current path")
        basepath = os.path.dirname(__file__)
        print("current path", basepath)
        filepath = os.path.join(basepath,'uploads',f.filename)
        print("upload folder is ", filepath)
        f.save(filepath)

        img = image.load_img(filepath,target_size = (64,64))
        x = image.img_to_array(img)
        x = np.expand_dims(x,axis =0)

        with graph.as_default():
            preds = model.predict_classes(x)
            4

            print("prediction",preds)

        index = ['Fusion Beat','Normal Beat','Unknown Beat','Supraventricular ectopic Beat','Ventricular ectopic beat']


        text = "The predicted type is " + str(index[preds[0]]) +".To know more about this scroll down and check with the ECG class description."

    return text
if __name__ == '__main__':
    app.run(debug = True)
```

Name	Date Modified
static	30-05-2020 05:03 PM
templates	30-05-2020 06:58 PM
uploads	01-06-2020 06:53 AM
app.py	30-05-2020 09:34 PM
ECG-1.h5	30-05-2020 10:36 AM

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Console 1/A

```
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.12.0 -- An enhanced Interactive Python.

In [1]:
```

IPython console | History

conda: base (Python 3.7.6) Line 53, Col 5 ASCII CRLF RW Mem 84%

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HTML CODE

Spyder (Python 3.7)

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C:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN

...:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\templates\index.html

index.html | app.py

```
<html lang="en">

<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>ECG Arrhythmia Classifier</title>
    <link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet">
    <script src="https://cdn.bootcss.com/popper.js/1.12.9/umd/popper.min.js"></script>
    <script src="https://cdn.bootcss.com/jquery/3.3.1/jquery.min.js"></script>
    <script src="https://cdn.bootcss.com/bootstrap/4.0.0/js/bootstrap.min.js"></script>
      <link href="{{ url_for('static', filename='css/main.css') }}" rel="stylesheet">
<link href="https://fonts.googleapis.com/css2?family=Concert+One&family=Fredoka+One&family=Lalezar&family=Markazi+Text&family=PT+Sans+Narrow&fam

</head>

<body>
<nav class="navbar navbar-expand-lg navbar-light bg-light">
  <button class="navbar-toggler" type="button" data-toggle="collapse" data-target="#navbarTogglerDemo03" aria-controls="navbarTogglerDemo03" ari
    <span class="navbar-toggler-icon"></span>
  </button>
  <a class="navbar-brand" href="#">ECG Arrhythmia Classifier</a>

  <div class="collapse navbar-collapse" id="navbarTogglerDemo03 options">
    <ul class="navbar-nav ml-auto">
      <li class="nav-item active">
        <a class="nav-link" href="#Home">Home<span class="sr-only">(current)</span></a>
      </li>
      <li class="nav-item">
        <a class="nav-link" href="#CheckECG">Check Arrhythmia</a>
      </li>
       <li class="nav-item">
        <a class="nav-link" href="#predict">Know more about Arrhythmia</a>
      </li>
      <li class="nav-item">
       <a class="nav-link" href="#about">About</a>
     </li>
    </ul>
  </div>
</nav>
<!-- Home -->
<section id="Home">
<div class="top">
  <h1>ECG Arrhythmia Classifier</h1><br><br>

<img src="{{url_for('static', filename='img1.jpg')}}"/>
  <p>Upload the image of the ECG and get the type of Arrhythmia within few seconds.</p>
</div>
</section>
<!-- check ECG -->
<section id="CheckECG">
<div class="checkecg">
  <div class="row">
          <div class="">
            <h1 class="big-heading">Upload the ECG image and get the results in few seconds.</h1>
            <form action = "http://localhost:5000/predict" id="upload-file" method="post" enctype="multipart/form-data">
              <br>
              <div class="lab">
                <label for="imageUpload" class="upload-label">
```

Name | Date Modified

- static 30-05-2020 05:03 PM
- templates 30-05-2020 06:58 PM
- uploads 01-06-2020 06:53 AM
- app.py 30-05-2020 09:34 PM
- ECG-1.h5 30-05-2020 10:36 AM

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Console 1/A

```
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.12.0 -- An enhanced Interactive Python.

