Mercedes-Benz Greener Manufacturing

January 13, 2023

0.1 Import Libraries

```
[1]: import numpy as np
     import pandas as pd
     import matplotlib.pyplot as plt
     import seaborn as sns
     from sklearn.model_selection import train_test_split
     pd.set_option("display.max_columns",None)

     import warnings;
     warnings.simplefilter ('ignore')
     from xgboost import XGBRegressor
```

0.2 Load the Dataset

```
[2]: df_test=pd.read_csv('test.csv')
     df_train=pd.read_csv('train.csv')
```

```
[3]: df_test.head()
```

```
[3]:    ID  X0 X1   X2 X3 X4 X5 X6 X8   X10   X11   X12   X13   X14   X15   X16   X17   X18  \
    0   1  az  v    n  f  d  t  a  w     0     0     0     0     0     0     0     0     0
    1   2   t  b   ai  a  d  b  g  y     0     0     0     0     0     0     0     0     0
    2   3  az  v   as  f  d  a  j  j     0     0     0     0     1     0     0     0     0
    3   4  az  l    n  f  d  z  l  n     0     0     0     0     0     0     0     0     0
    4   5   w  s   as  c  d  y  i  m     0     0     0     0     1     0     0     0     0

       X19   X20   X21   X22   X23   X24   X26   X27   X28   X29   X30   X31   X32   X33   X34  \
    0    0     0     0     0     0     0     0     1     1     1     0     1     0     0     0
    1    1     0     0     0     0     0     0     1     0     0     0     1     0     0     0
    2    0     0     0     0     0     0     0     1     0     1     0     1     0     0     0
    3    0     0     0     0     0     0     0     1     1     1     0     1     0     0     0
    4    0     0     0     0     0     0     0     1     0     0     0     0     0     0     0

       X35   X36   X37   X38   X39   X40   X41   X42   X43   X44   X45   X46   X47   X48   X49  \
    0    1     0     1     0     0     0     0     0     1     0     0     1     0     0     0
```

1	1	0	1	0	0	0	0	0	0	0	1	1	0	0	1
2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	1	0	0	0	0	0	1	0	0	1	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	X50	X51	X52	X53	X54	X55	X56	X57	X58	X59	X60	X61	X62	X63	X64 \
0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
1	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0
2	0	1	0	0	1	0	0	0	1	0	0	1	0	0	0
3	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
4	0	1	0	0	0	0	0	0	1	0	0	1	0	0	1

	X65	X66	X67	X68	X69	X70	X71	X73	X74	X75	X76	X77	X78	X79	X80 \
0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1
1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1
2	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1
3	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1
4	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1

	X81	X82	X83	X84	X85	X86	X87	X88	X89	X90	X91	X92	X93	X94	X95 \
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	X96	X97	X98	X99	X100	X101	X102	X103	X104	X105	X106	X107	X108 \
0	1	0	1	0	0	1	0	0	0	0	0	0	0
1	0	0	1	0	0	1	0	1	0	0	0	0	0
2	1	0	1	0	1	1	0	1	0	0	0	0	0
3	1	0	1	0	0	1	0	0	0	0	0	0	0
4	1	0	1	0	1	1	0	1	0	0	1	0	0

	X109	X110	X111	X112	X113	X114	X115	X116	X117	X118	X119	X120 \
0	0	0	1	0	0	1	0	0	0	0	0	0
1	0	0	1	0	0	0	0	1	0	1	1	1
2	0	0	1	0	0	0	0	0	0	0	0	1
3	0	0	1	0	0	1	0	0	0	0	0	1
4	0	0	1	0	0	0	0	0	0	1	1	1

	X122	X123	X124	X125	X126	X127	X128	X129	X130	X131	X132	X133 \
0	0	0	0	0	0	0	1	0	0	0	1	0
1	0	0	0	0	0	1	1	1	0	0	0	1
2	0	0	0	0	0	0	1	0	0	0	1	0
3	0	0	0	0	0	0	1	0	0	0	1	0
4	0	0	0	0	0	0	1	0	0	0	1	0

	X134	X135	X136	X137	X138	X139	X140	X141	X142	X143	X144	X145	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	0	0	1	1	1	0	1	0	1	0	0	0	
2	0	0	0	1	0	0	0	0	1	0	1	0	
3	0	0	0	0	0	0	0	0	0	0	1	0	
4	0	0	1	1	0	0	0	0	1	0	1	0	

	X146	X147	X148	X150	X151	X152	X153	X154	X155	X156	X157	X158	\
0	0	0	1	1	0	0	0	0	0	0	1	1	
1	1	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	1	0	0	0	0	0	0	1	0	
3	0	0	1	1	0	0	0	0	0	0	1	1	
4	0	0	0	1	1	0	0	0	0	1	0	0	

	X159	X160	X161	X162	X163	X164	X165	X166	X167	X168	X169	X170	\
0	0	0	0	1	0	0	0	1	0	0	0	0	
1	0	0	1	0	1	1	0	0	0	0	0	0	
2	1	0	0	1	0	0	0	1	0	0	0	0	
3	0	0	0	1	0	0	0	1	0	0	0	0	
4	0	0	0	0	1	0	0	0	0	0	0	0	

	X171	X172	X173	X174	X175	X176	X177	X178	X179	X180	X181	X182	\
0	0	0	0	0	0	0	0	0	1	0	0	0	
1	1	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	1	0	0	0	
4	1	0	0	0	0	0	0	0	0	0	0	0	

	X183	X184	X185	X186	X187	X189	X190	X191	X192	X194	X195	X196	\
0	0	0	1	0	0	0	0	0	0	1	0	0	
1	0	0	0	1	0	1	0	0	0	0	0	0	
2	0	0	1	0	0	0	0	1	0	1	0	0	
3	0	0	1	0	0	0	0	0	0	1	0	0	
4	0	0	0	0	1	1	0	1	0	1	0	0	

	X197	X198	X199	X200	X201	X202	X203	X204	X205	X206	X207	X208	\
0	0	0	0	0	0	0	0	1	0	0	0	0	
1	0	0	0	0	0	1	0	1	0	0	0	1	
2	0	0	0	0	0	0	0	1	0	0	0	0	
3	0	0	0	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	0	1	0	0	0	

	X209	X210	X211	X212	X213	X214	X215	X216	X217	X218	X219	X220	\
0	1	0	0	0	0	0	0	0	0	1	0	1	
1	0	0	0	0	0	0	1	0	0	1	0	0	
2	1	0	0	0	0	0	0	0	0	1	0	0	
3	1	0	0	0	0	0	0	0	0	1	0	1	

```
4       1       0       0       0       0       0       0       0       0       0       0       1

    X221  X222  X223  X224  X225  X226  X227  X228  X229  X230  X231  X232  \
0      0     0     1     0     0     0     0     0     0     0     0     1
1      0     0     0     0     0     0     0     0     1     0     0     0
2      0     0     1     1     0     0     0     0     0     0     0     1
3      0     0     1     0     0     0     0     0     1     0     0     1
4      0     0     1     1     0     0     0     0     1     0     0     0

    X233  X234  X235  X236  X237  X238  X239  X240  X241  X242  X243  X244  \
0      0     0     0     0     0     0     0     0     0     0     0     0
1      0     1     0     0     0     1     0     0     0     0     0     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     0     0     0     0     0     0     0     0     0
4      0     0     0     0     0     1     0     0     0     0     0     0

    X245  X246  X247  X248  X249  X250  X251  X252  X253  X254  X255  X256  \
0      0     1     0     0     0     1     0     0     0     0     0     1
1      0     0     1     0     0     1     0     0     0     0     0     0
2      0     0     0     0     0     0     1     0     0     0     0     0
3      0     1     0     0     0     1     0     1     0     0     0     1
4      0     1     0     0     0     0     1     0     0     0     0     0

    X257  X258  X259  X260  X261  X262  X263  X264  X265  X266  X267  X268  \
0      0     0     0     0     0     0     0     0     0     0     0     0
1      0     0     0     0     0     0     1     0     1     0     0     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     0     0     0     0     0     0     0     0     0
4      0     0     0     0     1     0     1     0     1     0     0     0

    X269  X270  X271  X272  X273  X274  X275  X276  X277  X278  X279  X280  \
0      0     0     0     1     1     0     0     1     0     0     1     0
1      0     0     0     0     1     0     1     0     0     0     0     0
2      0     0     0     0     0     1     0     1     0     0     1     0
3      0     0     0     1     1     0     0     1     0     0     1     0
4      0     0     0     0     1     0     1     0     0     0     0     0

    X281  X282  X283  X284  X285  X286  X287  X288  X289  X290  X291  X292  \
0      0     0     0     0     0     1     0     0     0     0     0     0
1      0     0     0     0     0     0     0     0     0     0     0     0
2      0     0     0     0     1     0     0     0     0     0     0     0
3      0     0     0     0     0     1     0     0     0     0     0     1
4      0     0     0     0     1     0     0     0     0     0     0     0

    X293  X294  X295  X296  X297  X298  X299  X300  X301  X302  X304  X305  \
0      0     0     0     0     0     0     0     0     0     0     1     0
1      0     1     0     0     0     0     0     0     0     0     1     0
```

	X294	X295	X296	X297	X298	X299	X300	X301	X302	X303	X304	X305
2	0	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	1	0	0	1	0

	X306	X307	X308	X309	X310	X311	X312	X313	X314	X315	X316	X317	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	1	0	0	0	0	1	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	1	0	0	1	0	0	0	

