

# Heart failure classification

The main goal of this project is to show usage of different machine learning techniques in classification where the dependent variable is death event. Dataset contains the medical records of 299 patients who had heart failure, collected during their follow-up period. Each patient profile has 13 clinical features. It was downloaded from <https://archive.ics.uci.edu/ml/datasets/Heart+failure+clinical+records>.

Project is divided into two parts. Firstly, the data is described, visualized and verified for occurrence of incorrect values. After it, the feature selection methods are applied. Properly prepared dataset is used in the second part of this project, where selected variables are used in modelling. Before implementing various types of methods, the dataset is divided into train and test sample. The following classification techniques are selected:

- Logistic Regression
- SVM
- Decision Tree
- Randoml Forest
- XGBBoost

## Exploratory data analysis

Exploratory data analysis is a crucial part in every project. Without properly data, our work is useless. That's why we highly concentrate on data preparation. Also, it is important to be aware what is inside the data. In this part of project, emphasis is placed on knowing the data and preparing it to further analysis.

In [1]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings(action="ignore")

import random
random.seed(8)
```

Out [2]:

	age	anaemia	creatinine_phosphokinase	diabetes	ejection_fraction	high_blood_pressure	platelets	serum_creatinine	serum_sodium	sex
1	55.0	0	7861	0	38	0	26358.03	1.1	130	1
2	65.0	0	146	0	20	0	162000.0	1.30	136	1
3	50.0	1	111	0	20	0	210000.0	1.90	137	1
4	65.0	0	160	0	20	0	327000.0	2.70	116	0
5	90.0	1	47	0	40	1	204000.0	2.10	132	1
6	75.0	1	246	0	15	0	127000.0	1.20	137	1
7	60.0	1	315	1	60	0	454000.0	1.10	131	1
8	65.0	0	157	0	65	0	26358.03	1.50	138	0
9	80.0	1	123	0	35	1	388000.0	9.40	133	1
10	75.0	1	81	0	38	1	368000.0	4.00	131	1
11	62.0	0	231	0	25	1	253000.0	0.90	140	1
12	45.0	1	981	0	30	0	136000.0	1.10	137	1
13	50.0	1	168	0	38	1	276000.0	1.10	137	1
14	49.0	1	80	0	30	1	427000.0	1.00	138	0
15	82.0	1	379	0	50	0	47000.0	1.30	136	1
16	87.0	1	149	0	38	0	262000.0	0.90	140	1
17	45.0	0	582	0	14	0	166000.0	0.80	127	1
18	70.0	1	125	0	25	1	237000.0	1.00	140	0
19	48.0	1	582	1	55	0	87000.0	1.90	121	0
20	65.0	1	52	0	25	1	276000.0	1.30	137	0
21	65.0	1	128	1	30	1	297000.0	1.60	136	0
22	68.0	1	220	0	35	1	289000.0	0.90	140	1
23	53.0	0	63	1	60	0	368000.0	0.80	135	1
24	75.0	0	582	1	30	1	26358.03	1.83	134	0
25	80.0	0	148	1	38	0	149000.0	1.90	144	1
26	95.0	1	112	0	40	1	196000.0	1.00	138	0
27	70.0	0	123	1	45	1	284000.0	1.30	136	1
28	58.0	1	60	0	38	0	153000.0	5.80	134	1
29	82.0	0	70	1	30	0	200000.0	1.20	132	1
30	94.0	0	23	0	38	1	26358.03	1.83	134	1
31	85.0	0	582	0	45	0	360000.0	3.00	132	1
32	50.0	1	249	1	35	1	319000.0	1.00	128	0
33	50.0	1	159	1	30	0	302000.0	1.20	138	0
34	65.0	0	94	1	50	1	188000.0	1.00	140	1
35	69.0	0	582	1	35	0	228000.0	3.50	134	1
36	90.0	1	60	1	50	0	226000.0	1.00	134	1
37	82.0	1	855	1	50	1	321000.0	1.00	145	0
38	60.0	0	2656	1	30	0	305000.0	2.30	137	1
39	60.0	0	235	1	38	0	329000.0	3.00	142	0
40	70.0	0	184	0	20	1	26358.03	1.83	134	1
41	50.0	0	582	1	30	1	153000.0	1.20	136	0
42	70.0	0	571	1	45	1	185000.0	1.20	139	1
43	72.0	0	127	1	50	1	218000.0	1.00	134	1
44	60.0	1	588	1	60	0	194000.0	1.10	142	0
45	50.0	0	582	1	38	0	310000.0	1.90	135	1
46	51.0	0	1380	0	25	1	271000.0	0.90	130	1
47	60.0	0	582	1	38	1	451000.0	0.60	138	1
48	80.0	1	553	0	20	1	140000.0	4.40	133	1
49	57.0	1	129	0	30	0	395000.0	1.00	140	0
...	...	...	...	...	...	...	...	...	...	...
249	53.0	0	207	1	40	0	223000.0	1.20	130	0
250	55.0	0	2522	0	30	1	404000.0	0.50	139	0
251	50.0	0	572	1	35	0	231000.0	0.80	143	0
252	50.0	0	245	0	45	1	274000.0	1.00	133	0
253	70.0	0	88	1	35	1	236000.0	1.20	132	1
254	53.0	1	446	0	60	1	26358.03	1.00	139	1
255	52.0	1	191	1	30	1	334000.0	1.00	142	1
256	65.0	0	326	0	38	0	294000.0	1.70	139	1
257	58.0	0	132	1	38	1	235000.0	0.80	135	1
258	45.0	1	66	1	25	0	233000.0	1.00	139	1
259	53.0	0	56	0	50	0	308000.0	0.70	135	1
260	55.0	0	66	0	40	0	203000.0	1.00	138	1
261	62.0	1	655	0	40	0	283000.0	0.70	133	0
262	65.0	1	258	1	25	0	198000.0	1.40	129	0
263	68.0	1	157	0	60	0	208000.0	1.00	140	0
264	61.0	0	582	1	38	0	147000.0	1.20	141	1
265	50.0	1	298	0	35	0	362000.0	0.90	140	1
266	55.0	0	1199	0	20	0	26358.03	1.83	134	1
267	56.0	1	135	1	38	0	133000.0	1.70	140	1
268	45.0	0	582	1	38	0	302000.0	0.90	140	0
269	40.0	0	582	1	35	0	222000.0	1.00	132	1
270	44.0	0	582	1	30	1	26358.03	1.60	130	1
271	51.0	0	582	1	40	0	221000.0	0.90	134	0
272	67.0	0	213	0	38	0	215000.0	1.20	133	0
273	42.0	0	64	0	40	0	189000.0	0.70	140	1
274	60.0	1	257	1	30	0	150000.0	1.00	137	1
275	45.0	0	582	0	38	1	422000.0	0.80	137	0
276	70.0	0	618	0	35	0	222000.0	1.10	142	0
277	70.0	0	582	1	38	0	021000.0	1.10	140	1
278	50.0	1	1051	1	30	0	232000.0	0.70	136	0
279	55.0	0	84	1	38	0	451000.0	1.30	136	0
280	70.0	0	2095	1	40	0	241000.0	1.00	137	1
281	70.0	0	64	0	40	0	01000.0	2.70	136	1
282	42.0	0	582	0	30	0	215000.0	3.80	128	1
283	65.0	0	1688	0	38	0	26358.03	1.10	138	1
284	50.0	1	54	0	40	0	279000.0	0.80	141	1
285	55.0	1	170	1	40	0	336000.0	1.20	135	1
286	60.0	0	253	0	35	0	279000.0	1.70	140	1
287	45.0	0	582	1	55	0	543000.0	1.00	132	0
288	65.0	0	892	1	35	0	26358.03	1.10	142	0
289	90.0	1	337	0	38	0	309000.0	0.90	144	0
290	45.0	0	615	1	55	0	222000.0	0.80	141	0
291	60.0	0	320	0	35	0	133000.0	1.40	139	1
292	52.0	0	190	1	38	0	382000.0	1.00	140	1
293	63.0	1	103	1	35	0	179000.0	0.90	136	1
294	62.0	0	61	1	38	1	15000.0	1.10	143	1
295	55.0	0	1820	0	38	0	276000.0	1.20	139	0
296	45.0	0	2060	1	60	0	742000.0	0.80	138	0
297	45.0	0	2413	0	38	0	140000.0	1.40	140	1
298	50.0	0	196	0	45	0	395000.0	1.60	136	1

299 rows x 13 columns

Variables description:

- age: age of the patient (years)
- anaemia: decrease of red blood cells or hemoglobin (boolean)
- high blood pressure: if the patient has hypertension (boolean)
- creatinine phosphokinase (CPK): level of the CPK enzyme in the blood (mcg/L)
- diabetes: if the patient has diabetes (boolean)
- ejection fraction: percentage of blood leaving the heart at each contraction (percentage)
- platelets: platelets in the blood (kiloplatelets/mL)
- sex: woman or man (binary)
- serum creatinine: level of serum creatinine in the blood (mg/dL)
- serum sodium: level of serum sodium in the blood (mEq/L)
- smoking: if the patient smokes or not (boolean)
- time: follow-up period (days)
- death event: if the patient deceased during the follow-up period (boolean)

In [3]:

```
df.dtypes
```

Out [3]:

age	float64
anaemia	int64
creatinine_phosphokinase	int64
diabetes	int64
ejection_fraction	int64
high_blood_pressure	int64
platelets	float64
serum_creatinine	float64
serum_sodium	int64
sex	int64
smoking	int64
time	int64
DEATH_EVENT	int64
dtype:	object

In [4]:

```
df.describe()
```

Out [4]:

	age	anaemia	creatinine_phosphokinase	diabetes	ejection_fraction	high_blood_pressure	platelets	serum_creatinine	serum_sodium
count	299.000000	299.000000	299.000000	299.000000	299.000000	299.000000	299.000000	299.000000	299.000000
mean	63.53893	0.431488	581.839465	0.418600	38.083612	0.351171	26358.026264	1.39388	
std	11.894809	0.496107	970.287881	0.494067	11.834841	0.478136	97804.236869	1.03451	
min	40.000000	0.000000	23.000000	0.000000	14.000000	0.000000	25100.000000	0.500000	
25%	51.000000	0.000000	116.500000	0.000000	30.000000	0.000000	212500.000000	0.900000	
50%	60.000000	0.000000	250.000000	0.000000	38.000000	0.000000	262000.000000	1.100000	
75%	70.000000	1.000000	582.000000	1.000000	45.000000	1.000000	303500.000000	1.400000	
max	95.000000	1.000000	7861.000000	1.000000	80.000000	1.000000	850000.000000	9.400000	

In [5]:

```
df.isnull().sum()
```

Out [5]:

age	0
anaemia	0
creatinine_phosphokinase	0
diabetes	0
ejection_fraction	0
high_blood_pressure	0
platelets	0
serum_creatinine	0
serum_sodium	0
sex	0
smoking	0
time	0
DEATH_EVENT	0
dtype:	int64

In [6]:

```
cat_var = ['anaemia', 'diabetes', 'high_blood_pressure', 'sex', 'smoking', 'DEATH_EVENT']
num_var = [i for i in df.columns if i not in cat_var]
```

Before making any visualisations, it's good to check the column types, basic statistics and number of NULLs. Based on these steps, we conclude that any actions in order to change the values in dataset are not necessary. Variables are divided into 2 groups based on their characteristics. Cat var are categorical variables and num var are numerical variables.



We check the proportion of values in categorical variables. There are no variables, where the proportion of 0 and 1 are similar.

In [8]:

```
# Checking for the distribution of the numeric features
fig, axs = plt.subplots(nrows=2, ncols=4, figsize = (15,10))
ax_title_pairs = zip(axs.flat, num_var)

for ax, n_var in ax_title_pairs:
    sns.boxplot(y=n_var, data=df, ax=ax, color = 'lawngreen')
    ax.set_xlabel(f'{n_var}', fontsize=15)
    ax.set_ylabel('None')

fig.suptitle('Box Plots for numerical variables', fontsize=25, weight='bold')
axs.flat[-1].remove()
plt.tight_layout()
```

Out [8]:



In [19]:	<table><tr><th></th><th>age</th><th>anaemia</th><th>creatinine</th><th>phosphokinase</th><th>diabetes</th><th>ejection_fraction</th><th>high_blood_pressure</th><th>serum_creatinine</th><th>serum_sodium</th><th>sex</th><th>smoke</th></tr><tr><td>184</td><td>0.327273</td><td>1</td><td>0.000823</td><td>0</td><td>0.166667</td><td>0</td><td>0.111111</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>254</td><td>0.263664</td><td>1</td><td>0.072197</td><td>0</td><td>0.696970</td><td>1</td><td>0.079365</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>189</td><td>0.000000</td><td>0</td><td>0.037720</td><td>0</td><td>0.466997</td><td>1</td><td>0.063492</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>7</td><td>0.363636</td><td>0</td><td>0.004096</td><td>0</td><td>0.166667</td><td>1</td><td>0.095238</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>118</td><td>0.454545</td><td>1</td><td>0.015361</td><td>1</td><td>0.696970</td><td>1</td><td>0.063492</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>171</td><td>0.218182</td><td>0</td><td>0.672982</td><td>0</td><td>0.393939</td><td>0</td><td>0.063492</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>208</td><td>0.363636</td><td>0</td><td>0.383390</td><td>1</td><td>0.393939</td><td>0</td><td>0.079365</td><td>0.407401</td><td>0</td><td></td><td></td></tr><tr><td>2</td><td>0.454545</td><td>0</td><td>0.020993</td><td>0</td><td>0.099099</td><td>0</td><td>0.126984</td><td>0.296296</td><td>1</td><td></td><td></td></tr><tr><td>48</td><td>0.727273</td><td>1</td><td>0.095459</td><td>0</td><td>0.099099</td><td>1</td><td>0.19048</td><td>0.444444</td><td>1</td><td></td><td></td></tr><tr><td>7</td><td>0.363636</td><td>1</td><td>0.049838</td><td>1</td><td>0.696970</td><td>0</td><td>0.095238</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>225</td><td>0.363636</td><td>0</td><td>0.111282</td><td>1</td><td>0.696970</td><td>0</td><td>0.142857</td><td>0.184818</td><td>0</td><td></td><td></td></tr><tr><td>137</td><td>0.509091</td><td>1</td><td>0.106332</td><td>0</td><td>0.166667</td><td>0</td><td>0.253968</td><td>0.333333</td><td>1</td><td></td><td></td></tr><tr><td>0</td><td>0.363636</td><td>0</td><td>0.095409</td><td>0</td><td>0.099099</td><td>1</td><td>0.222222</td><td>0.333333</td><td>1</td><td></td><td></td></tr><tr><td>289</td><td>0.090991</td><td>1</td><td>0.053593</td><td>0</td><td>0.363636</td><td>0</td><td>0.063492</td><td>0.851852</td><td>0</td><td></td><td></td></tr><tr><td>20</td><td>0.454545</td><td>1</td><td>0.004950</td><td>0</td><td>0.166667</td><td>1</td><td>0.126984</td><td>0.592593</td><td>0</td><td></td><td></td></tr><tr><td>76</td><td>0.545455</td><td>0</td><td>0.017777</td><td>0</td><td>0.696970</td><td>1</td><td>0.047619</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>265</td><td>0.181818</td><td>1</td><td>0.046936</td><td>0</td><td>0.318182</td><td>0</td><td>0.063492</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>283</td><td>0.454545</td><td>0</td><td>0.284178</td><td>0</td><td>0.363636</td><td>0</td><td>0.095238</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>194</td><td>0.090999</td><td>0</td><td>0.095409</td><td>0</td><td>0.099099</td><td>1</td><td>0.174603</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>92</td><td>0.063664</td><td>0</td><td>0.095409</td><td>0</td><td>0.696970</td><td>0</td><td>0.107937</td><td>0.592593</td><td>0</td><td></td><td></td></tr><tr><td>290</td><td>0.090999</td><td>0</td><td>0.101041</td><td>1</td><td>0.621212</td><td>0</td><td>0.047619</td><td>0.740741</td><td>0</td><td></td><td></td></tr><tr><td>61</td><td>0.181818</td><td>0</td><td>0.050350</td><td>0</td><td>0.393939</td><td>1</td><td>0.285714</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>266</td><td>0.272727</td><td>0</td><td>0.200717</td><td>0</td><td>0.099099</td><td>0</td><td>0.211111</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>207</td><td>0.181818</td><td>0</td><td>0.032258</td><td>0</td><td>0.363636</td><td>0</td><td>0.063492</td><td>0.555556</td><td>1</td><td></td><td></td></tr><tr><td>69</td><td>0.454545</td><td>0</td><td>0.015361</td><td>1</td><td>0.166667</td><td>0</td><td>0.211111</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>36</td><td>0.090991</td><td>1</td><td>0.006315</td><td>1</td><td>0.545455</td><td>0</td><td>0.079365</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>183</td><td>0.363636</td><td>0</td><td>0.012971</td><td>0</td><td>0.363636</td><td>1</td><td>0.126984</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>80</td><td>0.545455</td><td>0</td><td>0.007851</td><td>0</td><td>0.393939</td><td>0</td><td>0.190476</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>42</td><td>0.545455</td><td>0</td><td>0.093531</td><td>1</td><td>0.466997</td><td>1</td><td>0.111111</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>173</td><td>0.181818</td><td>1</td><td>0.015702</td><td>0</td><td>0.099099</td><td>0</td><td>0.047619</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>151</td><td>0.400000</td><td>0</td><td>0.001195</td><td>1</td><td>0.696970</td><td>1</td><td>0.063492</