In [1]:
```

IPython console | History

conda: base (Python 3.7.6) Line 28, Col 12 UTF-8-GUESSED CRLF RW Mem 87%

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Spyder (Python 3.7)

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...:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\templates\index.html

index.html | app.py

```
            <form action = "http://localhost:5000/predict" id="upload-file" method="post" enctype="multipart/form-data">
              <br>
              <div class="lab">
                <label for="imageUpload" class="upload-label">
                            Upload
                        </label>
                        <input type="file" name="image" id="imageUpload" accept=".png, .jpg, .jpeg">
                    </form>
              </div>

        <div class="image-section " style="display:none;">
                        <div class="img-preview">
                            <div id="imagePreview">
                            </div>
                        </div>
                        <div>
                            <button type="button" class="btn btn-info btn-lg " id="btn-predict">Click on this to see what arrhythmia it is!</but
                        </div>
                    </div>
<br>
                    <div class="loader" style="display:none;"></div>

                    <h3>
                        <span id="result"> </span>
                    </h3>

                </div>
          </div>
          <br>
          <div class="">
            <img src="{{url_for('static', filename='img.jpg')}}"/>
          </div>
        </div>
      </div>
    </section>
</div>
</section>

<!-- predict -->
<section id="predict">
<div class="">
  <h3>ECG Class Description</h3>
  <div class="container">
    <div class="row cla">
      <h4>Normal beat</h4>
    </div>
    <div class="Feature-box col-lg-4 col-md-12">
      <ul>
        <li>Normal beat</li>
        <li>Left bundle branch block beat</li>
        <li>Right bundle branch block beat</li>
        <li>Atrial escape beat</li>
        <li>Nodal (junctional) escape beat</li>
      </ul>
    </div>
  </div>
<div class="container">
  <div class="row cla">
      <h4>Supraventricular ectopic beat</h4>
```

Name	Date Modified
static	30-05-2020 05:03 PM
templates	30-05-2020 06:58 PM
uploads	01-06-2020 06:53 AM
app.py	30-05-2020 09:34 PM
ECG-1.h5	30-05-2020 10:36 AM

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Console 1/A

```
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.12.0 -- An enhanced Interactive Python.

In [1]:
```

IPython console | History

conda: base (Python 3.7.6) Line 28, Col 12 UTF-8-GUESSED CRLF RW Mem 85%

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...:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\templates\index.html

index.html | app.py

```
110     </div>
111   </div>
112 <div class="container">
113   <div class="row cla">
114     <h4>Supraventricular ectopic beat</h4>
115   </div>
116     <div class="Feature-box col-lg-4 col-md-12">
117       <ul>
118         <li>Atrial premature beat</li>
119         <li>Aberrated atrial premature beat </li>
120         <li>Nodal (junctional) premature beat</li>
121         <li>Supraventricular premature beat</li>
122       </ul>
123     </div>
124 </div>
125 <div class="container">
126   <div class="row v">
127     <h4>Ventricular ectopic beat</h4>
128   </div>
129 <div class="Feature-box col-lg-4 col-md-12">
130   <ul>
131     <li>Premature ventricular contraction</li>
132     <li>Ventricular escape beat</li>
133   </ul>
134 </div>
135 </div>
136   <div class="container">
137     <div class="row f">
138       <h4>Fusion beat </h4>
139     </div>
140     <div class="Feature-box col-lg-4 col-md-12">
141       <ul>
142         <li>Fusion of ventricular and normal beat</li>
143       </ul>
144     </div>
145   </div>
146   <div class="container">
147     <div class="row u">
148         <h4>Unknown beat</h4>
149     </div>
150   <div class="Feature-box col-lg-4 col-md-12">
151     <ul>
152       <li>Paced beat</li>
153       <li>Fusion of paced and normal beat</li>
154       <li>Unclassified beat</li>
155     </ul>
156   </div>
157   </div>
158
159
160 </div>
161
162 </section>
163 <!-- About -->
164 <section id="about">
165 <div id="home" class="ab">
166   <div class="">
167     <h3>How does this application works?</h3>
168     <p>Upload the image of the ECG and the application will let you know the type of Arrhythmia that the patient have.</p>
```

Name	Date Modified
static	30-05-2020 05:03 PM
templates	30-05-2020 06:58 PM
uploads	01-06-2020 06:53 AM
app.py	30-05-2020 09:34 PM
ECG-1.h5	30-05-2020 10:36 AM

Variable explorer | Help | Plots | Files

Console 1/A

```
Python 3.7.6 (default, Jan  8 2020, 20:23:39) [MSC v.1916 64 bit (AMD64)]
Type "copyright", "credits" or "license" for more information.