	X318	X319	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	0	0	0	0	0	0	1	0	0	1	0	0	
2	0	0	0	0	0	0	1	0	0	0	1	1	
3	0	0	0	0	0	0	0	0	0	0	1	0	
4	0	0	0	0	0	0	1	0	0	0	0	1	

	X330	X331	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	\
0	0	0	0	0	1	0	0	0	0	0	0	0	
1	0	0	0	0	1	0	0	0	0	0	0	0	
2	0	0	0	0	1	0	0	0	0	0	0	0	
3	0	0	0	0	1	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	1	1	0	0	0	0	

	X342	X343	X344	X345	X346	X347	X348	X349	X350	X351	X352	X353	\
0	0	0	0	0	0	0	1	0	1	0	0	0	
1	0	0	0	0	0	0	1	0	0	0	0	0	
2	0	1	0	0	0	0	1	0	1	0	0	0	
3	0	0	0	0	0	0	1	0	1	0	0	0	
4	0	0	0	0	0	0	1	0	1	1	0	0	

	X354	X355	X356	X357	X358	X359	X360	X361	X362	X363	X364	X365	\
0	0	0	0	0	1	0	0	1	0	1	0	0	
1	0	0	1	0	0	0	0	1	1	0	0	0	
2	0	0	0	0	0	0	0	1	0	1	0	0	
3	0	0	0	0	1	0	0	1	0	1	0	0	
4	0	0	0	0	1	0	0	1	0	1	0	0	

	X366	X367	X368	X369	X370	X371	X372	X373	X374	X375	X376	X377	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	1	0	0	0	0	0	0	0	0	1	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	1	0	0	

	X378	X379	X380	X382	X383	X384	X385

```
0        1     0     0     0     0     0     0
1        0     0     0     0     0     0     0
2        1     0     0     0     0     0     0
3        1     0     0     0     0     0     0
4        0     0     0     0     0     0     0
```

[4]: df_test.shape

[4]: (4209, 377)

[5]: df_train.head()

[5]:
```
    ID       y X0 X1  X2 X3 X4 X5 X6 X8  X10  X11  X12  X13  X14  X15  X16  \
0    0  130.81  k  v  at  a  d  u  j  o    0    0    0    1    0    0    0
1    6   88.53  k  t  av  e  d  y  l  o    0    0    0    0    0    0    0
2    7   76.26 az  w   n  c  d  x  j  x    0    0    0    0    0    0    0
3    9   80.62 az  t   n  f  d  x  l  e    0    0    0    0    0    0    0
4   13   78.02 az  v   n  f  d  h  d  n    0    0    0    0    0    0    0

   X17  X18  X19  X20  X21  X22  X23  X24  X26  X27  X28  X29  X30  X31  X32  \
0    0    1    0    0    1    0    0    0    0    0    0    0    0    1    0
1    0    1    0    0    0    0    0    0    0    1    0    0    0    1    0
2    1    0    0    0    0    0    0    0    0    1    1    1    0    1    0
3    0    0    0    0    0    0    0    0    0    1    1    1    0    1    0
4    0    0    0    0    0    0    0    0    0    1    1    1    0    1    0

   X33  X34  X35  X36  X37  X38  X39  X40  X41  X42  X43  X44  X45  X46  X47  \
0    0    0    1    0    1    0    0    0    0    0    0    0    0    1    0
1    0    0    1    0    1    0    0    0    0    0    0    0    0    0    0
2    0    0    1    0    1    0    0    0    0    0    1    0    0    1    0
3    0    0    1    0    1    0    0    0    0    0    1    0    0    1    0
4    0    0    1    0    1    0    0    0    0    0    1    0    0    1    0

   X48  X49  X50  X51  X52  X53  X54  X55  X56  X57  X58  X59  X60  X61  X62  \
0    0    0    0    0    0    0    0    0    0    0    1    0    0    0    0
1    0    0    0    1    0    0    0    0    0    0    0    0    0    1    0
2    0    0    0    1    0    0    1    0    0    0    1    0    0    1    0
3    0    0    0    0    0    0    1    0    0    0    0    0    0    1    0
4    0    0    0    1    0    0    1    0    0    0    0    0    0    1    0

   X63  X64  X65  X66  X67  X68  X69  X70  X71  X73  X74  X75  X76  X77  X78  \
0    0    0    0    0    0    1    0    1    0    0    1    0    0    0    0
1    0    0    0    0    0    0    0    1    0    0    1    0    0    0    0
2    0    0    0    0    0    1    0    1    1    0    1    1    1    0    0
3    0    0    0    0    0    0    0    1    1    0    1    0    1    0    0
4    0    0    0    0    0    0    0    1    0    0    1    0    1    0    0
```

```
    X79  X80  X81  X82  X83  X84  X85  X86  X87  X88  X89  X90  X91  X92  X93  \
0    0    0    0    0    0    0    1    0    0    0    0    0    0    0    0
1    0    1    0    0    0    0    1    0    0    0    0    0    0    0    0
2    0    1    0    0    0    1    1    0    0    0    0    0    0    0    0
3    0    1    0    0    0    1    0    0    0    0    0    0    0    0    0
4    0    1    0    0    0    0    0    0    0    0    0    0    0    0    0

    X94  X95  X96  X97  X98  X99  X100  X101  X102  X103  X104  X105  X106  \
0    0    0    0    0    0    0     0     0     0     0     0     0     0
1    0    0    1    0    1    0     1     1     0     0     0     0     0
2    0    0    1    0    1    0     0     1     0     0     0     0     0
3    0    0    1    0    1    0     0     1     0     0     0     0     0
4    0    0    1    0    1    0     0     1     0     0     0     0     0

    X107  X108  X109  X110  X111  X112  X113  X114  X115  X116  X117  X118  \
0     0     0     0     0     1     0     0     1     0     1     0     1
1     0     0     0     0     1     0     0     0     0     0     0     1
2     0     0     0     0     1     0     0     0     0     0     0     0
3     0     1     0     0     1     0     0     1     0     0     0     0
4     0     1     0     0     1     0     0     1     0     0     0     0

    X119  X120  X122  X123  X124  X125  X126  X127  X128  X129  X130  X131  \
0     1     1     0     0     0     0     0     0     1     0     0     1
1     1     1     0     0     0     0     0     1     1     0     0     0
2     0     1     0     0     0     0     0     0     1     0     0     0
3     0     1     0     0     0     0     0     0     1     0     0     0
4     0     1     0     0     0     0     0     0     1     0     0     0

    X132  X133  X134  X135  X136  X137  X138  X139  X140  X141  X142  X143  \
0     0     0     0     0     1     1     0     0     0     0     1     0
1     1     0     0     0     1     0     0     0     0     0     1     0
2     1     0     0     0     0     1     0     0     0     0     0     0
3     1     0     0     0     0     0     0     0     0     0     1     0
4     1     0     0     0     0     0     0     0     0     0     0     0

    X144  X145  X146  X147  X148  X150  X151  X152  X153  X154  X155  X156  \
0     1     0     0     0     0     1     0     0     0     0     0     1
1     1     0     0     0     0     1     0     0     0     0     0     1
2     1     0     0     0     1     1     0     0     0     0     0     0
3     1     0     0     0     1     1     0     0     0     0     0     0
4     1     0     0     0     1     1     0     0     0     0     0     0

    X157  X158  X159  X160  X161  X162  X163  X164  X165  X166  X167  X168  \
0     0     0     0     0     0     0     0     0     0     0     0     0
1     0     0     0     0     0     0     0     0     1     0     0     0
2     1     1     0     0     0     1     1     0     0     0     0     0
3     1     0     0     0     0     1     0     0     0     1     0     0
```

```
4     1     1     0     0     0     1     0     0     0     1     0     0

   X169  X170  X171  X172  X173  X174  X175  X176  X177  X178  X179  X180  \
0     0     1     0     0     0     0     0     0     0     0     1     0
1     0     0     0     0     0     0     0     0     0     1     0     0
2     1     0     0     0     0     0     0     0     0     0     1     0
3     0     0     0     0     0     1     0     0     0     0     1     0
4     0     0     0     0     0     0     0     0     0     0     1     0

   X181  X182  X183  X184  X185  X186  X187  X189  X190  X191  X192  X194  \
0     0     0     0     1     0     0     1     1     0     0     0     1
1     0     0     0     0     0     0     1     1     0     0     0     1
2     0     0     0     0     0     0     0     0     0     0     0     1
3     0     0     0     0     0     0     0     0     0     0     0     1
4     0     0     0     0     0     0     0     0     0     0     0     1

   X195  X196  X197  X198  X199  X200  X201  X202  X203  X204  X205  X206  \
0     0     0     0     0     0     0     0     0     0     1     0     0
1     0     0     0     0     0     0     0     0     0     0     1     0
2     0     0     0     0     0     0     0     0     0     0     1     1
3     0     0     0     0     0     0     0     0     0     0     1     0
4     0     0     0     0     0     0     0     0     0     0     1     0

   X207  X208  X209  X210  X211  X212  X213  X214  X215  X216  X217  X218  \
0     0     0     1     0     0     0     0     0     0     0     0     0
1     0     0     1     0     0     0     0     0     0     0     0     0
2     0     0     1     0     0     0     0     0     0     0     0     1
3     0     0     1     0     0     0     0     0     0     0     0     1
4     0     0     1     0     0     0     0     0     0     0     0     1

   X219  X220  X221  X222  X223  X224  X225  X226  X227  X228  X229  X230  \
0     0     1     0     0     0     0     0     0     0     0     0     0
1     0     0     0     0     0     0     0     0     0     0     1     0
2     1     1     0     0     1     1     0     0     0     1     0     0
3     0     1     0     0     1     0     0     0     0     0     1     0
4     0     1     0     0     1     0     0     0     0     0     1     0

   X231  X232  X233  X234  X235  X236  X237  X238  X239  X240  X241  X242  \
0     0     0     0     1     0     0     1     0     0     0     0     0
1     0     0     0     0     0     0     0     1     0     0     0     0
2     0     1     0     0     0     0     0     0     0     0     1     0
3     0     1     0     0     0     0     0     0     0     0     1     0
4     0     1     0     0     0     0     0     0     0     0     0     0

   X243  X244  X245  X246  X247  X248  X249  X250  X251  X252  X253  X254  \
0     0     0     0     0     0     0     0     0     0     0     0     0
1     0     0     0     0     0     0     0     1     0     0     0     0
```