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>47</td><td>0.363636</td><td>0</td><td>0.095409</td><td>1</td><td>0.363636</td><td>1</td><td>0.15873</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>210</td><td>0.345455</td><td>0</td><td>0.032258</td><td>1</td><td>0.045455</td><td>1</td><td>0.079365</td><td>0.555556</td><td>1</td><td></td><td></td></tr><tr><td>134</td><td>0.545455</td><td>0</td><td>0.770951</td><td>0</td><td>0.318182</td><td>0</td><td>0.107937</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>68</td><td>0.545455</td><td>0</td><td>0.023554</td><td>0</td><td>0.166667</td><td>0</td><td>0.111111</td><td>0.777778</td><td>1</td><td></td><td></td></tr><tr><td>176</td><td>0.527273</td><td>0</td><td>0.238266</td><td>0</td><td>0.393939</td><td>0</td><td>0.079365</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>144</td><td>0.281818</td><td>1</td><td>0.157023</td><td>0</td><td>0.166667</td><td>1</td><td>0.190476</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>100</td><td>0.454545</td><td>1</td><td>0.048131</td><td>0</td><td>0.166667</td><td>0</td><td>0.095238</td><td>0.740741</td><td>1</td><td></td><td></td></tr><tr><td>96</td><td>0.418182</td><td>1</td><td>0.083803</td><td>1</td><td>0.166667</td><td>1</td><td>0.126984</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>268</td><td>0.090999</td><td>0</td><td>0.095409</td><td>1</td><td>0.363636</td><td>0</td><td>0.063492</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>279</td><td>0.272727</td><td>0</td><td>0.010411</td><td>1</td><td>0.363636</td><td>0</td><td>0.126984</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>154</td><td>0.545455</td><td>1</td><td>0.053251</td><td>0</td><td>0.318182</td><td>1</td><td>0.047619</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>30</td><td>0.981818</td><td>0</td><td>0.095409</td><td>1</td><td>0.363636</td><td>1</td><td>0.211111</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>192</td><td>0.181818</td><td>1</td><td>0.016726</td><td>1</td><td>0.393939</td><td>0</td><td>0.031746</td><td>0.333333</td><td>1</td><td></td><td></td></tr><tr><td>252</td><td>0.181818</td><td>0</td><td>0.037890</td><td>0</td><td>0.466997</td><td>1</td><td>0.079365</td><td>0.444444</td><td>1</td><td></td><td></td></tr><tr><td>207</td><td>0.272727</td><td>0</td><td>0.306708</td><td>0</td><td>0.363636</td><td>0</td><td>0.111111</td><td>0.666667</td><td>1</td><td></td><td></td></tr><tr><td>187</td><td>0.363636</td><td>0</td><td>0.319679</td><td>1</td><td>0.363636</td><td>0</td><td>0.063492</td><td>0.851852</td><td>0</td><td></td><td></td></tr><tr><td>150</td><td>0.181818</td><td>0</td><td>0.425623</td><td>0</td><td>0.242424</td><td>1</td><td>0.000000</td><td>0.666667</td><td>0</td><td></td><td></td></tr><tr><td>253</td><td>0.181818</td><td>0</td><td>0.311145</td><td>1</td><td>0.318182</td><td>0</td><td>0.107937</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>111</td><td>0.272727</td><td>0</td><td>0.006315</td><td>0</td><td>0.318182</td><td>0</td><td>0.111111</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td><td>...</td></tr><tr><td>110</td><td>0.181818</td><td>0</td><td>0.018092</td><td>0</td><td>0.696970</td><td>0</td><td>0.111111</td><td>0.407407</td><td>1</td><td></td><td></td></tr><tr><td>49</td><td>0.309091</td><td>1</td><td>0.018092</td><td>0</td><td>0.242424</td><td>0</td><td>0.079365</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>127</td><td>0.327273</td><td>1</td><td>0.030210</td><td>1</td><td>0.696970</td><td>0</td><td>0.047619</td><td>0.592593</td><td>0</td><td></td><td></td></tr><tr><td>172</td><td>0.545455</td><td>1</td><td>0.025260</td><td>0</td><td>0.696970</td><td>1</td><td>0.095238</td><td>0.888889</td><td>1</td><td></td><td></td></tr><tr><td>221</td><td>0.454545</td><td>0</td><td>0.016214</td><td>0</td><td>0.545455</td><td>0</td><td>0.095238</td><td>0.888889</td><td>1</td><td></td><td></td></tr><tr><td>57</td><td>0.363636</td><td>1</td><td>0.099676</td><td>0</td><td>0.393939</td><td>0</td><td>0.15873</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>41</td><td>0.181818</td><td>0</td><td>0.017238</td><td>1</td><td>0.242424</td><td>1</td><td>0.111111</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>216</td><td>0.545455</td><td>0</td><td>0.201229</td><td>0</td><td>0.545455</td><td>1</td><td>0.063492</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>200</td><td>0.418182</td><td>1</td><td>0.095654</td><td>0</td><td>0.466997</td><td>0</td><td>0.031746</td><td>0.777778</td><td>1</td><td></td><td></td></tr><tr><td>112</td><td>0.181818</td><td>0</td><td>0.297654</td><td>1</td><td>0.166667</td><td>0</td><td>0.174603</td><td>0.555556</td><td>1</td><td></td><td></td></tr><tr><td>40</td><td>0.545455</td><td>0</td><td>0.095409</td><td>0</td><td>0.099099</td><td>1</td><td>0.211111</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>202</td><td>0.545455</td><td>0</td><td>0.012630</td><td>0</td><td>0.696970</td><td>1</td><td>0.063492</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>3</td><td>0.327273</td><td>1</td><td>0.018775</td><td>0</td><td>0.242424</td><td>1</td><td>0.079365</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>284</td><td>0.181818</td><td>1</td><td>0.005291</td><td>0</td><td>0.393939</td><td>0</td><td>0.047619</td><td>0.740741</td><td>1</td><td></td><td></td></tr><tr><td>193</td><td>0.600000</td><td>1</td><td>0.035501</td><td>1</td><td>0.242424</td><td>0</td><td>0.107937</td><td>0.777778</td><td>1</td><td></td><td></td></tr><tr><td>224</td><td>0.327273</td><td>0</td><td>0.095409</td><td>1</td><td>0.166667