MISC 达芬奇密码

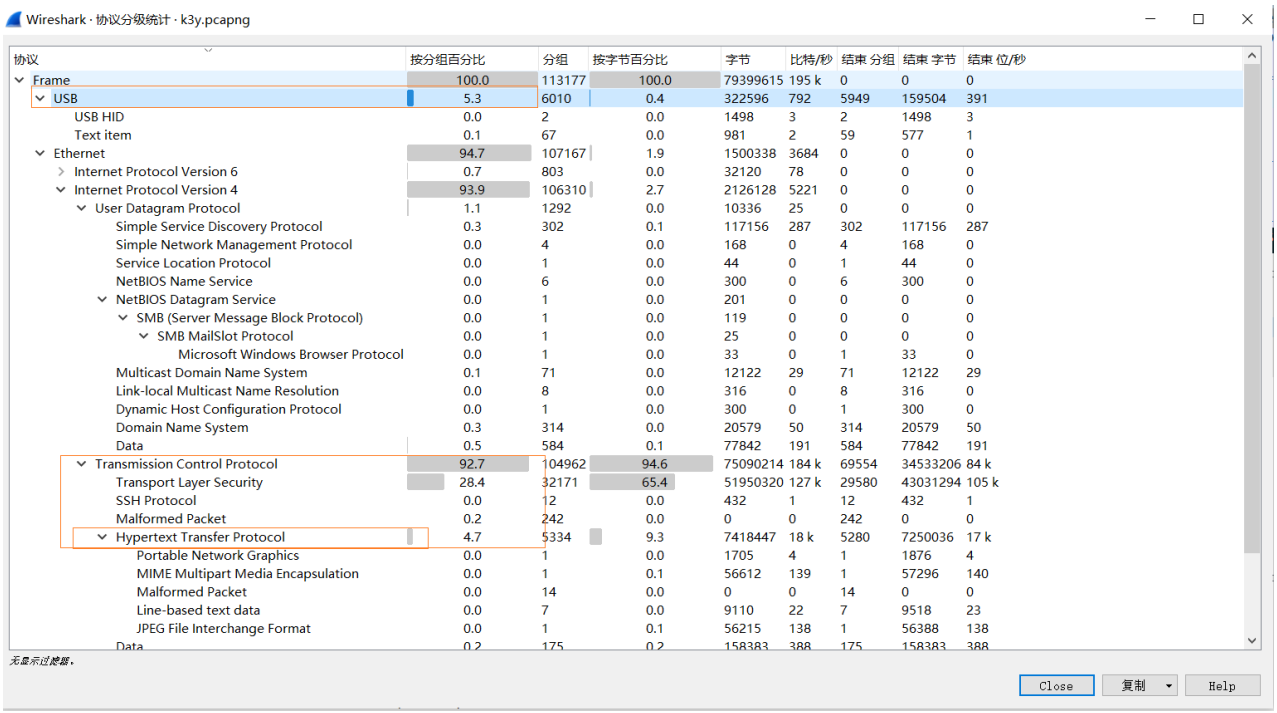
题目描述

达芬奇偷偷把key画了下来，你能找到key然后解开密码吗？

解题思路

1. 附件有一个流量包，有个flagtxt是unicode，结合题意应该是从流量包中找到线索去解决flagtxt中内容