2	0	1	0	1	0	0	0	1	0	1	0	0
3	0	1	0	1	0	0	0	1	0	1	0	0
4	0	0	0	1	0	0	0	1	0	1	0	0

	X255	X256	X257	X258	X259	X260	X261	X262	X263	X264	X265	X266	\
0	0	0	0	0	0	0	0	1	1	0	0	1
1	0	0	0	0	0	0	0	0	1	0	1	0
2	0	1	0	0	0	0	0	0	0	0	0	0
3	0	1	0	0	0	0	0	0	0	0	0	0
4	0	1	0	0	0	0	0	0	0	0	0	0

	X267	X268	X269	X270	X271	X272	X273	X274	X275	X276	X277	X278	\
0	0	0	0	0	0	0	1	0	1	0	0	0
1	0	0	0	0	0	0	1	0	1	0	0	0
2	0	0	0	0	0	1	1	1	0	1	0	0
3	0	0	0	0	0	1	1	0	0	1	0	0
4	0	0	0	0	0	1	1	0	0	1	0	0

	X279	X280	X281	X282	X283	X284	X285	X286	X287	X288	X289	X290	\
0	0	0	0	0	0	0	1	0	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0	0	0
2	1	0	0	0	0	0	0	1	0	0	0	0
3	1	0	0	0	0	0	0	1	0	0	0	0
4	1	0	0	0	0	0	0	1	0	0	0	0

	X291	X292	X293	X294	X295	X296	X297	X298	X299	X300	X301	X302	\
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0

	X304	X305	X306	X307	X308	X309	X310	X311	X312	X313	X314	X315	\
0	0	0	1	0	0	0	0	0	0	0	0	0
1	1	0	0	0	0	0	0	1	0	0	0	0
2	1	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0	0	0
4	1	0	0	0	0	0	0	0	0	0	0	0

	X316	X317	X318	X319	X320	X321	X322	X323	X324	X325	X326	X327	\
0	1	0	0	0	0	0	0	0	1	0	0	1
1	1	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0

	X328	X329	X330	X331	X332	X333	X334	X335	X336	X337	X338	X339	\

```
0    0    1    0    0    0    0    1    0    0    0    0    0
1    0    1    0    0    0    0    0    0    1    1    0    0
2    1    0    0    0    0    0    1    0    0    0    0    0
3    1    0    0    0    0    0    0    0    0    0    0    0
4    1    0    0    0    0    0    1    0    0    0    0    0
```

	X340	X341	X342	X343	X344	X345	X346	X347	X348	X349	X350	X351	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	1	0	0	0	
2	0	0	0	0	0	0	0	0	1	0	1	0	
3	0	0	0	0	0	0	0	0	1	0	1	0	
4	0	0	0	0	0	0	0	0	1	0	1	0	

	X352	X353	X354	X355	X356	X357	X358	X359	X360	X361	X362	X363	\
0	0	0	1	0	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	1	0	1	
2	0	0	1	0	0	0	1	0	0	1	0	1	
3	0	0	0	0	0	0	1	0	0	1	0	1	
4	0	0	0	0	0	0	1	0	0	1	0	1	

	X364	X365	X366	X367	X368	X369	X370	X371	X372	X373	X374	X375	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	1	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	1	0	0	0	0	

	X376	X377	X378	X379	X380	X382	X383	X384	X385
0	0	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0

[6]: `df_train.shape`

[6]: (4209, 378)

0.3 Separation of Numerical and Categorical Columns for Train and Test Data

[7]:
```
df_cat=df_train.select_dtypes(include=np.object)
df_num=df_train.select_dtypes(exclude=np.object)
```

[8]:
```
test_df_cat=df_test.select_dtypes(include=np.object)
test_df_num=df_test.select_dtypes(exclude=np.object)
```

```
[9]: # categorical data for train dataset
     df_cat.head()
```

```
[9]:    X0 X1  X2 X3 X4 X5 X6 X8
     0   k  v  at  a  d  u  j  o
     1   k  t  av  e  d  y  l  o
     2  az  w   n  c  d  x  j  x
     3  az  t   n  f  d  x  l  e
     4  az  v   n  f  d  h  d  n
```

```
[10]: # numerical data for train dataset
      df_num.head()
```

```
[10]:    ID       y  X10  X11  X12  X13  X14  X15  X16  X17  X18  X19  X20  X21  \
     0   0  130.81    0    0    0    1    0    0    0    0    1    0    0    1
     1   6   88.53    0    0    0    0    0    0    0    0    1    0    0    0
     2   7   76.26    0    0    0    0    0    0    0    1    0    0    0    0
     3   9   80.62    0    0    0    0    0    0    0    0    0    0    0    0
     4  13   78.02    0    0    0    0    0    0    0    0    0    0    0    0
```

```
        X22  X23  X24  X26  X27  X28  X29  X30  X31  X32  X33  X34  X35  X36  X37  \
     0    0    0    0    0    0    0    0    0    1    0    0    0    1    0    1
     1    0    0    0    0    1    0    0    0    1    0    0    0    1    0    1
     2    0    0    0    0    1    1    1    0    1    0    0    0    1    0    1
     3    0    0    0    0    1    1    1    0    1    0    0    0    1    0    1
     4    0    0    0    0    1    1    1    0    1    0    0    0    1    0    1
```

```
        X38  X39  X40  X41  X42  X43  X44  X45  X46  X47  X48  X49  X50  X51  X52  \
     0    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0
     1    0    0    0    0    0    0    0    0    0    0    0    0    0    1    0
     2    0    0    0    0    0    1    0    0    1    0    0    0    0    1    0
     3    0    0    0    0    0    1    0    0    1    0    0    0    0    0    0
     4    0    0    0    0    0    1    0    0    1    0    0    0    0    1    0
```

```
        X53  X54  X55  X56  X57  X58  X59  X60  X61  X62  X63  X64  X65  X66  X67  \
     0    0    0    0    0    0    1    0    0    0    0    0    0    0    0    0
     1    0    0    0    0    0    0    0    0    1    0    0    0    0    0    0
     2    0    1    0    0    0    1    0    0    1    0    0    0    0    0    0
     3    0    1    0    0    0    0    0    0    1    0    0    0    0    0    0
     4    0    1    0    0    0    0    0    0    1    0    0    0    0    0    0
```

```
        X68  X69  X70  X71  X73  X74  X75  X76  X77  X78  X79  X80  X81  X82  X83  \
     0    1    0    1    0    0    1    0    0    0    0    0    0    0    0    0
     1    0    0    1    0    0    1    0    0    0    0    0    1    0    0    0
     2    1    0    1    1    0    1    1    1    0    0    0    1    0    0    0
     3    0    0    1    1    0    1    0    1    0    0    0    1    0    0    0
     4    0    0    1    0    0    1    0    1    0    0    0    1    0    0    0
```

```
     X84  X85  X86  X87  X88  X89  X90  X91  X92  X93  X94  X95  X96  X97  X98  \
0     0    1    0    0    0    0    0    0    0    0    0    0    0    0    0
1     0    1    0    0    0    0    0    0    0    0    0    0    1    0    1
2     1    1    0    0    0    0    0    0    0    0    0    0    1    0    1
3     1    0    0    0    0    0    0    0    0    0    0    0    1    0    1
4     0    0    0    0    0    0    0    0    0    0    0    0    1    0    1

     X99  X100  X101  X102  X103  X104  X105  X106  X107  X108  X109  X110  \
0     0     0     0     0     0     0     0     0     0     0     0     0
1     0     1     1     0     0     0     0     0     0     0     0     0
2     0     0     1     0     0     0     0     0     0     0     0     0
3     0     0     1     0     0     0     0     0     0     1     0     0
4     0     0     1     0     0     0     0     0     0     1     0     0

     X111  X112  X113  X114  X115  X116  X117  X118  X119  X120  X122  X123  \
0      1     0     0     1     0     1     0     1     1     1     0     0
1      1     0     0     0     0     0     0     1     1     1     0     0
2      1     0     0     0     0     0     0     0     0     1     0     0
3      1     0     0     1     0     0     0     0     0     1     0     0
4      1     0     0     1     0     0     0     0     0     1     0     0

     X124  X125  X126  X127  X128  X129  X130  X131  X132  X133  X134  X135  \
0      0     0     0     0     1     0     0     1     0     0     0     0
1      0     0     0     1     1     0     0     0     1     0     0     0
2      0     0     0     0     1     0     0     0     1     0     0     0
3      0     0     0     0     1     0     0     0     1     0     0     0
4      0     0     0     0     1     0     0     0     1     0     0     0

     X136  X137  X138  X139  X140  X141  X142  X143  X144  X145  X146  X147  \
0      1     1     0     0     0     0     1     0     1     0     0     0
1      1     0     0     0     0     0     1     0     1     0     0     0
2      0     1     0     0     0     0     0     0     1     0     0     0
3      0     0     0     0     0     0     1     0     1     0     0     0
4      0     0     0     0     0     0     0     0     1     0     0     0

     X148  X150  X151  X152  X153  X154  X155  X156  X157  X158  X159  X160  \
0      0     1     0     0     0     0     0     1     0     0     0     0
1      0     1     0     0     0     0     0     1     0     0     0     0
2      1     1     0     0     0     0     0     0     1     1     0     0
3      1     1     0     0     0     0     0     0     1     0     0     0
4      1     1     0     0     0     0     0     0     1     1     0     0

     X161  X162  X163  X164  X165  X166  X167  X168  X169  X170  X171  X172  \
0      0     0     0     0     0     0     0     0     0     1     0     0
1      0     0     0     0     1     0     0     0     0     0     0     0
2      0     1     1     0     0     0     0     0     1     0     0     0
```