IPython 7.12.0 -- An enhanced Interactive Python.

In [1]:
```

IPython console | History

conda: base (Python 3.7.6) | Line 153, Col 47 | UTF-8-GUESSED | CRLF | RW | Mem 89%

Type here to search

ENG 10:59 AM 01-06-2020

Spyder (Python 3.7)

File Edit Search Source Run Debug Consoles Projects Tools View Help

C:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN

...:\Users\LOHIT\Desktop\project materials\ECG Arrhythmia classification using CNN\templates\index.html

index.html | app.py

```
    <div class="Feature-box col-lg-4 col-md-12">
      <ul>
        <li>Fusion of ventricular and normal beat</li>
      </ul>
    </div>
  </div>
  <div class="container">
    <div class="row u">
        <h4>Unknown beat</h4>
    </div>
  <div class="Feature-box col-lg-4 col-md-12">
    <ul>
      <li>Paced beat</li>
      <li>Fusion of paced and normal beat</li>
      <li>Unclassified beat</li>
    </ul>
  </div>
  </div>


</div>

</section>
<!-- About -->
<section id="about">
<div id="home" class="ab">
  <div class="">
    <h3>How does this application works?</h3>
    <p>Upload the image of the ECG and the application will let you know the type of Arrhythmia that the patient have.</p>
  </div>
  <div class="">
  <h3>ECG</h3>
  <p>An electrocardiogram (ECG) is a simple test that can be used to check your heart's rhythm and electrical activity.
    Sensors attached to the skin are used to detect the electrical signals produced by your heart each time it beats.
    These signals are recorded by a machine and are looked at by a doctor to see if they're unusual.
    An ECG may be requested by a heart specialist (cardiologist) or any doctor who thinks the patient might have a problem with your heart, incl
  </p>
</div>

<div class="">
  <h3>Arrhythmia</h3>
  <p>An arrhythmia describes an irregular heartbeat. With this condition, a person's heart may beat too quickly, too slowly, too early, or with
</div>
</div>


<footer>
  <div id="footer" class="container-fluid white">
      <p class="foot1">ECG class description are classified using AAMI standard.</p>
      <p class="foot1">&copy; 2020 Yuvarani V.</p>