2. 分析流量

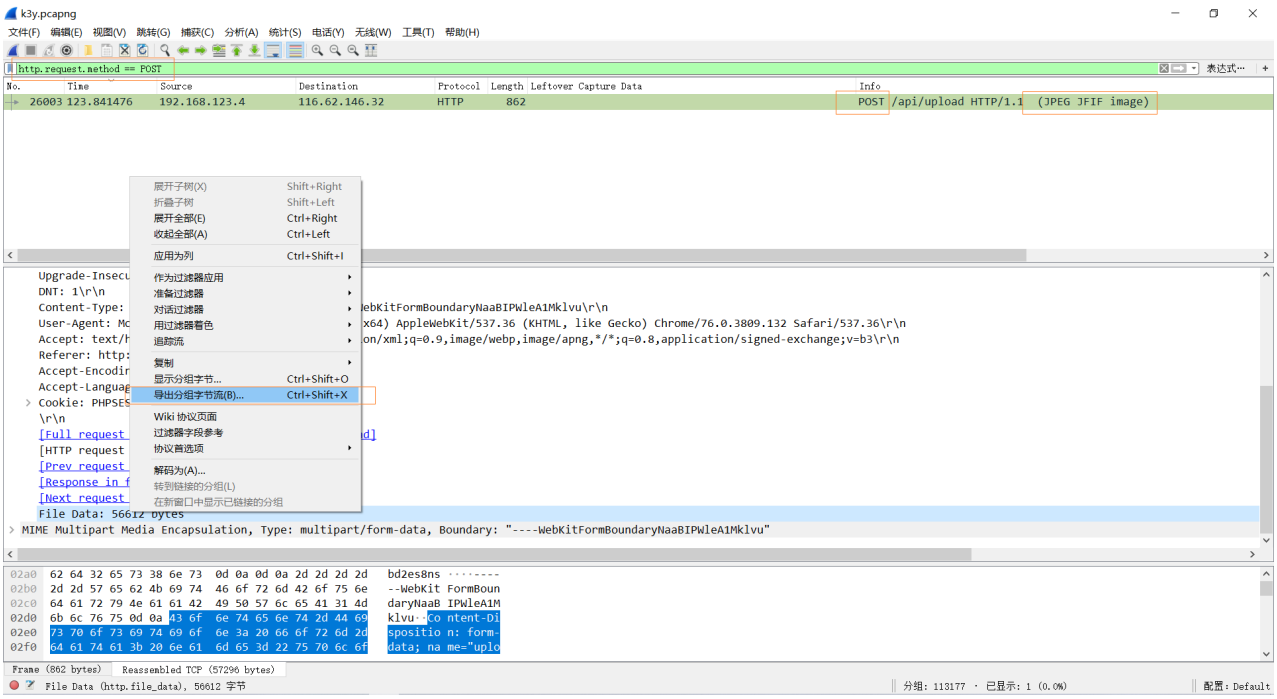
   大致看流量包的协议组成，会话地址等等



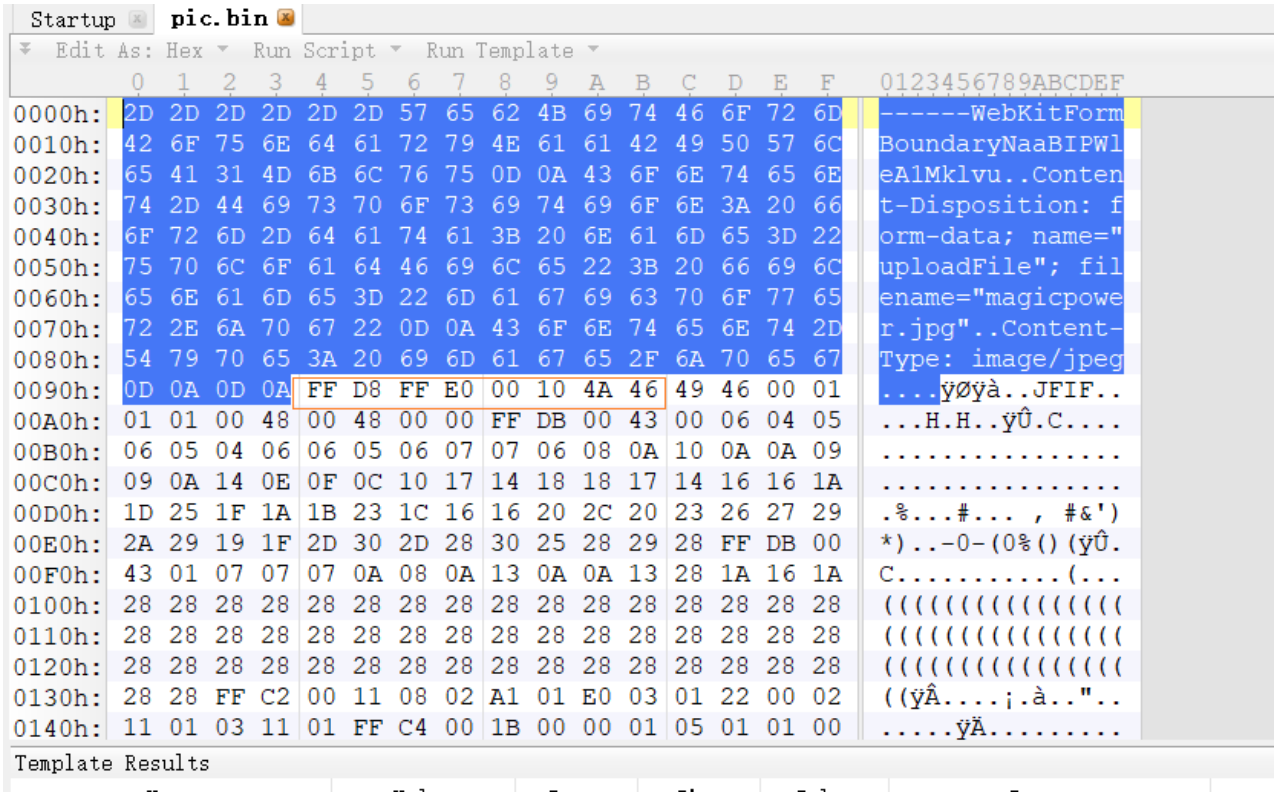