	X173	X174	X175	X176	X177	X178	X179	X180	X181	X182	X183	X184	\
3	0	1	0	0	0	1	0	0	0	0	0	0	
4	0	1	0	0	0	1	0	0	0	0	0	0	
0	0	0	0	0	0	0	1	0	0	0	0	1	
1	0	0	0	0	0	1	0	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	0	0	0	
3	0	1	0	0	0	0	1	0	0	0	0	0	
4	0	0	0	0	0	0	1	0	0	0	0	0	

	X185	X186	X187	X189	X190	X191	X192	X194	X195	X196	X197	X198	\
0	0	0	1	1	0	0	0	1	0	0	0	0	
1	0	0	1	1	0	0	0	1	0	0	0	0	
2	0	0	0	0	0	0	0	1	0	0	0	0	
3	0	0	0	0	0	0	0	1	0	0	0	0	
4	0	0	0	0	0	0	0	1	0	0	0	0	

	X199	X200	X201	X202	X203	X204	X205	X206	X207	X208	X209	X210	\
0	0	0	0	0	0	1	0	0	0	0	1	0	
1	0	0	0	0	0	0	1	0	0	0	1	0	
2	0	0	0	0	0	0	1	1	0	0	1	0	
3	0	0	0	0	0	0	1	0	0	0	1	0	
4	0	0	0	0	0	0	1	0	0	0	1	0	

	X211	X212	X213	X214	X215	X216	X217	X218	X219	X220	X221	X222	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	0	1	1	1	0	0	
3	0	0	0	0	0	0	0	1	0	1	0	0	
4	0	0	0	0	0	0	0	1	0	1	0	0	

	X223	X224	X225	X226	X227	X228	X229	X230	X231	X232	X233	X234	\
0	0	0	0	0	0	0	0	0	0	0	0	1	
1	0	0	0	0	0	0	1	0	0	0	0	0	
2	1	1	0	0	0	1	0	0	0	1	0	0	
3	1	0	0	0	0	0	1	0	0	1	0	0	
4	1	0	0	0	0	0	1	0	0	1	0	0	

	X235	X236	X237	X238	X239	X240	X241	X242	X243	X244	X245	X246	\
0	0	0	1	0	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	1	0	1	
3	0	0	0	0	0	0	1	0	0	1	0	1	
4	0	0	0	0	0	0	0	0	0	0	0	1	

	X247	X248	X249	X250	X251	X252	X253	X254	X255	X256	X257	X258	\
0	0	0	0	0	0	0	0	0	0	0	0	0	

1	0	0	0	1	0	0	0	0	0	0	0	0
2	0	0	0	1	0	1	0	0	0	1	0	0
3	0	0	0	1	0	1	0	0	0	1	0	0
4	0	0	0	1	0	1	0	0	0	1	0	0

	X259	X260	X261	X262	X263	X264	X265	X266	X267	X268	X269	X270	\
0	0	0	0	1	1	0	0	1	0	0	0	0	
1	0	0	0	0	1	0	1	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	

	X271	X272	X273	X274	X275	X276	X277	X278	X279	X280	X281	X282	\
0	0	0	1	0	1	0	0	0	0	0	0	0	
1	0	0	1	0	1	0	0	0	0	0	0	0	
2	0	1	1	1	0	1	0	0	1	0	0	0	
3	0	1	1	0	0	1	0	0	1	0	0	0	
4	0	1	1	0	0	1	0	0	1	0	0	0	

	X283	X284	X285	X286	X287	X288	X289	X290	X291	X292	X293	X294	\
0	0	0	1	0	0	0	0	0	0	0	0	0	
1	0	0	1	0	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	1	0	0	0	0	1	0	0	0	
4	0	0	0	1	0	0	0	0	0	0	0	0	

	X295	X296	X297	X298	X299	X300	X301	X302	X304	X305	X306	X307	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	0	0	0	0	0	0	0	0	1	0	0	0	
2	0	0	0	0	0	0	0	0	1	0	0	0	
3	0	0	0	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	0	1	0	0	0	

	X308	X309	X310	X311	X312	X313	X314	X315	X316	X317	X318	X319	\
0	0	0	0	0	0	0	0	0	1	0	0	0	
1	0	0	0	1	0	0	0	0	1	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	0	

	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	X330	X331	\
0	0	0	0	0	1	0	0	1	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	0	1	0	0	0	1	0	0	0	
3	0	0	0	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	0	1	0	0	0	

	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	X342	X343	\
0	0	0	1	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	1	1	0	0	0	0	0	0	
2	0	0	1	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	1	0	0	0	0	0	0	0	0	0	

	X344	X345	X346	X347	X348	X349	X350	X351	X352	X353	X354	X355	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	0	0	0	0	1	0	0	0	0	0	0	0	
2	0	0	0	0	1	0	1	0	0	0	1	0	
3	0	0	0	0	1	0	1	0	0	0	0	0	
4	0	0	0	0	1	0	1	0	0	0	0	0	

	X356	X357	X358	X359	X360	X361	X362	X363	X364	X365	X366	X367	\
0	0	0	0	0	0	1	0	0	0	0	0	0	
1	0	0	0	0	0	1	0	1	0	0	0	0	
2	0	0	1	0	0	1	0	1	0	0	0	0	
3	0	0	1	0	0	1	0	1	0	0	0	0	
4	0	0	1	0	0	1	0	1	0	0	0	0	

	X368	X369	X370	X371	X372	X373	X374	X375	X376	X377	X378	X379	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	1	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	1	0	0	0	0	0	0	0	
4	0	0	0	1	0	0	0	0	0	0	0	0	

	X380	X382	X383	X384	X385
0	0	0	0	0	0
1	0	0	0	0	0
2	0	1	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0

```
[11]: columns=df_num.columns
```

```
[12]: df_num.shape
```

```
[12]: (4209, 370)
```

```
[13]: # categorical data for test dataset
      test_df_cat.head()
```

```
[13]:    X0 X1  X2 X3 X4 X5 X6 X8
      0  az  v   n  f  d  t  a  w
      1   t  b  ai  a  d  b  g  y
```

```
2  az  v  as  f  d  a  j  j
3  az  l  n  f  d  z  l  n
4  w   s  as  c  d  y  i  m
```

[14]: `# numerical data for test dataset`
`test_df_num.head()`

[14]:

	ID	X10	X11	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	\
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	
2	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	

	X24	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38	X39	\
0	0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	
1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	
2	0	0	1	0	1	0	1	0	0	0	1	0	1	0	0	
3	0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	
4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	

	X40	X41	X42	X43	X44	X45	X46	X47	X48	X49	X50	X51	X52	X53	X54	\
0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	

	X55	X56	X57	X58	X59	X60	X61	X62	X63	X64	X65	X66	X67	X68	X69	\
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	

	X70	X71	X73	X74	X75	X76	X77	X78	X79	X80	X81	X82	X83	X84	X85	\
0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	
2	1	0	0	1	0	1	0	0	0	1	0	0	0	0	1	
3	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
4	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	

