Data Collection and Preprocessing Phase

Date	21 June 2024
Team ID	740037
Project Title	Estimating Presence or Absence of smoking Through Bio Signals
Maximum Marks	6 Marks

Data Exploration and Preprocessing Report

Effective data exploration and preprocessing are foundational steps in developing a reliable system for estimating smoking behavior using biosignals. By understanding the characteristics of the data, addressing noise and outliers, and extracting meaningful features, the processed data is now ready for further analysis and model development.

Section	Description
Data Overview	Descriptive statistics:

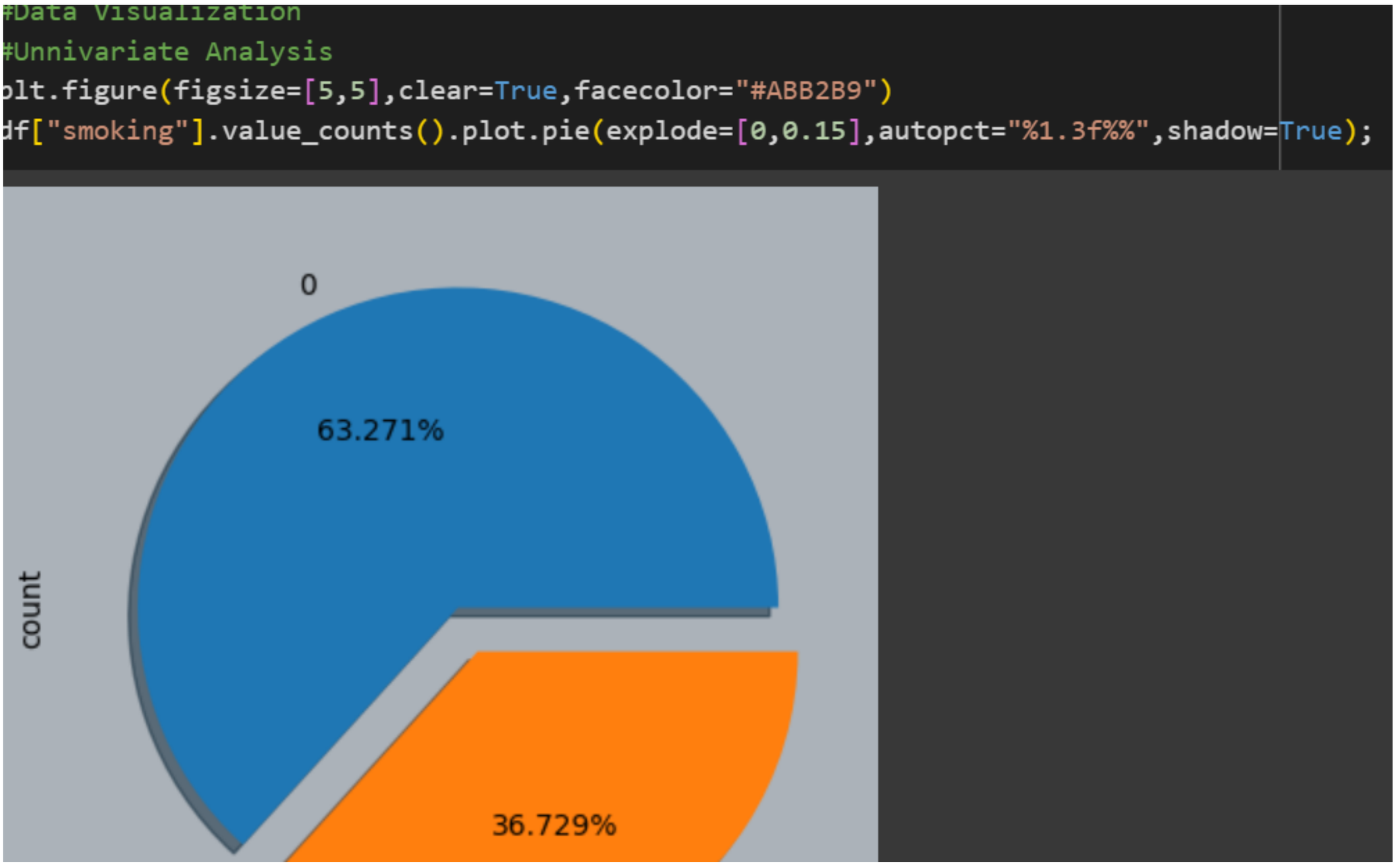
```
df.describe()
```

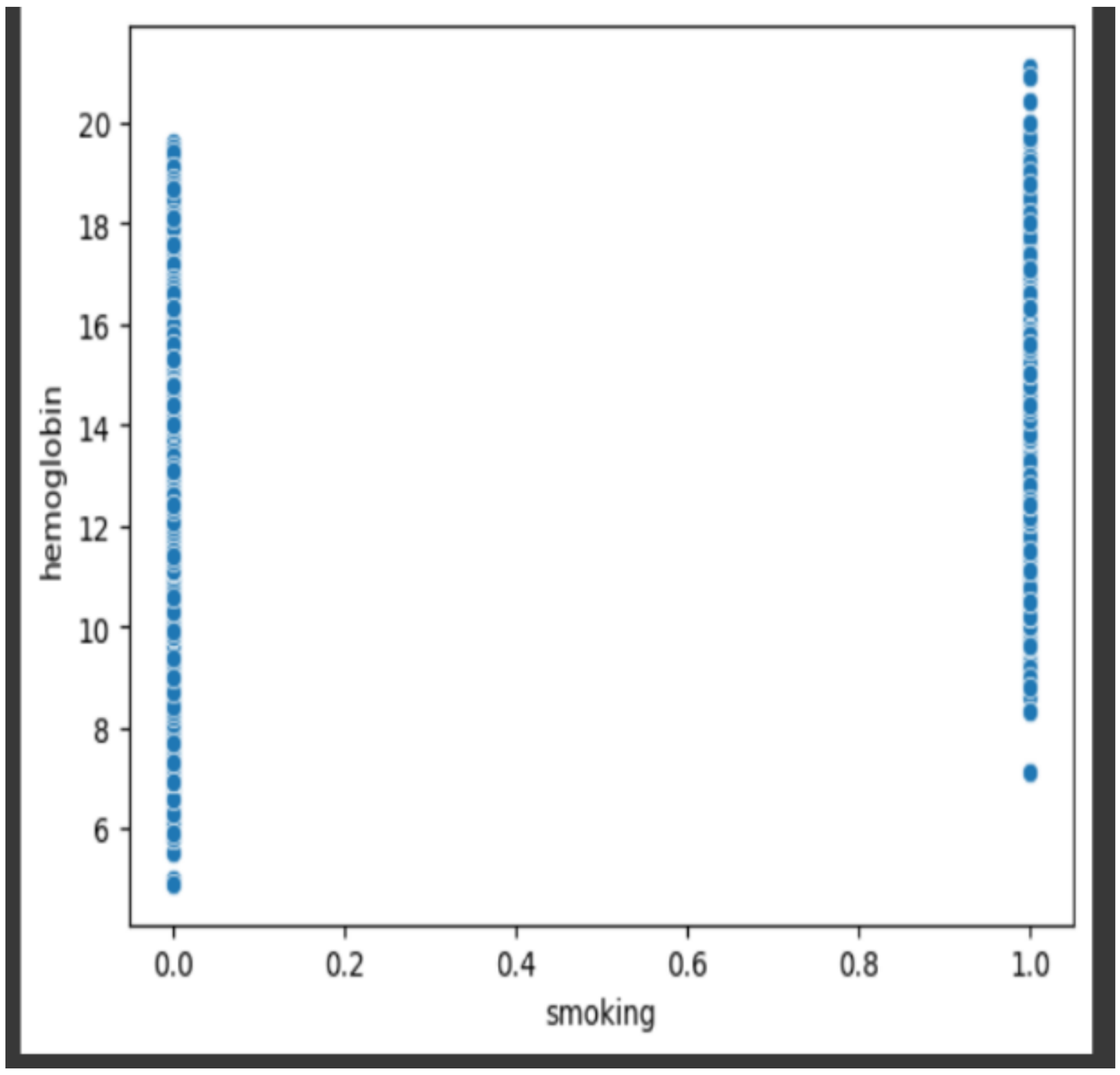
	ID	gender	age	height(cm)	weight(kg)	waist(cm)	eyesight(left)	eyesight(right)	hearing(left)	hearing(
count	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.
mean	27845.500000	0.635657	44.182917	164.649321	65.864936	82.046418	1.012623	1.007443	1.025587	1.
std	16077.039933	0.481250	12.071418	9.194597	12.820306	9.274223	0.486873	0.485964	0.157902	0.
min	0.000000	0.000000	20.000000	130.000000	30.000000	51.000000	0.100000	0.100000	1.000000	1.
25%	13922.750000	0.000000	40.000000	160.000000	55.000000	76.000000	0.800000	0.800000	1.000000	1.
50%	27845.500000	1.000000	40.000000	165.000000	65.000000	82.000000	1.000000	1.000000	1.000000	1.
75%	41768.250000	1.000000	55.000000	170.000000	75.000000	88.000000	1.200000	1.200000	1.000000	1.
max	55691.000000	1.000000	85.000000	190.000000	135.000000	129.000000	9.900000	9.900000	2.000000	2.