</td><td>0</td><td>0.079365</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>128</td><td>0.381818</td><td>0</td><td>0.038402</td><td>0</td><td>0.242424</td><td>1</td><td>0.031746</td><td>0.555556</td><td>1</td><td></td><td></td></tr><tr><td>39</td><td>0.363636</td><td>0</td><td>0.036184</td><td>1</td><td>0.363636</td><td>0</td><td>0.096825</td><td>0.777778</td><td>0</td><td></td><td></td></tr><tr><td>205</td><td>0.181818</td><td>1</td><td>0.024578</td><td>1</td><td>0.099099</td><td>0</td><td>0.079365</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>3</td><td>0.181818</td><td>1</td><td>0.015020</td><td>0</td><td>0.099099</td><td>0</td><td>0.222222</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>50</td><td>0.509091</td><td>1</td><td>0.094555</td><td>0</td><td>0.166667</td><td>1</td><td>0.079365</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>230</td><td>0.363636</td><td>0</td><td>0.024407</td><td>0</td><td>0.242424</td><td>0</td><td>0.190476</td><td>0.222222</td><td>0</td><td></td><td></td></tr><tr><td>31</td><td>0.181818</td><td>0</td><td>0.000000</td><td>0</td><td>0.466997</td><td>0</td><td>0.096825</td><td>0.407407</td><td>1</td><td></td><td></td></tr><tr><td>206</td><td>0.000000</td><td>1</td><td>0.013313</td><td>0</td><td>0.393939</td><td>0</td><td>0.047619</td><td>0.740741</td><td>1</td><td></td><td></td></tr><tr><td>24</td><td>0.363636</td><td>0</td><td>0.095409</td><td>1</td><td>0.242424</td><td>1</td><td>0.211111</td><td>0.481481</td><td>0</td><td></td><td></td></tr><tr><td>178</td><td>0.418182</td><td>1</td><td>0.016897</td><td>1</td><td>0.696970</td><td>0</td><td>0.111111</td><td>0.888889</td><td>1</td><td></td><td></td></tr><tr><td>23</td><td>0.236364</td><td>0</td><td>0.006827</td><td>1</td><td>0.696970</td><td>0</td><td>0.047619</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>34</td><td>0.545455</td><td>0</td><td>0.021128</td><td>1</td><td>0.545455</td><td>1</td><td>0.079365</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>90</td><td>0.545455</td><td>0</td><td>0.007339</td><td>1</td><td>0.466997</td><td>0</td><td>0.047619</td><td>0.555556</td><td>1</td><td></td><td></td></tr><tr><td>67</td><td>0.581818</td><td>1</td><td>0.014849</td><td>0</td><td>0.166667</td><td>0</td><td>0.079365</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>85</td><td>0.200000</td><td>0</td><td>0.003887</td><td>0</td><td>0.545455</td><td>0</td><td>0.031746</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>236</td><td>0.636364</td><td>0</td><td>0.016385</td><td>0</td><td>0.545455</td><td>1</td><td>0.095238</td><td>1.000000</td><td>1</td><td></td><td></td></tr><tr><td>12</td><td>0.090999</td><td>1</td><td>0.163509</td><td>0</td><td>0.242424</td><td>0</td><td>0.095238</td><td>0.592593</td><td>1</td><td></td><td></td></tr><tr><td>175</td><td>0.363636</td><td>1</td><td>0.012889</td><td>0</td><td>0.696970</td><td>0</td><td>0.079365</td><td>0.629630</td><td>1</td><td></td><td></td></tr><tr><td>54</td><td>0.363636</td><td>1</td><td>0.040451</td><td>1</td><td>0.363636</td><td>0</td><td>0.269841</td><td>0.407407</td><td>0</td><td></td><td></td></tr><tr><td>272</td><td>0.490999</td><td>0</td><td>0.032429</td><td>0</td><td>0.363636</td><td>0</td><td>0.111111</td><td>0.444444</td><td>0</td><td></td><td></td></tr><tr><td>106</td><td>0.272727</td><td>0</td><td>0.123741</td><td>0</td><td>0.466997</td><td>0</td><td>0.126984</td><td>0.444444</td><td>0</td><td></td><td></td></tr><tr><td>277</td><td>0.545455</td><td>0</td><td>0.095409</td><td>1</td><td>0.363636</td><td>0</td><td>0.095238</td><td>0.703704</td><td>1</td><td></td><td></td></tr><tr><td>21</td><td>0.454545</td><td>1</td><td>0.017921</td><td>1</td><td>0.242424</td><td>1</td><td>0.174603</td><td>0.555556</td><td>0</td><td></td><td></td></tr><tr><td>148</td><td>0.636364</td><td>1</td><td>0.095409</td><td>0</td><td>0.242424</td><td>0</td><td>0.211111</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>65</td><td>0.363636</td><td>0</td><td>0.007680</td><td>0</td><td>0.099099</td><td>0</td><td>0.380952</td><td>0.222222</td><td>1</td><td></td><td></td></tr><tr><td>276</td><td>0.545455</td><td>0</td><td>0.101553</td><td>0</td><td>0.318182</td><td>0</td><td>0.095238</td><td>0.777778</td><td>0</td><td></td><td></td></tr><tr><td>113</td><td>0.545455</td><td>1</td><td>0.008363</td><td>0</td><td>0.696970</td><td>0</td><td>0.126984</td><td>0.592593</td><td>0</td><td></td><td></td></tr><tr><td>160</td><td>0.472727</td><td>1</td><td>0.008363</td><td>0</td><td>0.393939</td><td>1</td><td>0.111111</td><td>0.481481</td><td>1</td><td></td><td></td></tr><tr><td>130</td><td>0.363636</td><td>1</td><td>0.121864</td><td>0</td><td>0.696970</td><td>1</td><td>0.158730</td><td>0.518519</td><td>1</td><td></td><td></td></tr><tr><td>89</td><td>0.309091</td><td>1</td><td>0.015702</td><td>0</td><td>0.166667</td><td>1</td><td>0.095238</td><td>0.851852</td><td>1</td><td></td><td></td></tr><tr><td>51</td><td>0.263664</td><td>1</td><td>0.071606</td><td>0</td><td>0.099099</td><td>1</td><td>0.142857</td><td>0.666667</td><td>0</td><td></td><td></td></tr><tr><td>196</td><td>0.090999</td><td>0</td><td>0.095409</td><td>1</td><td>0.363636</td><td>1</td><td>0.107937</td><td>0.592593</td><td>0</td><td></td><td></td></tr><tr><td>141</td><td>0.109091</td><td>1</td><td>0.045742</td><td>0</td><td>0.318182</td><td>0</td><td>0.063492</td><td>0.703704</td><td>0</td><td></td><td></td></tr><tr><td>238</td><td>0.400000</td><td>0</td><td>0.044035</td><td>1</td><td>0.318182</td><td>0</td><td>0.079365</td><td>0.555556</td><td>0</td><td></td><td></td></tr></table>		