	X86	X87	X88	X89	X90	X91	X92	X93	X94	X95	X96	X97	X98	X99	X100	\
0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	
3	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	

```
4    0    0    0    0    0    0    0    0    0    1    0    1    0    1

     X101  X102  X103  X104  X105  X106  X107  X108  X109  X110  X111  X112  \
0     1     0     0     0     0     0     0     0     0     0     1     0
1     1     0     1     0     0     0     0     0     0     0     1     0
2     1     0     1     0     0     0     0     0     0     0     1     0
3     1     0     0     0     0     0     0     0     0     0     1     0
4     1     0     1     0     0     1     0     0     0     0     1     0

     X113  X114  X115  X116  X117  X118  X119  X120  X122  X123  X124  X125  \
0     0     1     0     0     0     0     0     0     0     0     0     0
1     0     0     0     1     0     1     1     1     0     0     0     0
2     0     0     0     0     0     0     0     1     0     0     0     0
3     0     1     0     0     0     0     0     1     0     0     0     0
4     0     0     0     0     0     1     1     1     0     0     0     0

     X126  X127  X128  X129  X130  X131  X132  X133  X134  X135  X136  X137  \
0     0     0     1     0     0     0     1     0     0     0     0     0
1     0     1     1     1     0     0     0     1     0     0     1     1
2     0     0     1     0     0     0     1     0     0     0     0     1
3     0     0     1     0     0     0     1     0     0     0     0     0
4     0     0     1     0     0     0     1     0     0     0     1     1

     X138  X139  X140  X141  X142  X143  X144  X145  X146  X147  X148  X150  \
0     0     0     0     0     0     0     1     0     0     0     1     1
1     1     0     1     0     1     0     0     0     1     0     0     0
2     0     0     0     0     1     0     1     0     0     0     0     1
3     0     0     0     0     0     0     1     0     0     0     1     1
4     0     0     0     0     1     0     1     0     0     0     0     1

     X151  X152  X153  X154  X155  X156  X157  X158  X159  X160  X161  X162  \
0     0     0     0     0     0     0     1     1     0     0     0     1
1     0     0     0     0     0     1     0     0     0     0     1     0
2     0     0     0     0     0     0     1     0     1     0     0     1
3     0     0     0     0     0     0     1     1     0     0     0     1
4     1     0     0     0     0     1     0     0     0     0     0     0

     X163  X164  X165  X166  X167  X168  X169  X170  X171  X172  X173  X174  \
0     0     0     0     1     0     0     0     0     0     0     0     0
1     1     1     0     0     0     0     0     0     1     0     0     0
2     0     0     0     1     0     0     0     0     0     0     0     0
3     0     0     0     1     0     0     0     0     0     0     0     0
4     1     0     0     0     0     0     0     0     1     0     0     0

     X175  X176  X177  X178  X179  X180  X181  X182  X183  X184  X185  X186  \
0     0     0     0     0     1     0     0     0     0     0     1     0
1     0     0     0     0     0     0     0     0     0     0     0     1
```

2	0	0	0	0	0	0	0	0	0	0	1	0
3	0	0	0	0	1	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	0	0	0	0	0

	X187	X189	X190	X191	X192	X194	X195	X196	X197	X198	X199	X200	\
0	0	0	0	0	0	1	0	0	0	0	0	0	
1	0	1	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	1	0	0	0	0	0	0	
3	0	0	0	0	0	1	0	0	0	0	0	0	
4	1	1	0	1	0	1	0	0	0	0	0	0	

	X201	X202	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	\
0	0	0	0	1	0	0	0	0	1	0	0	0	
1	0	1	0	1	0	0	0	1	0	0	0	0	
2	0	0	0	1	0	0	0	0	1	0	0	0	
3	0	0	0	0	1	0	0	0	1	0	0	0	
4	0	0	0	0	1	0	0	0	1	0	0	0	

	X213	X214	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	\
0	0	0	0	0	0	1	0	1	0	0	1	0	
1	0	0	1	0	0	1	0	0	0	0	0	0	
2	0	0	0	0	0	1	0	0	0	0	1	1	
3	0	0	0	0	0	1	0	1	0	0	1	0	
4	0	0	0	0	0	0	0	1	0	0	1	1	

	X225	X226	X227	X228	X229	X230	X231	X232	X233	X234	X235	X236	\
0	0	0	0	0	0	0	0	1	0	0	0	0	
1	0	0	0	0	1	0	0	0	0	1	0	0	
2	0	0	0	0	0	0	0	1	0	0	0	0	
3	0	0	0	0	1	0	0	1	0	0	0	0	
4	0	0	0	0	1	0	0	0	0	0	0	0	

	X237	X238	X239	X240	X241	X242	X243	X244	X245	X246	X247	X248	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	0	1	0	0	0	0	0	0	0	0	1	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	1	0	0	
4	0	1	0	0	0	0	0	0	0	1	0	0	

	X249	X250	X251	X252	X253	X254	X255	X256	X257	X258	X259	X260	\
0	0	1	0	0	0	0	0	1	0	0	0	0	
1	0	1	0	0	0	0	0	0	0	0	0	0	
2	0	0	1	0	0	0	0	0	0	0	0	0	
3	0	1	0	1	0	0	0	1	0	0	0	0	
4	0	0	1	0	0	0	0	0	0	0	0	0	

	X261	X262	X263	X264	X265	X266	X267	X268	X269	X270	X271	X272	\

```
0     0     0     0     0     0     0     0     0     0     0     0     1
1     0     0     1     0     1     0     0     0     0     0     0     0
2     0     0     0     0     0     0     0     0     0     0     0     0
3     0     0     0     0     0     0     0     0     0     0     0     1
4     1     0     1     0     1     0     0     0     0     0     0     0
```

	X273	X274	X275	X276	X277	X278	X279	X280	X281	X282	X283	X284	\
0	1	0	0	1	0	0	1	0	0	0	0	0	
1	1	0	1	0	0	0	0	0	0	0	0	0	
2	0	1	0	1	0	0	1	0	0	0	0	0	
3	1	0	0	1	0	0	1	0	0	0	0	0	
4	1	0	1	0	0	0	0	0	0	0	0	0	

	X285	X286	X287	X288	X289	X290	X291	X292	X293	X294	X295	X296	\
0	0	1	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	1	0	0	
2	1	0	0	0	0	0	0	0	0	0	0	0	
3	0	1	0	0	0	0	0	1	0	0	0	0	
4	1	0	0	0	0	0	0	0	0	0	0	0	

	X297	X298	X299	X300	X301	X302	X304	X305	X306	X307	X308	X309	\
0	0	0	0	0	0	0	1	0	0	0	0	0	
1	0	0	0	0	0	0	1	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	0	0	0	
3	0	0	0	0	0	0	1	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	0	0	0	

	X310	X311	X312	X313	X314	X315	X316	X317	X318	X319	X320	X321	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	1	0	0	0	0	1	0	0	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	1	0	0	1	0	0	0	0	0	0	0	

	X322	X323	X324	X325	X326	X327	X328	X329	X330	X331	X332	X333	\
0	0	0	0	0	0	0	1	0	0	0	0	0	
1	0	0	1	0	0	1	0	0	0	0	0	0	
2	0	0	1	0	0	0	1	1	0	0	0	0	
3	0	0	0	0	0	0	1	0	0	0	0	0	
4	0	0	1	0	0	0	0	1	0	0	0	0	

	X334	X335	X336	X337	X338	X339	X340	X341	X342	X343	X344	X345	\
0	1	0	0	0	0	0	0	0	0	0	0	0	
1	1	0	0	0	0	0	0	0	0	0	0	0	
2	1	0	0	0	0	0	0	0	0	1	0	0	
3	1	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	1	1	0	0	0	0	0	0	0	0	

```
        X346   X347   X348   X349   X350   X351   X352   X353   X354   X355   X356   X357   \
    0      0      0      1      0      1      0      0      0      0      0      0      0
    1      0      0      1      0      0      0      0      0      0      0      1      0
    2      0      0      1      0      1      0      0      0      0      0      0      0
    3      0      0      1      0      1      0      0      0      0      0      0      0
    4      0      0      1      0      1      1      0      0      0      0      0      0

        X358   X359   X360   X361   X362   X363   X364   X365   X366   X367   X368   X369   \
    0      1      0      0      1      0      1      0      0      0      0      0      0
    1      0      0      0      1      1      0      0      0      0      0      1      0
    2      0      0      0      1      0      1      0      0      0      0      0      0
    3      1      0      0      1      0      1      0      0      0      0      0      0
    4      1      0      0      1      0      1      0      0      0      0      0      0

        X370   X371   X372   X373   X374   X375   X376   X377   X378   X379   X380   X382   \
    0      0      0      0      0      0      0      0      0      1      0      0      0
    1      0      0      0      0      0      0      0      1      0      0      0      0
    2      0      0      0      0      0      0      0      0      1      0      0      0
    3      0      0      0      0      0      0      0      0      1      0      0      0
    4      0      0      0      0      0      1      0      0      0      0      0      0

        X383   X384   X385
    0      0      0      0
    1      0      0      0
    2      0      0      0
    3      0      0      0
    4      0      0      0
```

[15]:
```python
test_columns=test_df_num.columns
```

[16]:
```python
test_df_num.shape
```

[16]: (4209, 369)

0.4 If for any Columns, the Variance is equal to zero

[17]:
```python
# variance of numerical data of train set
variance_df_num=df_num.var()
```