   可以观察到既有usb流量又有网络流量

3. 分析网络流量

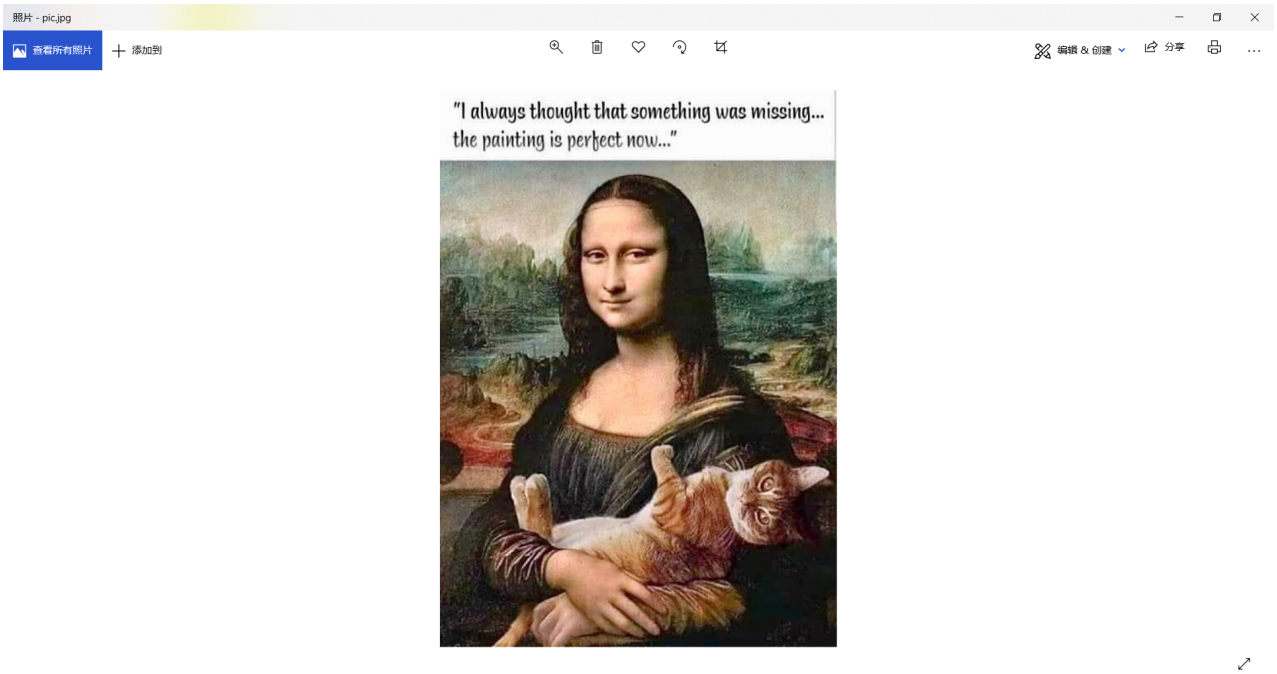
   筛选http流量，可以从中找到一个post包并且可以发现post的是jpg文件（可通过http.request.method筛选）