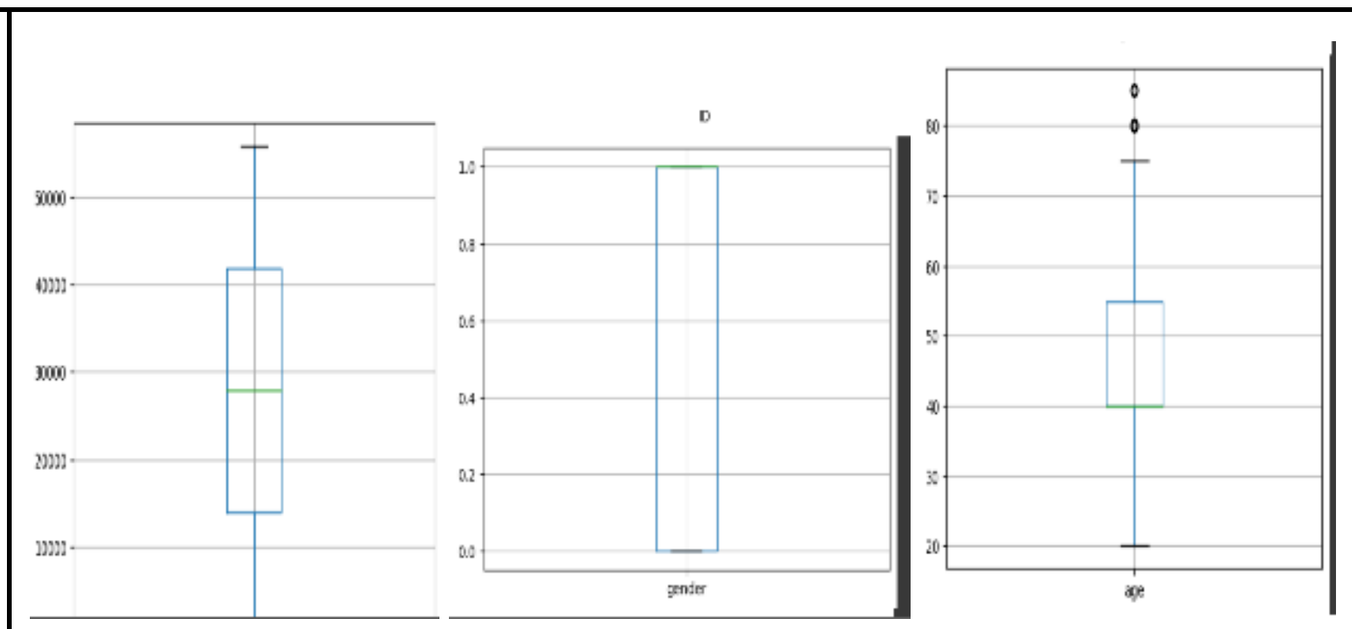
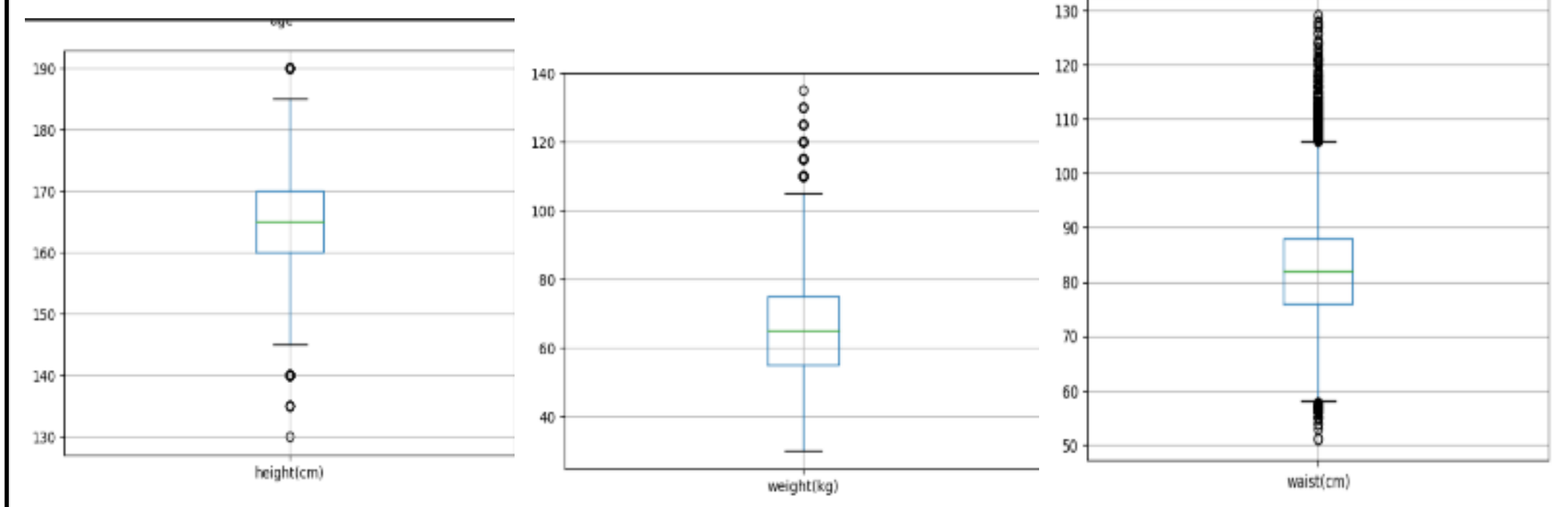