[18]:
```python
# finding out the variance which are of zero in training set
variable_var_zero=[]

for i in range(0,len(variance_df_num)):
    if variance_df_num[i]==0: # checking if the variance for the df_num␣
    ↪dataframe column has zero
```

```
            variable_var_zero.append(columns[i])
```

```python
[19]: np.ravel(variable_var_zero)
```

```
[19]: array(['X11', 'X93', 'X107', 'X233', 'X235', 'X268', 'X289', 'X290',
             'X293', 'X297', 'X330', 'X347'], dtype='<U4')
```

```python
[20]: # features which are of zero variance in training data set will be dropped
      df_num_variance_with_zero_drop=df_num.
       →drop(['X11','X93','X107','X233','X235','X268','X289','X290','X293','X297','X330','X347'],␣
       →axis=1)
      df_num_variance_with_zero_drop.head()
```

```
[20]:    ID       y  X10  X12  X13  X14  X15  X16  X17  X18  X19  X20  X21  X22  \
      0   0  130.81    0    0    1    0    0    0    0    1    0    0    1    0
      1   6   88.53    0    0    0    0    0    0    0    1    0    0    0    0
      2   7   76.26    0    0    0    0    0    0    1    0    0    0    0    0
      3   9   80.62    0    0    0    0    0    0    0    0    0    0    0    0
      4  13   78.02    0    0    0    0    0    0    0    0    0    0    0    0

         X23  X24  X26  X27  X28  X29  X30  X31  X32  X33  X34  X35  X36  X37  X38  \
      0    0    0    0    0    0    0    0    1    0    0    0    1    0    1    0
      1    0    0    0    1    0    0    0    1    0    0    0    1    0    1    0
      2    0    0    0    1    1    1    0    1    0    0    0    1    0    1    0
      3    0    0    0    1    1    1    0    1    0    0    0    1    0    1    0
      4    0    0    0    1    1    1    0    1    0    0    0    1    0    1    0

         X39  X40  X41  X42  X43  X44  X45  X46  X47  X48  X49  X50  X51  X52  X53  \
      0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0
      1    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
      2    0    0    0    0    1    0    0    1    0    0    0    0    1    0    0
      3    0    0    0    0    1    0    0    1    0    0    0    0    0    0    0
      4    0    0    0    0    1    0    0    1    0    0    0    0    1    0    0

         X54  X55  X56  X57  X58  X59  X60  X61  X62  X63  X64  X65  X66  X67  X68  \
      0    0    0    0    0    1    0    0    0    0    0    0    0    0    0    1
      1    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0
      2    1    0    0    0    1    0    0    1    0    0    0    0    0    0    1
      3    1    0    0    0    0    0    0    1    0    0    0    0    0    0    0
      4    1    0    0    0    0    0    0    1    0    0    0    0    0    0    0

         X69  X70  X71  X73  X74  X75  X76  X77  X78  X79  X80  X81  X82  X83  X84  \
      0    0    1    0    0    1    0    0    0    0    0    0    0    0    0    0
      1    0    1    0    0    1    0    0    0    0    0    1    0    0    0    0
      2    0    1    1    0    1    1    1    0    0    0    1    0    0    0    1
      3    0    1    1    0    1    0    1    0    0    0    1    0    0    0    1
      4    0    1    0    0    1    0    1    0    0    0    1    0    0    0    0
```

	X85	X86	X87	X88	X89	X90	X91	X92	X94	X95	X96	X97	X98	X99	X100	\
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	
2	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
3	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	

	X101	X102	X103	X104	X105	X106	X108	X109	X110	X111	X112	X113	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	1	0	0	0	0	0	0	0	0	1	0	0	
2	1	0	0	0	0	0	0	0	0	1	0	0	
3	1	0	0	0	0	0	1	0	0	1	0	0	
4	1	0	0	0	0	0	1	0	0	1	0	0	

	X114	X115	X116	X117	X118	X119	X120	X122	X123	X124	X125	X126	\
0	1	0	1	0	1	1	1	0	0	0	0	0	
1	0	0	0	0	1	1	1	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	0	0	0	
3	1	0	0	0	0	0	1	0	0	0	0	0	
4	1	0	0	0	0	0	1	0	0	0	0	0	

	X127	X128	X129	X130	X131	X132	X133	X134	X135	X136	X137	X138	\
0	0	1	0	0	1	0	0	0	0	1	1	0	
1	1	1	0	0	0	1	0	0	0	1	0	0	
2	0	1	0	0	0	1	0	0	0	0	1	0	
3	0	1	0	0	0	1	0	0	0	0	0	0	
4	0	1	0	0	0	1	0	0	0	0	0	0	

	X139	X140	X141	X142	X143	X144	X145	X146	X147	X148	X150	X151	\
0	0	0	0	1	0	1	0	0	0	0	1	0	
1	0	0	0	1	0	1	0	0	0	0	1	0	
2	0	0	0	0	0	1	0	0	0	1	1	0	
3	0	0	0	1	0	1	0	0	0	1	1	0	
4	0	0	0	0	0	1	0	0	0	1	1	0	

	X152	X153	X154	X155	X156	X157	X158	X159	X160	X161	X162	X163	\
0	0	0	0	0	1	0	0	0	0	0	0	0	
1	0	0	0	0	1	0	0	0	0	0	0	0	
2	0	0	0	0	0	1	1	0	0	0	1	1	
3	0	0	0	0	0	1	0	0	0	0	1	0	
4	0	0	0	0	0	1	1	0	0	0	1	0	

	X164	X165	X166	X167	X168	X169	X170	X171	X172	X173	X174	X175	\
0	0	0	0	0	0	0	1	0	0	0	0	0	
1	0	1	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	0	1	0	0	0	0	0	0	

3	0	0	1	0	0	0	0	0	0	0	1	0
4	0	0	1	0	0	0	0	0	0	0	0	0

	X176	X177	X178	X179	X180	X181	X182	X183	X184	X185	X186	X187	\
0	0	0	0	1	0	0	0	0	1	0	0	1	
1	0	0	1	0	0	0	0	0	0	0	0	1	
2	0	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	0	0	1	0	0	0	0	0	0	0	0	

	X189	X190	X191	X192	X194	X195	X196	X197	X198	X199	X200	X201	\
0	1	0	0	0	1	0	0	0	0	0	0	0	
1	1	0	0	0	1	0	0	0	0	0	0	0	
2	0	0	0	0	1	0	0	0	0	0	0	0	
3	0	0	0	0	1	0	0	0	0	0	0	0	
4	0	0	0	0	1	0	0	0	0	0	0	0	

	X202	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	X213	\
0	0	0	1	0	0	0	0	1	0	0	0	0	
1	0	0	0	1	0	0	0	1	0	0	0	0	
2	0	0	0	1	1	0	0	1	0	0	0	0	
3	0	0	0	1	0	0	0	1	0	0	0	0	
4	0	0	0	1	0	0	0	1	0	0	0	0	

	X214	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	X225	\
0	0	0	0	0	0	0	1	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	1	1	1	0	0	1	1	0	
3	0	0	0	0	1	0	1	0	0	1	0	0	
4	0	0	0	0	1	0	1	0	0	1	0	0	

	X226	X227	X228	X229	X230	X231	X232	X234	X236	X237	X238	X239	\
0	0	0	0	0	0	0	0	1	0	1	0	0	
1	0	0	0	1	0	0	0	0	0	0	1	0	
2	0	0	1	0	0	0	1	0	0	0	0	0	
3	0	0	0	1	0	0	1	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	0	0	0	

	X240	X241	X242	X243	X244	X245	X246	X247	X248	X249	X250	X251	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	1	0	
2	0	1	0	0	1	0	1	0	0	0	1	0	
3	0	1	0	0	1	0	1	0	0	0	1	0	
4	0	0	0	0	0	0	1	0	0	0	1	0	

	X252	X253	X254	X255	X256	X257	X258	X259	X260	X261	X262	X263	\
0	0	0	0	0	0	0	0	0	0	0	1	1	

1	0	0	0	0	0	0	0	0	0	0	0	1
2	1	0	0	0	1	0	0	0	0	0	0	0
3	1	0	0	0	1	0	0	0	0	0	0	0
4	1	0	0	0	1	0	0	0	0	0	0	0

	X264	X265	X266	X267	X269	X270	X271	X272	X273	X274	X275	X276	\
0	0	0	1	0	0	0	0	0	1	0	1	0
1	0	1	0	0	0	0	0	0	1	0	1	0
2	0	0	0	0	0	0	0	1	1	1	0	1
3	0	0	0	0	0	0	0	1	1	0	0	1
4	0	0	0	0	0	0	0	1	1	0	0	1

	X277	X278	X279	X280	X281	X282	X283	X284	X285	X286	X287	X288	\
0	0	0	0	0	0	0	0	0	1	0	0	0
1	0	0	0	0	0	0	0	0	1	0	0	0
2	0	0	1	0	0	0	0	0	0	1	0	0
3	0	0	1	0	0	0	0	0	0	1	0	0
4	0	0	1	0	0	0	0	0	0	1	0	0

	X291	X292	X294	X295	X296	X298	X299	X300	X301	X302	X304	X305	\
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	1	0
3	1	0	0	0	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	0	0	0	1	0

	X306	X307	X308	X309	X310	X311	X312	X313	X314	X315	X316	X317	\
0	1	0	0	0	0	0	0	0	0	0	1	0
1	0	0	0	0	0	1	0	0	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0

	X318	X319	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	\
0	0	0	0	0	0	0	1	0	0	1	0	1
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0	0	0	1	0
3	0	0	0	0	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	0	0	0	1	0