如图导出分组字节流，在010editor中打开删除头部无用字节只保留jpg字节



另存为jpg



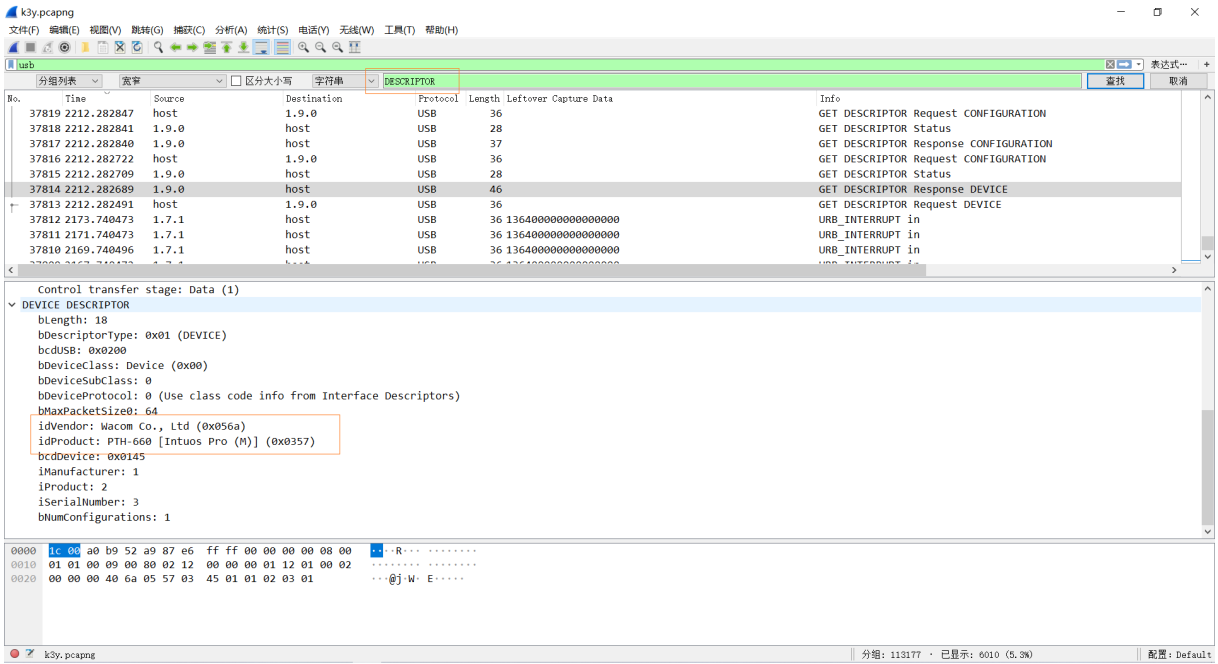
可以用各种工具检查这张图片，但是并不会有什么结果🐷（烟雾弹

4. 分析usb流量

    1. 判断usb设备

        usb设备建立连接时会发送包含设备信息的包，搜索关键字DESCRIPTOR

        （详细可见usb协议https://www.usb.org/sites/default/files/documents/hut1_12v2.pdf 3.6小节



        可以找到一个wacom pth660的设备，搜索后可以发现是个数位板，该设备source 1.11.1，另外还有一个设备1.9.1可能是鼠标或键盘

    2. 过滤有效流量

        usb流量的数据域是Leftover Capture Data，数位板设备src 1.11.1，筛选后可以判断frame length为54时leftover cap data域携带信息更多，更可能是有效流量