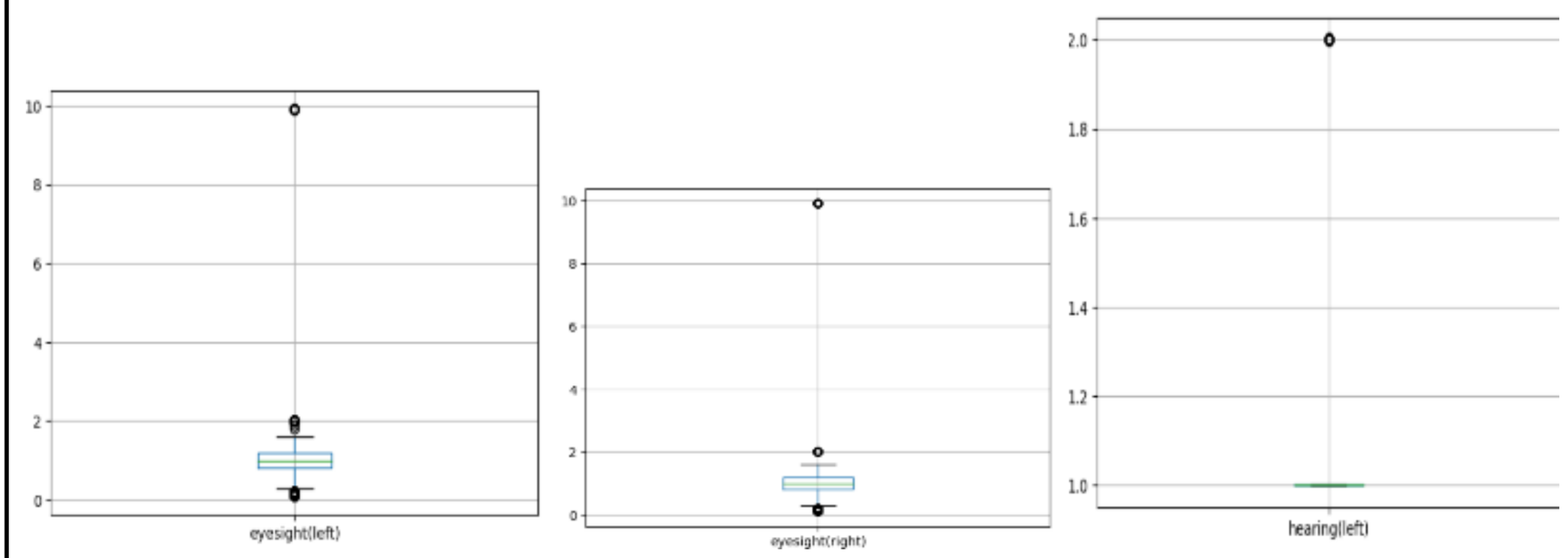
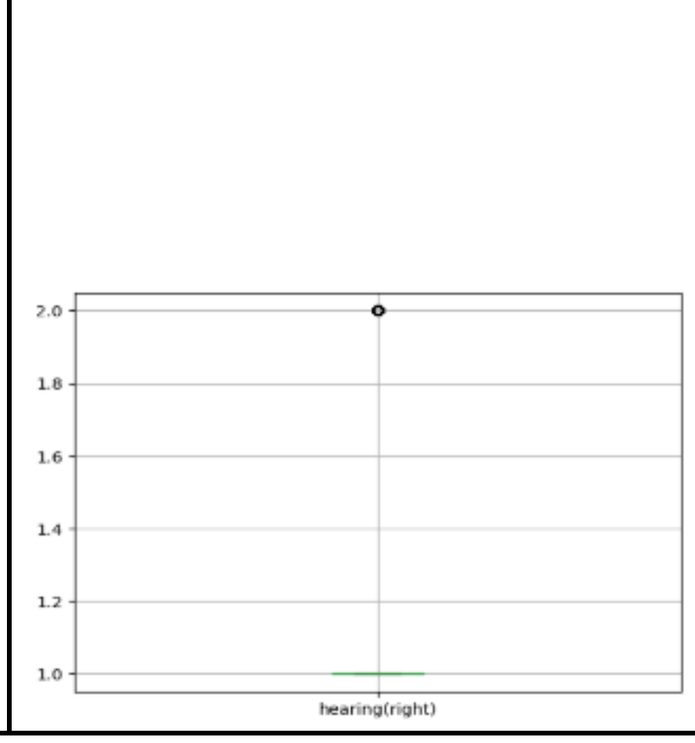