	X331	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	X342	\
0	0	0	0	1	0	0	0	0	0	0	0	0
1	0	0	0	0	0	1	1	0	0	0	0	0
2	0	0	0	1	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	0	0

```
       X343  X344  X345  X346  X348  X349  X350  X351  X352  X353  X354  X355  \
0         0     0     0     0     0     0     0     0     0     0     1     0
1         0     0     0     0     1     0     0     0     0     0     0     0
2         0     0     0     0     1     0     1     0     0     0     1     0
3         0     0     0     0     1     0     1     0     0     0     0     0
4         0     0     0     0     1     0     1     0     0     0     0     0

       X356  X357  X358  X359  X360  X361  X362  X363  X364  X365  X366  X367  \
0         0     0     0     0     0     1     0     0     0     0     0     0
1         0     0     0     0     0     1     0     1     0     0     0     0
2         0     0     1     0     0     1     0     1     0     0     0     0
3         0     0     1     0     0     1     0     1     0     0     0     0
4         0     0     1     0     0     1     0     1     0     0     0     0

       X368  X369  X370  X371  X372  X373  X374  X375  X376  X377  X378  X379  \
0         0     0     0     0     0     0     0     0     0     1     0     0
1         0     0     0     0     0     0     0     1     0     0     0     0
2         0     0     0     0     0     0     0     0     0     0     0     0
3         0     0     0     0     1     0     0     0     0     0     0     0
4         0     0     0     1     0     0     0     0     0     0     0     0

       X380  X382  X383  X384  X385
0         0     0     0     0     0
1         0     0     0     0     0
2         0     1     0     0     0
3         0     0     0     0     0
4         0     0     0     0     0
```

[21]: `df_num_variance_with_zero_drop.describe()`

[21]:
```
                    ID            y           X10           X12           X13  \
count      4209.000000  4209.000000  4209.000000  4209.000000  4209.000000
mean       4205.960798   100.669318     0.013305     0.075077     0.057971
std        2437.608688    12.679381     0.114590     0.263547     0.233716
min           0.000000    72.110000     0.000000     0.000000     0.000000
25%        2095.000000    90.820000     0.000000     0.000000     0.000000
50%        4220.000000    99.150000     0.000000     0.000000     0.000000
75%        6314.000000   109.010000     0.000000     0.000000     0.000000
max        8417.000000   265.320000     1.000000     1.000000     1.000000

                   X14          X15          X16          X17          X18  \
count      4209.000000  4209.000000  4209.000000  4209.000000  4209.000000
mean          0.428130     0.000475     0.002613     0.007603     0.007840
std           0.494867     0.021796     0.051061     0.086872     0.088208
min           0.000000     0.000000     0.000000     0.000000     0.000000
25%           0.000000     0.000000     0.000000     0.000000     0.000000
50%           0.000000     0.000000     0.000000     0.000000     0.000000
```

75%	1.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X19	X20	X21	X22	X23 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.099549	0.142789	0.002613	0.086957	0.020670
std	0.299433	0.349899	0.051061	0.281805	0.142294
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X24	X26	X27	X28	X29 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001901	0.004989	0.682585	0.032549	0.043003
std	0.043561	0.070467	0.465526	0.177475	0.202888
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X30	X31	X32	X33	X34 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.004514	0.232359	0.011167	0.000238	0.005464
std	0.067043	0.422387	0.105093	0.015414	0.073729
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X35	X36	X37	X38	X39 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.232359	0.004514	0.232359	0.033262	0.000238
std	0.422387	0.067043	0.422387	0.179341	0.015414
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X40	X41	X42	X43	X44 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.000713	0.011404	0.000238	0.072226	0.011404
std	0.026691	0.106192	0.015414	0.258893	0.106192

	min	25%	50%	75%	max
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X45	X46	X47	X48	X49 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.253267	0.597292	0.012830	0.022333	0.122119
std	0.434934	0.490501	0.112552	0.147782	0.327462
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	1.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X50	X51	X52	X53	X54 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.214065	0.721787	0.042290	0.006890	0.043478
std	0.410221	0.448172	0.201275	0.082729	0.203955
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X55	X56	X57	X58	X59 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.005227	0.021145	0.013305	0.574958	0.000713
std	0.072117	0.143885	0.114590	0.494408	0.026691
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X60	X61	X62	X63	X64 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001426	0.953908	0.005940	0.011404	0.375148
std	0.037734	0.209709	0.076849	0.106192	0.484219
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X65	X66	X67	X68	X69 \

count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.002138	0.027085	0.001901	0.073414	0.029936
std	0.046198	0.162350	0.043561	0.260846	0.170431
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X70	X71	X73	X74	X75 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.919933	0.103588	0.019957	0.999287	0.036113
std	0.271428	0.304761	0.139870	0.026691	0.186594
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	1.000000	0.000000	0.000000	1.000000	0.000000
50%	1.000000	0.000000	0.000000	1.000000	0.000000
75%	1.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X76	X77	X78	X79	X80 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.043478	0.012592	0.005702	0.025184	0.947018
std	0.203955	0.111519	0.075305	0.156703	0.224024
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	1.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000
75%	0.000000	0.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X81	X82	X83	X84	X85 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.229033	0.017106	0.001188	0.103588	0.408173
std	0.420260	0.129683	0.034450	0.304761	0.491554
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X86	X87	X88	X89	X90 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001426	0.000950	0.007128	0.000713	0.007365
std	0.037734	0.030817	0.084134	0.026691	0.085514
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000

max	1.000000	1.000000	1.000000	1.000000	1.000000

	X91	X92	X94	X95	X96 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001663	0.000950	0.007365	0.000238	0.758137
std	0.040752	0.030817	0.085514	0.015414	0.428262
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	1.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000
75%	0.000000	0.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X97	X98	X99	X100	X101 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.004277	0.942504	0.008553	0.690188	0.935614
std	0.065263	0.232815	0.092098	0.462471	0.245468
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	1.000000
50%	0.000000	1.000000	0.000000	1.000000	1.000000
75%	0.000000	1.000000	0.000000	1.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X102	X103	X104	X105	X106 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.006890	0.784509	0.001901	0.002376	0.013067
std	0.082729	0.411211	0.043561	0.048691	0.113576
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X108	X109	X110	X111	X112 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.014730	0.040390	0.000950	0.974816	0.002851
std	0.120486	0.196895	0.030817	0.156703	0.053325
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	1.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X113	X114	X115	X116	X117 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.00000
mean	0.022333	0.146115	0.285579	0.196721	0.04918
std	0.147782	0.353264	0.451743	0.397567	0.21627
min	0.000000	0.000000	0.000000	0.000000	0.00000

25%	0.000000	0.000000	0.000000	0.000000	0.00000
50%	0.000000	0.000000	0.000000	0.000000	0.00000
75%	0.000000	0.000000	1.000000	0.000000	0.00000
max	1.000000	1.000000	1.000000	1.000000	1.00000

	X118	X119	X120	X122	X123	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.622238	0.622238	0.957710	0.007128	0.002613	
std	0.484885	0.484885	0.201275	0.084134	0.051061	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	0.000000	
50%	1.000000	1.000000	1.000000	0.000000	0.000000	
75%	1.000000	1.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X124	X125	X126	X127	X128	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000475	0.003089	0.038964	0.495129	0.958422	
std	0.021796	0.055496	0.193532	0.500036	0.199646	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	1.000000	
50%	0.000000	0.000000	0.000000	0.000000	1.000000	
75%	0.000000	0.000000	0.000000	1.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X129	X130	X131	X132	X133	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.122594	0.041578	0.026610	0.688525	0.124258	
std	0.328010	0.199646	0.160959	0.463152	0.329914	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X134	X135	X136	X137	X138	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.022333	0.027085	0.956522	0.581848	0.040865	
std	0.147782	0.162350	0.203955	0.493314	0.198000	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	0.000000	
50%	0.000000	0.000000	1.000000	1.000000	0.000000	
75%	0.000000	0.000000	1.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X139	X140	X141	X142	X143	\
count	4209.00000	4209.000000	4209.000000	4209.000000	4209.000000	

mean	0.09052	0.040390	0.014255	0.770254	0.038251
std	0.28696	0.196895	0.118555	0.420719	0.191825
min	0.00000	0.000000	0.000000	0.000000	0.000000
25%	0.00000	0.000000	0.000000	1.000000	0.000000
50%	0.00000	0.000000	0.000000	1.000000	0.000000
75%	0.00000	0.000000	0.000000	1.000000	0.000000
max	1.00000	1.000000	1.000000	1.000000	1.000000

	X144	X145	X146	X147	X148	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.808030	0.001426	0.040865	0.022333	0.044904	
std	0.393896	0.037734	0.198000	0.147782	0.207117	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X150	X151	X152	X153	X154	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.792350	0.085531	0.032312	0.000713	0.208838	
std	0.405673	0.279703	0.176848	0.026691	0.406527	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	1.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X155	X156	X157	X158	X159	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.076503	0.717273	0.282727	0.229746	0.013542	
std	0.265832	0.450379	0.450379	0.420719	0.115595	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X160	X161	X162	X163	X164	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.001188	0.197672	0.040865	0.303397	0.062485	
std	0.034450	0.398290	0.198000	0.459780	0.242063	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X165	X166	X167	X168	X169	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.004514	0.033262	0.000950	0.270848	0.006652	
std	0.067043	0.179341	0.030817	0.444451	0.081300	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X170	X171	X172	X173	X174	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.024234	0.657401	0.005940	0.009741	0.017344	
std	0.153792	0.474635	0.076849	0.098226	0.130564	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X175	X176	X177	X178	X179	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.022333	0.017106	0.050131	0.557377	0.047992	
std	0.147782	0.129683	0.218240	0.496756	0.213776	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X180	X181	X182	X183	X184	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.157995	0.093847	0.106201	0.004039	0.001426	
std	0.364779	0.291650	0.308131	0.063432	0.037734	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X185	X186	X187	X189	X190	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.018769	0.535994	0.420527	0.915419	0.000238	
std	0.135725	0.498762	0.493702	0.278290	0.015414	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	1.000000	0.000000	