        全部筛选条件 `(usb.src == "1.11.1") && (frame.len == 54)` 并导出筛选后的分组test.pcapng

3. 分析数据域

usb协议https://www.usb.org/sites/default/files/documents/hut1_12v2.pdf 中写了数位板的数据基本格式，并且给出了几个数位板数据格式示例

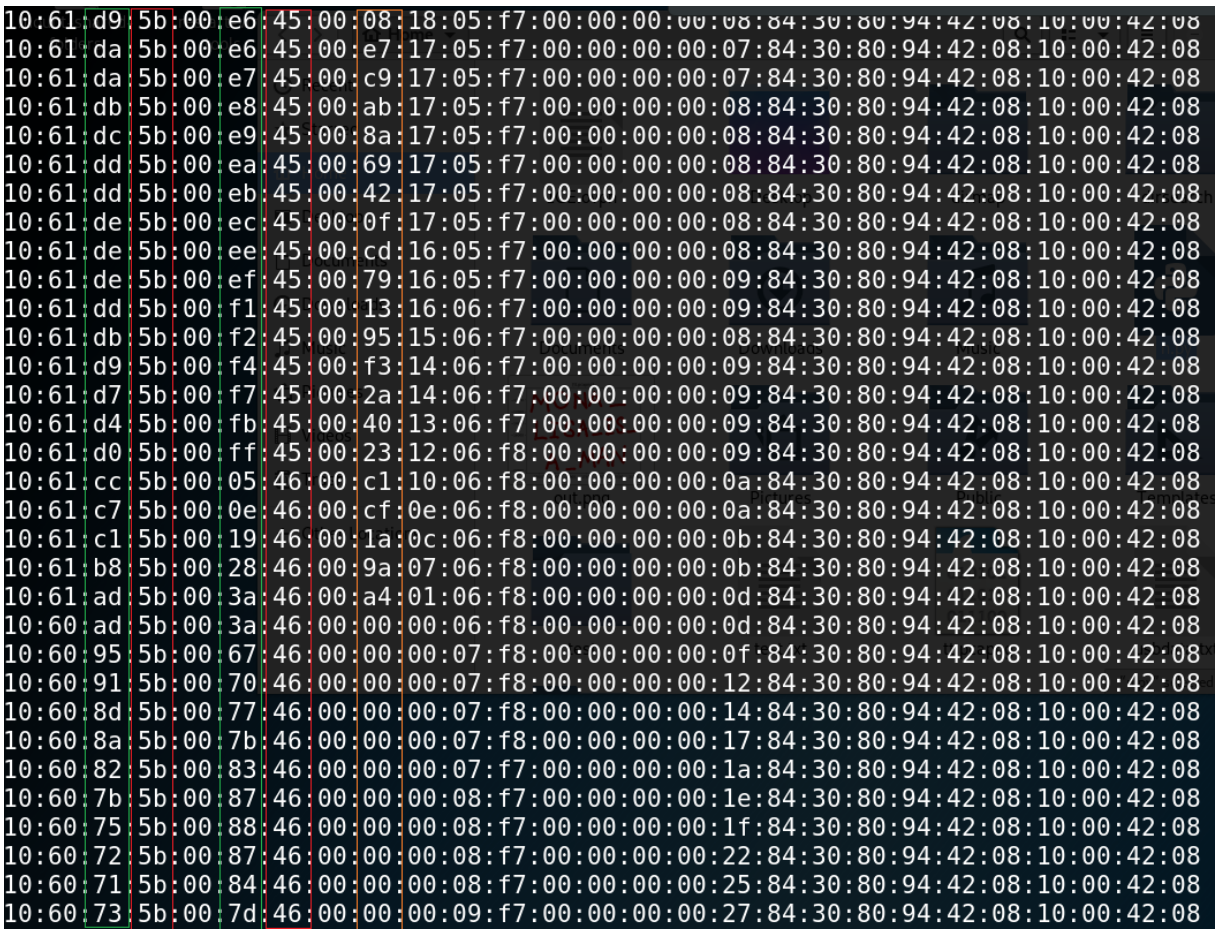
wacom pth660经搜索可以发现是一块带压感的专业绘画板，所以可以参考figure19