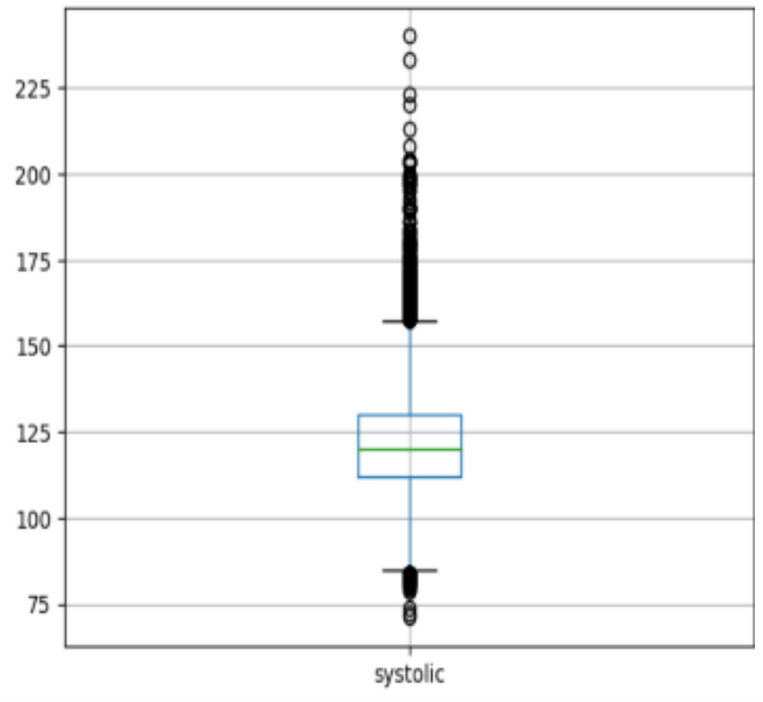
8 rows × 27 columns