  </div>

    <script src="{{ url_for('static', filename='js/main.js') }}" type="text/javascript"></script>
</footer>
</body>
</html>
```

Name | Date Modified

- static 30-05-2020 05:03 PM
- templates 30-05-2020 06:58 PM
- uploads 01-06-2020 06:53 AM
- app.py 30-05-2020 09:34 PM
- ECG-1.h5 30-05-2020 10:36 AM

Variable explorer | Help | Plots | Files

Console 1/A

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conda: base (Python 3.7.6) | Line 153, Col 47 | UTF-8-GUESSED | CRLF | RW | Mem 88%

Type here to search

ENG 10:59 AM 01-06-2020

THE FINAL UI

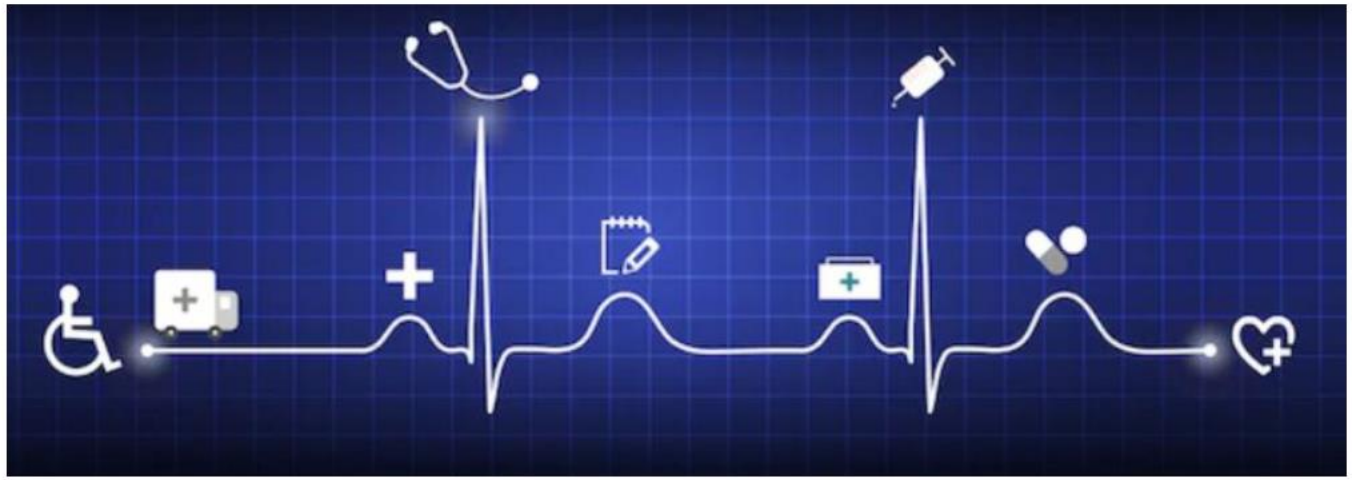
ECG Arrhythmia Classifier

Upload the image of the ECG and get the type of Arrhythmia within few seconds.

- Click on “check Arrhythmia option” to get next page

Upload the ECG image and get the results in few seconds.

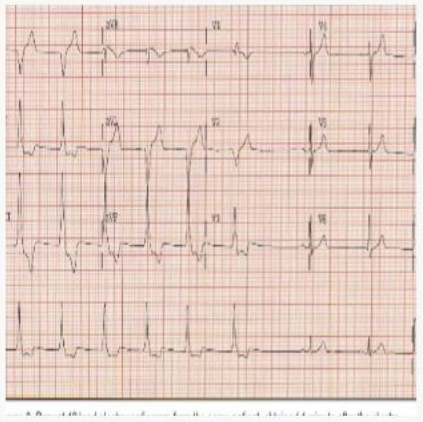
Upload



- Upload image by clicking upload option

Upload the ECG image and get the results in few seconds.

Upload

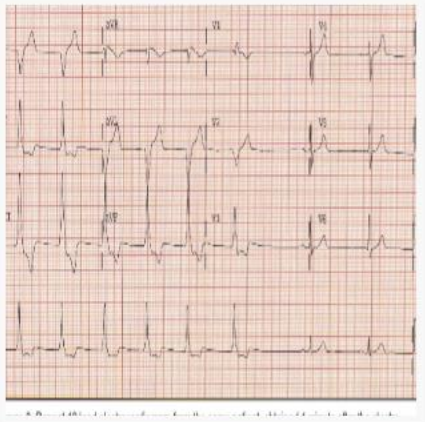


Click on this to see what arrhythmia it is!

- Click on the button provide at below picture to get report

Upload the ECG image and get the results in few seconds.

Upload



Result: The predicted type is Normal Beat.To know more about this scroll down and check with the ECG class description.

- Click on “Know more about Arrhythmia” option at home page to get info about in

ECG Class Description

Normal beat	• Normal beat • Left bundle branch block beat • Right bundle branch block beat • Atrial escape beat • Nodal (junctional) escape beat
Supraventricular ectopic beat	• Atrial premature beat • Aberrated atrial premature beat • Nodal (junctional) premature beat • Supraventricular premature beat
Ventricular ectopic beat	• Premature ventricular contraction • Ventricular escape beat
Fusion beat	• Fusion of ventricular and normal

	• Atrial escape beat • Nodal (junctional) escape beat
Supraventricular ectopic beat	• Atrial premature beat • Aberrated atrial premature beat • Nodal (junctional) premature beat • Supraventricular premature beat
Ventricular ectopic beat	• Premature ventricular contraction • Ventricular escape beat
Fusion beat	• Fusion of ventricular and normal beat
Unknown beat	• Paced beat • Fusion of paced and normal beat • Unclassified beat

- Click on “About” option to know more about ECG and Arrhythmia

How does this application works?

Upload the image of the ECG and the application will let you know the type of Arrhythmia that the patient have.

ECG

An electrocardiogram (ECG) is a simple test that can be used to check your heart's rhythm and electrical activity. Sensors attached to the skin are used to detect the electrical signals produced by your heart each time it beats. These signals are recorded by a machine and are looked at by a doctor to see if they're unusual. An ECG may be requested by a heart specialist (cardiologist) or any doctor who thinks the patient might have a problem with your heart, including Patient GP. That's the result of this test we will analyze.

Arrhythmia

An arrhythmia describes an irregular heartbeat. With this condition, a person’s heart may beat too quickly, too slowly, too early, or with an irregular rhythm.


THANK
YOU!