Figure 19: Example Digitizer Pressure Stylus Input Report

	Bit							
Byte	7	6	5	4	3	2	1	0
0	ReportID = 3 (indicating pressure stylus report)							
1	X Coordinate Bits 0-7							
2	X Coordinate Bits 8-15							
3	Y Coordinate Bits 0-7							
4	Y Coordinate Bits 8-15							
5	In Range	Barrel Switch	Unused					
6	Pressure Bits 0-7							

需要注意的是，x,y坐标的储存是**按照小端序**，另外**控制筛选压力值**可以使作图结果更精准

观察提取出的leftover capture data数据可以猜测找到坐标存储位置，红框为坐标高位bit，同一时间内变化小于绿框（低位bit）变化率，橙框变化猜测为压力值，笔离开画板时压力变为0



4. 脚本画图

   根据数据画图，脚本如下（魔改了wangyihang大佬的鼠标流量脚本

   用脚本处理筛选后的分组

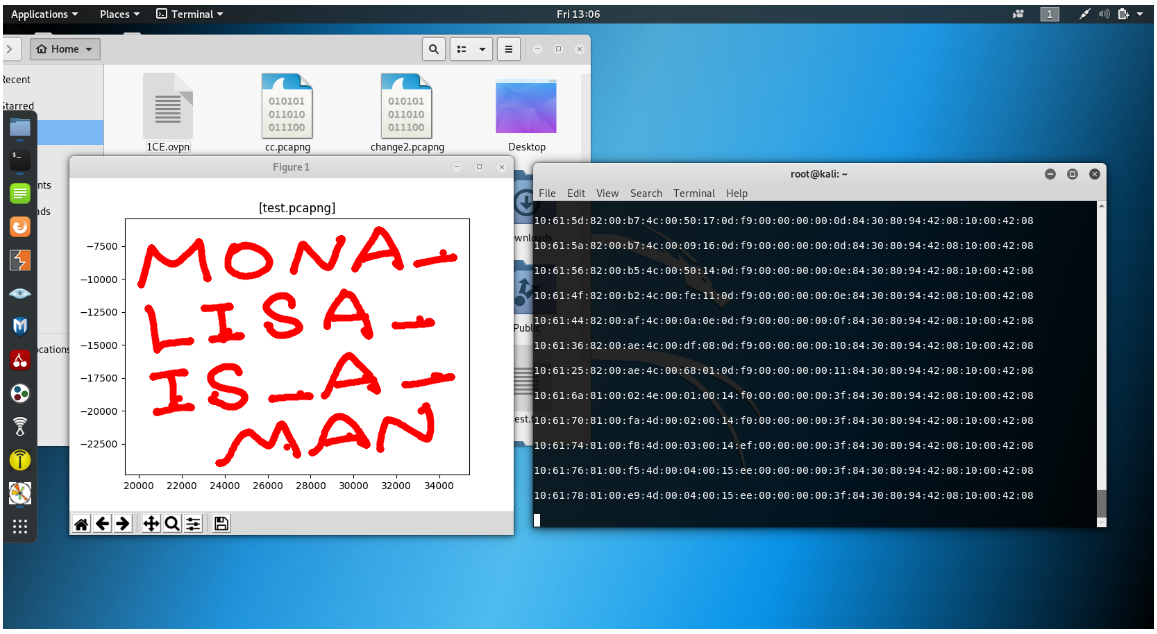
   `python UsbDigitizerHacker.py test.pcapng`

```
# coding:utf-8

import sys
import os
import numpy as np
import matplotlib.pyplot as plt

mousePositionX = 0
mousePositionY = 0

X = []
Y = []

DataFileName = "test.txt"
data = []

def main():
    global mousePositionX
    global mousePositionY
    # check argv
    if len(sys.argv) == 1:
```

```
        print "Usage : "
        print "        python UsbDigitizerHacker.py data.pcap [Conditions used
to sort]"
        print "Tips : "
        print "        To use this python2 script , you must install the
numpy,matplotlib first."
        print "        You can use `sudo pip install matplotlib numpy` to
install it"
        exit(1)

    # get argv
    pcapFilePath = sys.argv[1]
    print pcapFilePath
    # get data of pcap
    if len(sys.argv)==2:
        command = "tshark -r '%s' -T fields -e usb.capdata > %s" % (
            pcapFilePath, DataFileName)
        print command
        os.system(command)
    if len(sys.argv)==3:
        Conditions=sys.argv[2]
        command = "tshark -r '%s' -T fields -e usb.capdata -Y '%s' > %s" % (
            pcapFilePath,Conditions, DataFileName)
        print command
        os.system(command)


    with open(DataFileName, "rb") as f:
        flag=1
        for line in f:
            if line[24:26] != "00":  #根据压力值筛选，使画图结果更精准
                print line
                data.append(line[0:-1])

    #x,y坐标 小端序
    for line in data:
        x0=int(line[6:8],16)
        x1=int(line[9:11],16)
        x=x0+x1*256
        y0=int(line[15:17],16)
        y1=int(line[18:20],16)
        y=y0+y1*256
        X.append(x)
        Y.append(-y)

    #draw
    fig = plt.figure()
    ax1 = fig.add_subplot(111)
    ax1.set_title('[%s]' % (pcapFilePath))
    ax1.scatter(X, Y, c='r', marker='o')
    plt.savefig("out.png")
    plt.show()
```

```
    #clean temp data
    os.system("rm ./%s" % (DataFileName))

if __name__ == "__main__":
    main()
```