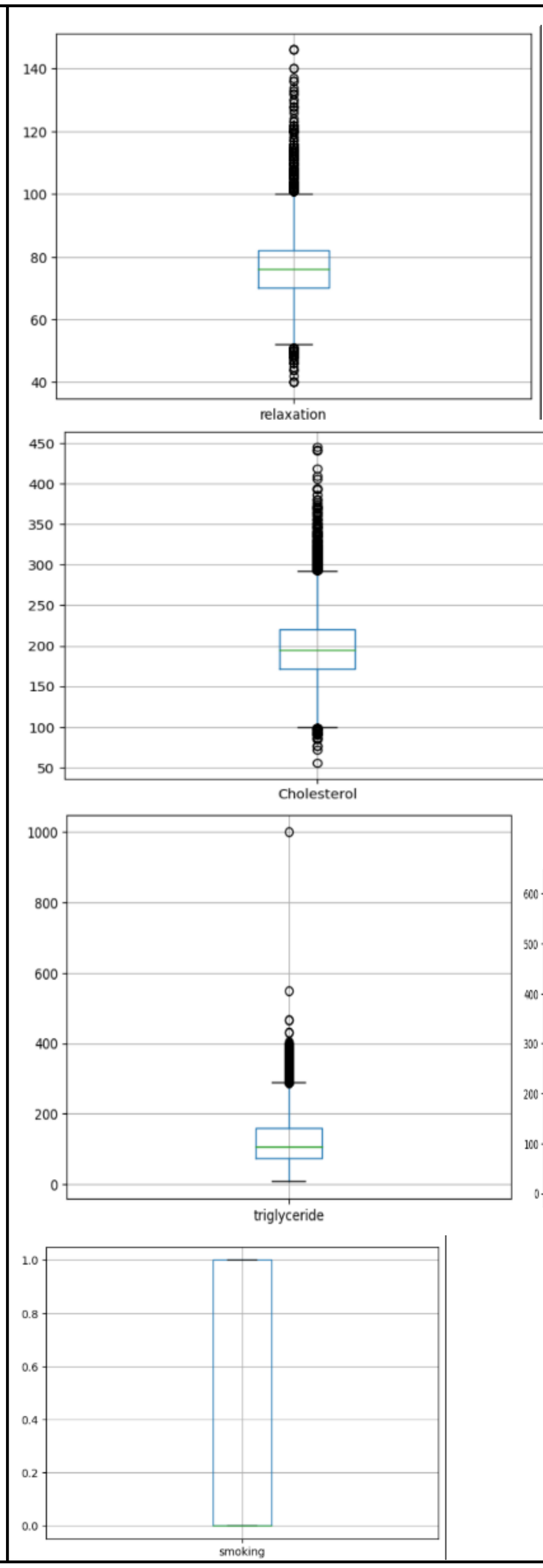
hearing(left)	hearing(right)	...	hemoglobin	Urine_protein	serum_creatinine	AST	ALT	Gtp	oral	dental_caries
55692.000000	55692.000000	...	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.000000	55692.0	55692.000000
1.025587	1.026144	...	14.622592	1.087212	0.885738	26.182935	27.036037	39.952201	0.0	0.213334
0.157902	0.159564	...	1.564498	0.404882	0.221524	19.355460	30.947853	50.290539	0.0	0.409665
1.000000	1.000000	...	4.900000	1.000000	0.100000	6.000000	1.000000	1.000000	0.0	0.000000
1.000000	1.000000	...	13.600000	1.000000	0.800000	19.000000	15.000000	17.000000	0.0	0.000000
1.000000	1.000000	...	14.800000	1.000000	0.900000	23.000000	21.000000	25.000000	0.0	0.000000
1.000000	1.000000	...	15.800000	1.000000	1.000000	28.000000	31.000000	43.000000	0.0	0.000000
2.000000	2.000000	...	21.100000	6.000000	11.600000	1311.000000	2914.000000	999.000000	0.0	1.000000