age	anaemia	creatinine	phosphokinase	diabetes	ejection_fraction	high_blood_pressure	serum_creatinine	serum_sodium	sex	smoke	184	0.327273	1	0.000823	0	0.166667	0	0.111111	0.592593	1			254	0.263664	1	0.072197	0	0.696970	1	0.079365	0.666667	1			189	0.000000	0	0.037720	0	0.466997	1	0.063492	0.703704	0			7	0.363636	0	0.004096	0	0.166667	1	0.095238	0.592593	1			118	0.454545	1	0.015361	1	0.696970	1	0.063492	0.703704	0			171	0.218182	0	0.672982	0	0.393939	0	0.063492	0.703704	1			208	0.363636	0	0.383390	1	0.393939	0	0.079365	0.407401	0			2	0.454545	0	0.020993	0	0.099099	0	0.126984	0.296296	1			48	0.727273	1	0.095459	0	0.099099	1	0.19048	0.444444	1			7	0.363636	1	0.049838	1	0.696970	0	0.095238	0.703704	1			225	0.363636	0	0.111282	1	0.696970	0	0.142857	0.184818	0			137	0.509091	1	0.106332	0	0.166667	0	0.253968	0.333333	1			0	0.363636	0	0.095409	0	0.099099	1	0.222222	0.333333	1			289	0.090991	1	0.053593	0	0.363636	0	0.063492	0.851852	0			20	0.454545	1	0.004950	0	0.166667	1	0.126984	0.592593	0			76	0.545455	0	0.017777	0	0.696970	1	0.047619	0.703704	0			265	0.181818	1	0.046936	0	0.318182	0	0.063492	0.703704	1			283	0.454545	0	0.284178	0	0.363636	0	0.095238	0.629630	1			194	0.090999	0	0.095409	0	0.099099	1	0.174603	0.518519	1			92	0.063664	0	0.095409	0	0.696970	0	0.107937	0.592593	0			290	0.090999	0	0.101041	1	0.621212	0	0.047619	0.740741	0			61	0.181818	0	0.050350	0	0.393939	1	0.285714	0.703704	0			266	0.272727	0	0.200717	0	0.099099	0	0.211111	0.481481	1			207	0.181818	0	0.032258	0	0.363636	0	0.063492	0.555556	1			69	0.454545	0	0.015361	1	0.166667	0	0.211111	0.518519	1			36	0.090991	1	0.006315	1	0.545455	0	0.079365	0.481481	1			183	0.363636	0	0.012971	0	0.363636	1	0.126984	0.481481	1			80	0.545455	0	0.007851	0	0.393939	0	0.190476	0.555556	0			42	0.545455	0	0.093531	1	0.466997	1	0.111111	0.666667	1			173	0.181818	1	0.015702	0	0.099099	0	0.047619	0.666667	1			151	0.400000	0	0.001195	1	0.696970	1	0.063492	0.666667	1			47	0.363636	0	0.095409	1	0.363636	1	0.15873	0.629630	1			210	0.345455	0	0.032258	1	0.045455	1	0.079365	0.555556	1			134	0.545455	0	0.770951	0	0.318182	0	0.107937	0.592593	1			68	0.545455	0	0.023554	0	0.166667	0	0.111111	0.777778	1			176	0.527273	0	0.238266	0	0.393939	0	0.079365	0.518519	1			144	0.281818	1	0.157023	0	0.166667	1	0.190476	0.666667	1			100	0.454545	1	0.048131	0	0.166667	0	0.095238	0.740741	1			96	0.418182	1	0.083803	1	0.166667	1	0.126984	0.481481	1			268	0.090999	0	0.095409	1	0.363636	0	0.063492	0.703704	0			279	0.272727	0	0.010411	1	0.363636	0	0.126984	0.555556	0			154	0.545455	1	0.053251	0	0.318182	1	0.047619	0.555556	0			30	0.981818	0	0.095409	1	0.363636	1	0.211111	0.481481	1			192	0.181818	1	0.016726	1	0.393939	0	0.031746	0.333333	1			252	0.181818	0	0.037890	0	0.466997	1	0.079365	0.444444	1			207	0.272727	0	0.306708	0	0.363636	0	0.111111	0.666667	1			187	0.363636	0	0.319679	1	0.363636	0	0.063492	0.851852	0			150	0.181818	0	0.425623	0	0.242424	1	0.000000	0.666667	0			253	0.181818	0	0.311145	1	0.318182	0	0.107937	0.592593	1			111	0.272727	0	0.006315	0	0.318182	0	0.111111	0.518519	1			...	...	...	...	...	...	...	...	...	...	...	...	110	0.181818	0	0.018092	0	0.696970	0	0.111111	0.407407	1			49	0.309091	1	0.018092	0	0.242424	0	0.079365	0.703704	0			127	0.327273	1	0.030210	1	0.696970	0	0.047619	0.592593	0			172	0.545455	1	0.025260	0	0.696970	1	0.095238	0.888889	1			221	0.454545	0	0.016214	0	0.545455	0	0.095238	0.888889	1			57	0.363636	1	0.099676	0	0.393939	0	0.15873	0.629630	1			41	0.181818	0	0.017238	1	0.242424	1	0.111111	0.555556	0			216	0.545455	0	0.201229	0	0.545455	1	0.063492	0.703704	1			200	0.418182	1	0.095654	0	0.466997	0	0.031746	0.777778	1			112	0.181818	0	0.297654	1	0.166667	0	0.174603	0.555556	1			40	0.545455	0	0.095409	0	0.099099	1	0.211111	0.481481	1			202	0.545455	0	0.012630	0	0.696970	1	0.063492	0.629630	1			3	0.327273	1	0.018775	0	0.242424	1	0.079365	0.703704	1			284	0.181818	1	0.005291	0	0.393939	0	0.047619	0.740741	1			193	0.600000	1	0.035501	1	0.242424	0	0.107937	0.777778	1			224	0.327273	0	0.095409	1	0.166667	0	0.079365	0.629630	1			128	0.381818	0	0.038402	0	0.242424	1	0.031746	0.555556	1			39	0.363636	0	0.036184	1	0.363636	0	0.096825	0.777778	0			205	0.181818	1	0.024578	1	0.099099	0	0.079365	0.555556	0			3	0.181818	1	0.015020	0	0.099099	0	0.222222	0.592593	1			50	0.509091	1	0.094555	0	0.166667	1	0.079365	0.629630	1			230	0.363636	0	0.024407	0	0.242424	0	0.190476	0.222222	0			31	0.181818	0	0.000000	0	0.466997	0	0.096825	0.407407	1			206	0.000000	1	0.013313	0	0.393939	0	0.047619	0.740741	1			24	0.363636	0	0.095409	1	0.242424	1	0.211111	0.481481	0			178	0.418182	1	0.016897	1	0.696970	0	0.111111	0.888889	1			23	0.236364	0	0.006827	1	0.696970	0	0.047619	0.518519	1			34	0.545455	0	0.021128	1	0.545455	1	0.079365	0.703704	1			90	0.545455	0	0.007339	1	0.466997	0	0.047619	0.555556	1			67	0.581818	1	0.014849	0	0.166667	0	0.079365	0.703704	1			85	0.200000	0	0.003887	0	0.545455	0	0.031746	0.703704	1			236	0.636364	0	0.016385	0	0.545455	1	0.095238	1.000000	1			12	0.090999	1	0.163509	0	0.242424	0	0.095238	0.592593	1			175	0.363636	1	0.012889	0	0.696970	0	0.079365	0.629630	1			54	0.363636	1	0.040451	1	0.363636	0	0.269841	0.407407	0			272	0.490999	0	0.032429	0	0.363636	0	0.111111	0.444444	0			106	0.272727	0	0.123741	0	0.466997	0	0.126984	0.444444	0			277	0.545455	0	0.095409	1	0.363636	0	0.095238	0.703704	1			21	0.454545	1	0.017921	1	0.242424	1	0.174603	0.555556	0			148	0.636364	1	0.095409	0	0.242424	0	0.211111	0.481481	1			65	0.363636	0	0.007680	0	0.099099	0	0.380952	0.222222	1			276	0.545455	0	0.101553	0	0.318182	0	0.095238	0.777778	0			113	0.545455	1	0.008363	0	0.696970	0	0.126984	0.592593	0			160	0.472727	1	0.008363	0	0.393939	1	0.111111	0.481481	1			130	0.363636	1	0.121864	0	0.696970	1	0.158730	0.518519	1			89	0.309091	1	0.015702	0	0.166667	1	0.095238	0.851852	1			51	0.263664	1	0.071606	0	0.099099	1	0.142857	0.666667	0			196	0.090999	0	0.095409	1	0.363636	1	0.107937	0.592593	0			141	0.109091	1	0.045742	0	0.318182	0	0.063492	0.703704	0			238	0.400000	0	0.044035	1	0.318182	0	0.079365	0.555556	0		