结果



如题目描述所说的key是 `MONA_LISA_IS_A_MAN`

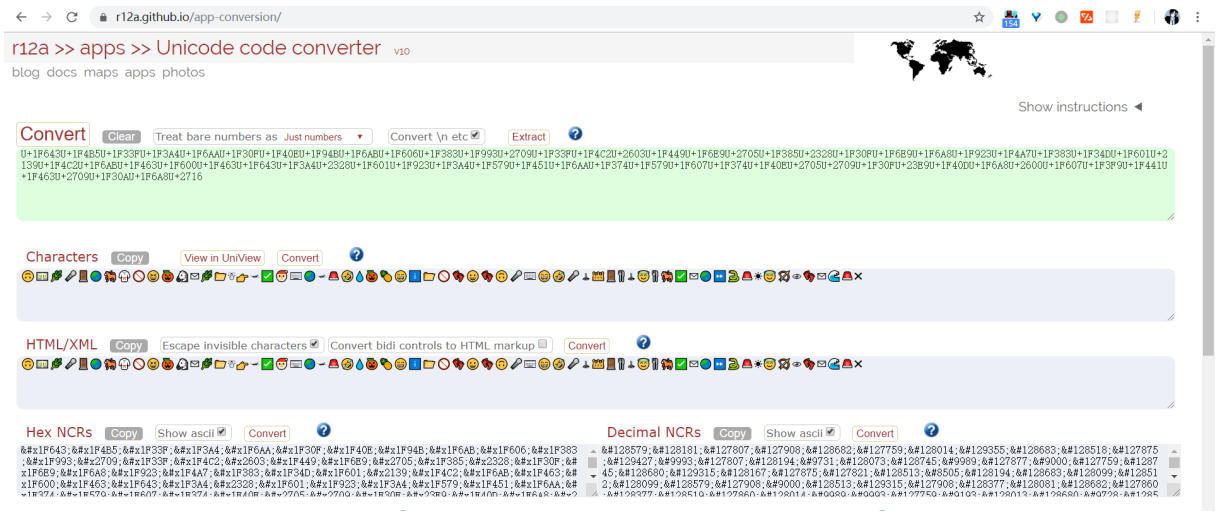
4. 分析 flag.txt

   看就知道是unicode

```
U+1F643U+1F4B5U+1F33FU+1F3A4U+1F6AAU+1F30FU+1F40EU+1F94BU+1F6ABU+1F606U+1F383U+1F993U+2709U+1F33FU+1F4C2U+2603U+1F449U+1F6E9U+2705U+1F385U+2328U+1F30FU+1F6E9U+1F6A8U+1F923U+1F4A7U+1F383U+1F34DU+1F601U+2139U+1F4C2U+1F6ABU+1F463U+1F600U+1F463U+1F643U+1F3A4U+2328U+1F601U+1F923U+1F3A4U+1F579U+1F451U+1F6AAU+1F374U+1F579U+1F607U+1F374U+1F40EU+2705U+