```
 1 "C:\Users\squal\Dropbox\Engenharia Informatica\Projetos\PYTHON\
   TI\Ficha 2\venv\Scripts\python.exe" "C:/Users/squal/Dropbox/
   Engenharia Informatica/Projetos/PYTHON/TI/Ficha 2/main.py"
 2 Escolha o ficheiro a ler:
 3 1 - "lena.bmp"
 4 2 - "binaria.bmp"
 5 3 - "ct1.bmp"
 6 4 - "texto.txt"
 7 5 - "saxriff.wav"
 8 OPÇÃO: 3
 9 NOME DO FICHEIRO: "ct1.bmp"
10 ---------------------------
11 EX 1 a 3
12 Entropia: 5.972233535340102
13 ---------------------------
14 EX 4
15 Média ponderada: 6.007546456832934
16 Variância ponderada: 5.201652395703405
17 ---------------------------
18 EX 5
19 Entropia pares: 4.4812678152221
20 ---------------------------
21 EX 6a
22 QUERY: Exemplo --- TARGET: Exemplo
23 infoMutua: [2.12192809 1.92192809 1.64643934 2.17095059 1.
   97095059 1.77095059
24  2.04643934 2.12192809 2.32192809 2.52192809 2.24643934 2.
   24643934
25  2.24643934 2.24643934 2.44643934 2.44643934 2.52192809 2.
   72192809
26  2.52192809 2.32192809 2.32192809 2.12192809 2.32192809 2.
   32192809
27  2.12192809 2.04643934 2.04643934 2.04643934 2.04643934 2.
   04643934
28  2.32192809 2.32192809 2.04643934 2.12192809 2.12192809 1.
   84643934
29  1.77095059 1.84643934 2.04643934 2.04643934 2.32192809]
30 ---------------------------
31 EX 6b
32 QUERY: saxwriff.wav --- TARGET: "target01 - repeat.wav"
33 infoMutua: [0.10687443 0.11363084 0.11897523 0.15128366]
34
35 QUERY: saxwriff.wav --- TARGET: "target02 - repeatNoise.wav"
36 infoMutua: [0.17275313 0.17145628 0.13226736 0.23536088]
37
38 ---------------------------
39 EX 6c
```

```
40 QUERY: saxwriff.wav --- TARGET: "Song01.wav"
41 infoMutua: [0.27388239 0.27605158 0.26999454]
42 Inf mútua máxima: 0.27605158127805074
43 Inf mútua ordem decrescente: [0.27605158 0.27388239 0.26999454]
44
45 QUERY: saxwriff.wav --- TARGET: "Song02.wav"
46 infoMutua: [0.38038876 0.38527132]
47 Inf mútua máxima: 0.38527132071761666
48 Inf mútua ordem decrescente: [0.38527132 0.38038876]
49
50 QUERY: saxwriff.wav --- TARGET: "Song03.wav"
51 infoMutua: [0.38485691 0.31204146 0.306936  ]
52 Inf mútua máxima: 0.3848569099907228
53 Inf mútua ordem decrescente: [0.38485691 0.31204146 0.306936  ]
54
55 QUERY: saxwriff.wav --- TARGET: "Song04.wav"
56 infoMutua: [0.41892845 0.42107753]
57 Inf mútua máxima: 0.42107753301648404
58 Inf mútua ordem decrescente: [0.42107753 0.41892845]
59
60 QUERY: saxwriff.wav --- TARGET: "Song05.wav"
61 infoMutua: []
62 Traceback (most recent call last):
63   File "C:/Users/squal/Dropbox/Engenharia Informatica/Projetos/
   PYTHON/TI/Ficha 2/main.py", line 451, in <module>
64     main("ct1.bmp")
65   File "C:/Users/squal/Dropbox/Engenharia Informatica/Projetos/
   PYTHON/TI/Ficha 2/main.py", line 418, in main
66     exercicio_6c(data, alfabeto, "Song05.wav")
67   File "C:/Users/squal/Dropbox/Engenharia Informatica/Projetos/
   PYTHON/TI/Ficha 2/main.py", line 345, in exercicio_6c
68     print(f"Inf mútua máxima: {np.amax(inf_mutua)}")
69   File "<__array_function__ internals>", line 6, in amax
70   File "C:\Users\squal\Dropbox\Engenharia Informatica\Projetos\
   PYTHON\TI\Ficha 2\venv\lib\site-packages\numpy\core\fromnumeric
   .py", line 2706, in amax
71     keepdims=keepdims, initial=initial, where=where)
72   File "C:\Users\squal\Dropbox\Engenharia Informatica\Projetos\
   PYTHON\TI\Ficha 2\venv\lib\site-packages\numpy\core\fromnumeric
   .py", line 87, in _wrapreduction
73     return ufunc.reduce(obj, axis, dtype, out, **passkwargs)
74 ValueError: zero-size array to reduction operation maximum
   which has no identity
75
76 Process finished with exit code 1
77
```