dental_caries	tartar	smoking
55692.000000	55692.000000	55692.000000
0.213334	0.555556	0.367288
0.409665	0.496908	0.482070
0.000000	0.000000	0.000000
0.000000	0.000000	0.000000
0.000000	1.000000	0.000000
0.000000	1.000000	1.000000
1.000000	1.000000	1.000000

Univariate Analysis	

Bivariate Analysis	
Multivariate Analysis	-

Outliers and Anomalies	    


relaxation
fasting_blood_sugar
Cholesterol
triglyceride
HDL
smoking

Data Preprocessing Code Screenshots

Loading Data

	ID	gender	age	height(cm)	weight(kg)	waist(cm)	eyesight(left)	eyesight(right)	hearing(left)	hearing(right)	...	hemoglobin	p
0	0	F	40	155	60	81.3	1.2	1.0	1.0	1.0	.	12.9	
1	1	F	40	160	60	81.0	0.8	0.6	1.0	1.0	.	12.7	
2	2	M	55	170	60	80.0	0.8	0.8	1.0	1.0	.	15.8	
3	3	M	40	165	70	88.0	1.5	1.5	1.0	1.0	.	14.7	
4	4	F	40	155	60	86.0	1.0	1.0	1.0	1.0	.	12.5	
...	...	...	...	...	...	...	...	...	...	...	...	...	
55687	55675	F	40	170	65	75.0	0.9	0.9	1.0	1.0	.	12.3	
55688	55681	F	45	160	50	70.0	1.2	1.2	1.0	1.0	.	14.0	
55689	55683	F	55	160	50	68.5	1.0	1.2	1.0	1.0	.	12.4	
55690	55684	M	50	165	60	78.0	0.8	1.0	1.0	1.0	.	14.4	
55691	55691	M	55	160	65	85.0	0.9	0.7	1.0	1.0	.	15.0	

55692 rows × 27 columns

hemoglobin	Urine protein	serum creatinine	AST	ALT	Gtp	oral	dental caries	tartar	smoking
12.9	1.0	0.7	18.0	19.0	27.0	Y	0	Y	0
12.7	1.0	0.6	22.0	19.0	18.0	Y	0	Y	0
15.8	1.0	1.0	21.0	16.0	22.0	Y	0	N	1
14.7	1.0	1.0	19.0	26.0	18.0	Y	0	Y	0
12.5	1.0	0.6	16.0	14.0	22.0	Y	0	N	0
...	...	...	...	...	...	...	...	...	...
12.3	1.0	0.6	14.0	7.0	10.0	Y	1	Y	0
14.0	1.0	0.9	20.0	12.0	14.0	Y	0	Y	0
12.4	1.0	0.5	17.0	11.0	12.0	Y	0	N	0
14.4	1.0	0.7	20.0	19.0	18.0	Y	0	N	0
15.0	1.0	0.8	26.0	29.0	41.0	Y	0	Y	1

Handling Missing Data

```
ID                   0
gender               0
age                  0
height(cm)           0
weight(kg)           0
waist(cm)            0
eyesight(left)       0
eyesight(right)      0
hearing(left)        0
hearing(right)       0
systolic             0
relaxation           0
fasting_blood_sugar  0
Cholesterol          0
triglyceride         0
HDL                  0
LDL                  0
hemoglobin           0
Urine_protein        0
serum_creatinine     0
AST                  0
ALT                  0
Gtp                  0
oral                 0
dental_caries        0
tartar               0
smoking              0
dtype: int64
```

Data Transformation

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Feature Engineering	Attached the codes in final submission.
Save Processed Data	-