2709U+1F30FU+23E9U+1F40DU+1F6A8U+2600U+1F607U+1F3F9U+1F441U+1F463U+2709U+1F30AU+1F6A8U+2716
```

   转换(https://r12a.github.io/app-conversion/)可以发现都是emoji

```
🙃💵🌿🎤🚪🌏🐎🥋🚫😆🎃🦓✉🌿📂☃👉🛩✅🎅⌨🌏🛩🚨🤣💧🎃🍍😁ℹ📂🚫👣😀👣🙃🎤⌨
😁🤣🎤🕹👑🚪🍴🕹😇🍴🐎✅✉🌏⏩🐍🚨☀😇🏹👁👣✉🌊🚨✖
```

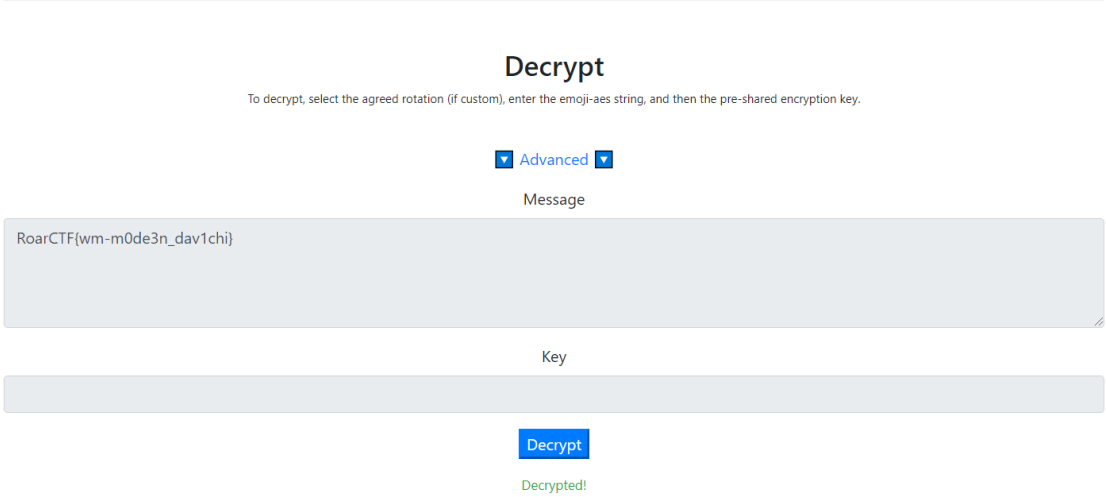


搜索emoji cipher可以发现一个叫emoji-aes的东西...

https://aghorler.github.io/emoji-aes/

(其实有好几个与emoji加密相关的，但只有这个需要以一个字符串作为key)

message使用emoji串，key使用`MONA_LISA_IS_A_MAN`



得到RoarCTF{wm-m0de3n_dav1chi}