	age	anaemia	creatinine	phosphokinase	diabetes	ejection_fraction	high_blood_pressure	serum_creatinine	serum_sodium	sex	smoke																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
184	0.327273	1	0.000823	0	0.166667	0	0.111111	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
254	0.263664	1	0.072197	0	0.696970	1	0.079365	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
189	0.000000	0	0.037720	0	0.466997	1	0.063492	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
7	0.363636	0	0.004096	0	0.166667	1	0.095238	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
118	0.454545	1	0.015361	1	0.696970	1	0.063492	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
171	0.218182	0	0.672982	0	0.393939	0	0.063492	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
208	0.363636	0	0.383390	1	0.393939	0	0.079365	0.407401	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
2	0.454545	0	0.020993	0	0.099099	0	0.126984	0.296296	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
48	0.727273	1	0.095459	0	0.099099	1	0.19048	0.444444	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
7	0.363636	1	0.049838	1	0.696970	0	0.095238	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
225	0.363636	0	0.111282	1	0.696970	0	0.142857	0.184818	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
137	0.509091	1	0.106332	0	0.166667	0	0.253968	0.333333	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
0	0.363636	0	0.095409	0	0.099099	1	0.222222	0.333333	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
289	0.090991	1	0.053593	0	0.363636	0	0.063492	0.851852	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
20	0.454545	1	0.004950	0	0.166667	1	0.126984	0.592593	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
76	0.545455	0	0.017777	0	0.696970	1	0.047619	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
265	0.181818	1	0.046936	0	0.318182	0	0.063492	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
283	0.454545	0	0.284178	0	0.363636	0	0.095238	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
194	0.090999	0	0.095409	0	0.099099	1	0.174603	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
92	0.063664	0	0.095409	0	0.696970	0	0.107937	0.592593	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
290	0.090999	0	0.101041	1	0.621212	0	0.047619	0.740741	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
61	0.181818	0	0.050350	0	0.393939	1	0.285714	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
266	0.272727	0	0.200717	0	0.099099	0	0.211111	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
207	0.181818	0	0.032258	0	0.363636	0	0.063492	0.555556	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
69	0.454545	0	0.015361	1	0.166667	0	0.211111	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
36	0.090991	1	0.006315	1	0.545455	0	0.079365	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
183	0.363636	0	0.012971	0	0.363636	1	0.126984	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
80	0.545455	0	0.007851	0	0.393939	0	0.190476	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
42	0.545455	0	0.093531	1	0.466997	1	0.111111	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
173	0.181818	1	0.015702	0	0.099099	0	0.047619	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
151	0.400000	0	0.001195	1	0.696970	1	0.063492	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
47	0.363636	0	0.095409	1	0.363636	1	0.15873	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
210	0.345455	0	0.032258	1	0.045455	1	0.079365	0.555556	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
134	0.545455	0	0.770951	0	0.318182	0	0.107937	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
68	0.545455	0	0.023554	0	0.166667	0	0.111111	0.777778	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
176	0.527273	0	0.238266	0	0.393939	0	0.079365	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
144	0.281818	1	0.157023	0	0.166667	1	0.190476	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
100	0.454545	1	0.048131	0	0.166667	0	0.095238	0.740741	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
96	0.418182	1	0.083803	1	0.166667	1	0.126984	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
268	0.090999	0	0.095409	1	0.363636	0	0.063492	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
279	0.272727	0	0.010411	1	0.363636	0	0.126984	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
154	0.545455	1	0.053251	0	0.318182	1	0.047619	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
30	0.981818	0	0.095409	1	0.363636	1	0.211111	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
192	0.181818	1	0.016726	1	0.393939	0	0.031746	0.333333	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
252	0.181818	0	0.037890	0	0.466997	1	0.079365	0.444444	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
207	0.272727	0	0.306708	0	0.363636	0	0.111111	0.666667	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
187	0.363636	0	0.319679	1	0.363636	0	0.063492	0.851852	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
150	0.181818	0	0.425623	0	0.242424	1	0.000000	0.666667	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
253	0.181818	0	0.311145	1	0.318182	0	0.107937	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
111	0.272727	0	0.006315	0	0.318182	0	0.111111	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
...	...	...	...	...	...	...	...	...	...	...	...																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
110	0.181818	0	0.018092	0	0.696970	0	0.111111	0.407407	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
49	0.309091	1	0.018092	0	0.242424	0	0.079365	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
127	0.327273	1	0.030210	1	0.696970	0	0.047619	0.592593	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
172	0.545455	1	0.025260	0	0.696970	1	0.095238	0.888889	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
221	0.454545	0	0.016214	0	0.545455	0	0.095238	0.888889	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
57	0.363636	1	0.099676	0	0.393939	0	0.15873	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
41	0.181818	0	0.017238	1	0.242424	1	0.111111	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
216	0.545455	0	0.201229	0	0.545455	1	0.063492	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
200	0.418182	1	0.095654	0	0.466997	0	0.031746	0.777778	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
112	0.181818	0	0.297654	1	0.166667	0	0.174603	0.555556	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
40	0.545455	0	0.095409	0	0.099099	1	0.211111	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
202	0.545455	0	0.012630	0	0.696970	1	0.063492	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
3	0.327273	1	0.018775	0	0.242424	1	0.079365	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
284	0.181818	1	0.005291	0	0.393939	0	0.047619	0.740741	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
193	0.600000	1	0.035501	1	0.242424	0	0.107937	0.777778	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
224	0.327273	0	0.095409	1	0.166667	0	0.079365	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
128	0.381818	0	0.038402	0	0.242424	1	0.031746	0.555556	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
39	0.363636	0	0.036184	1	0.363636	0	0.096825	0.777778	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
205	0.181818	1	0.024578	1	0.099099	0	0.079365	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
3	0.181818	1	0.015020	0	0.099099	0	0.222222	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
50	0.509091	1	0.094555	0	0.166667	1	0.079365	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
230	0.363636	0	0.024407	0	0.242424	0	0.190476	0.222222	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
31	0.181818	0	0.000000	0	0.466997	0	0.096825	0.407407	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
206	0.000000	1	0.013313	0	0.393939	0	0.047619	0.740741	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
24	0.363636	0	0.095409	1	0.242424	1	0.211111	0.481481	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
178	0.418182	1	0.016897	1	0.696970	0	0.111111	0.888889	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
23	0.236364	0	0.006827	1	0.696970	0	0.047619	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
34	0.545455	0	0.021128	1	0.545455	1	0.079365	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
90	0.545455	0	0.007339	1	0.466997	0	0.047619	0.555556	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
67	0.581818	1	0.014849	0	0.166667	0	0.079365	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
85	0.200000	0	0.003887	0	0.545455	0	0.031746	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
236	0.636364	0	0.016385	0	0.545455	1	0.095238	1.000000	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
12	0.090999	1	0.163509	0	0.242424	0	0.095238	0.592593	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
175	0.363636	1	0.012889	0	0.696970	0	0.079365	0.629630	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
54	0.363636	1	0.040451	1	0.363636	0	0.269841	0.407407	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
272	0.490999	0	0.032429	0	0.363636	0	0.111111	0.444444	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
106	0.272727	0	0.123741	0	0.466997	0	0.126984	0.444444	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
277	0.545455	0	0.095409	1	0.363636	0	0.095238	0.703704	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
21	0.454545	1	0.017921	1	0.242424	1	0.174603	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
148	0.636364	1	0.095409	0	0.242424	0	0.211111	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
65	0.363636	0	0.007680	0	0.099099	0	0.380952	0.222222	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
276	0.545455	0	0.101553	0	0.318182	0	0.095238	0.777778	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
113	0.545455	1	0.008363	0	0.696970	0	0.126984	0.592593	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
160	0.472727	1	0.008363	0	0.393939	1	0.111111	0.481481	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
130	0.363636	1	0.121864	0	0.696970	1	0.158730	0.518519	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
89	0.309091	1	0.015702	0	0.166667	1	0.095238	0.851852	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
51	0.263664	1	0.071606	0	0.099099	1	0.142857	0.666667	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
196	0.090999	0	0.095409	1	0.363636	1	0.107937	0.592593	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
141	0.109091	1	0.045742	0	0.318182	0	0.063492	0.703704	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
238	0.400000	0	0.044035	1	0.318182	0	0.079365	0.555556	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																