	X191	X192	X194	X195	X196 \

50%	0.000000	1.000000	0.000000	1.000000	0.000000
75%	0.000000	1.000000	1.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X191	X192	X194	X195	X196 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.470896	0.002376	0.464006	0.011642	0.010216
std	0.499212	0.048691	0.498762	0.107280	0.100570
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	1.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X197	X198	X199	X200	X201 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.032312	0.023046	0.002851	0.006652	0.177714
std	0.176848	0.150067	0.053325	0.081300	0.382318
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X202	X203	X204	X205	X206 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.241388	0.016869	0.000238	0.999762	0.019244
std	0.427976	0.128794	0.015414	0.015414	0.137399
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	1.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X207	X208	X209	X210	X211 \
count	4209.000000	4209.00000	4209.000000	4209.000000	4209.000000
mean	0.000238	0.06296	0.898551	0.000238	0.014968
std	0.015414	0.24292	0.301959	0.015414	0.121439
min	0.000000	0.00000	0.000000	0.000000	0.000000
25%	0.000000	0.00000	1.000000	0.000000	0.000000
50%	0.000000	0.00000	1.000000	0.000000	0.000000
75%	0.000000	0.00000	1.000000	0.000000	0.000000
max	1.000000	1.00000	1.000000	1.000000	1.000000

	X212	X213	X214	X215	X216 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.005464	0.001901	0.006890	0.098598	0.005940

std	0.073729	0.043561	0.082729	0.298157	0.076849
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X217	X218	X219	X220	X221	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.007365	0.312426	0.067474	0.561178	0.008078	
std	0.085514	0.463537	0.250872	0.496302	0.089524	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	1.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X222	X223	X224	X225	X226	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.022333	0.555239	0.317415	0.096935	0.032312	
std	0.147782	0.496998	0.465526	0.295905	0.176848	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X227	X228	X229	X230	X231	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.003089	0.038964	0.960086	0.005227	0.016156	
std	0.055496	0.193532	0.195782	0.072117	0.126090	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	0.000000	
50%	0.000000	0.000000	1.000000	0.000000	0.000000	
75%	0.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X232	X234	X236	X237	X238	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.043003	0.201711	0.000475	0.006652	0.916132	
std	0.202888	0.401325	0.021796	0.081300	0.277223	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	1.000000	
50%	0.000000	0.000000	0.000000	0.000000	1.000000	
75%	0.000000	0.000000	0.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X239	X240	X241	X242	X243 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.006890	0.002851	0.097173	0.007365	0.007128
std	0.082729	0.053325	0.296228	0.085514	0.084134
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X244	X245	X246	X247	X248 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.103588	0.000713	0.409361	0.241388	0.001426
std	0.304761	0.026691	0.491774	0.427976	0.037734
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X249	X250	X251	X252	X253 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.007603	0.552863	0.394155	0.000713	0.001426
std	0.086872	0.497257	0.488727	0.026691	0.037734
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X254	X255	X256	X257	X258 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.005227	0.019482	0.073177	0.000238	0.002376
std	0.072117	0.138228	0.260457	0.015414	0.048691
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X259	X260	X261	X262	X263 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.000238	0.000238	0.419577	0.001426	0.956997
std	0.015414	0.015414	0.493548	0.037734	0.202888
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	1.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000

	75%	0.000000	0.000000	1.000000	0.000000	1.000000
	max	1.000000	1.000000	1.000000	1.000000	1.000000

	X264	X265	X266	X267	X269	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.039439	0.905441	0.001426	0.009028	0.000475	
std	0.194661	0.292640	0.037734	0.094599	0.021796	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	1.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X270	X271	X272	X273	X274	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000238	0.002138	0.037539	0.720124	0.009979	
std	0.015414	0.046198	0.190100	0.448992	0.099405	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X275	X276	X277	X278	X279	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.726776	0.038489	0.001426	0.000475	0.043003	
std	0.445668	0.192396	0.037734	0.021796	0.202888	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X280	X281	X282	X283	X284	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000238	0.002613	0.004039	0.140651	0.041102	
std	0.015414	0.051061	0.063432	0.347702	0.198551	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X285	X286	X287	X288	X291	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.205750	0.054645	0.015918	0.000238	0.010454	
std	0.404296	0.227313	0.125174	0.015414	0.101720	

```
min    0.000000   0.000000   0.000000   0.000000   0.000000
25%    0.000000   0.000000   0.000000   0.000000   0.000000
50%    0.000000   0.000000   0.000000   0.000000   0.000000
75%    0.000000   0.000000   0.000000   0.000000   0.000000
max    1.000000   1.000000   1.000000   1.000000   1.000000

              X292          X294          X295          X296          X298  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.009028      0.124970      0.000238      0.000238      0.004514
std       0.094599      0.330725      0.015414      0.015414      0.067043
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      0.000000
50%       0.000000      0.000000      0.000000      0.000000      0.000000
75%       0.000000      0.000000      0.000000      0.000000      0.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000

              X299          X300          X301          X302          X304  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.004514      0.206938      0.046804      0.011404      0.924210
std       0.067043      0.405158      0.211245      0.106192      0.264693
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      1.000000
50%       0.000000      0.000000      0.000000      0.000000      1.000000
75%       0.000000      0.000000      0.000000      0.000000      1.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000

              X305          X306          X307          X308          X309  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.013305      0.043716      0.002138      0.009503      0.007128
std       0.114590      0.204486      0.046198      0.097033      0.084134
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      0.000000
50%       0.000000      0.000000      0.000000      0.000000      0.000000
75%       0.000000      0.000000      0.000000      0.000000      0.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000

              X310          X311          X312          X313          X314  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.002613      0.598479      0.004277      0.301022      0.431694
std       0.051061      0.490264      0.065263      0.458757      0.495371
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      0.000000
50%       0.000000      1.000000      0.000000      0.000000      0.000000
75%       0.000000      1.000000      0.000000      1.000000      1.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000

              X315          X316          X317          X318          X319  \
```

count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.028748	0.195533	0.007603	0.000713	0.000475
std	0.167117	0.396658	0.086872	0.026691	0.021796
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X320	X321	X322	X323	X324	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.007128	0.238774	0.021858	0.009266	0.574958	
std	0.084134	0.426385	0.146237	0.095824	0.494408	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	1.000000	
75%	0.000000	0.000000	0.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X325	X326	X327	X328	X329	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.005702	0.032312	0.128297	0.040152	0.435258	
std	0.075305	0.176848	0.334459	0.196339	0.495850	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X331	X332	X333	X334	X335	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.056070	0.000713	0.023996	0.462580	0.003564	
std	0.230085	0.026691	0.153055	0.498657	0.059598	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X336	X337	X338	X339	X340	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.127346	0.516512	0.006890	0.000238	0.022333	
std	0.333400	0.499787	0.082729	0.015414	0.147782	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	

max	1.000000	1.000000	1.000000	1.000000	1.000000

	X341	X342	X343	X344	X345 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.008078	0.022333	0.078403	0.008553	0.022333
std	0.089524	0.147782	0.268837	0.092098	0.147782
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X346	X348	X349	X350	X351 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.047517	0.947256	0.044904	0.338798	0.297220
std	0.212768	0.223549	0.207117	0.473357	0.457089
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	1.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X352	X353	X354	X355	X356 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.054170	0.002138	0.202899	0.380375	0.179853
std	0.226379	0.046198	0.402205	0.485537	0.384110
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X357	X358	X359	X360	X361 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001188	0.426942	0.031837	0.076503	0.966025
std	0.034450	0.494693	0.175586	0.265832	0.181186
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	1.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000
75%	0.000000	1.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X362	X363	X364	X365	X366 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.520314	0.753861	0.002851	0.002851	0.001188
std	0.499647	0.430812	0.053325	0.053325	0.034450
min	0.000000	0.000000	0.000000	0.000000	0.000000

	25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%		1.000000	1.000000	0.000000	0.000000	0.000000
75%		1.000000	1.000000	0.000000	0.000000	0.000000
max		1.000000	1.000000	1.000000	1.000000	1.000000

	X367	X368	X369	X370	X371	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.051794	0.062723	0.000475	0.006652	0.014255	
std	0.221637	0.242492	0.021796	0.081300	0.118555	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X372	X373	X374	X375	X376	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000475	0.019244	0.227370	0.318841	0.057258	
std	0.021796	0.137399	0.419183	0.466082	0.232363	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X377	X378	X379	X380	X382	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.314802	0.020670	0.009503	0.008078	0.007603	
std	0.464492	0.142294	0.097033	0.089524	0.086872	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X383	X384	X385
count	4209.000000	4209.000000	4209.000000
mean	0.001663	0.000475	0.001426
std	0.040752	0.021796	0.037734
min	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000

```
[22]: df_num_variance_with_zero_drop.shape
```

[22]: (4209, 358)

[23]: ```python
df_train.shape
```

[23]: (4209, 378)

[24]: ```python
df_cat.shape
```

[24]: (4209, 8)

[25]: ```python
# variance of numerical data for test set
test_variance_df_num=df_num.var()
```

[26]: ```python
# finding out the variance which are of zero in test set
test_variable_var_zero=[]
for i in range(0,len(test_variance_df_num)):
        if test_variance_df_num[i]==0:
            test_variable_var_zero.append(columns[i])
```

[27]: ```python
np.ravel(test_variable_var_zero)
```

[27]: array(['X11', 'X93', 'X107', 'X233', 'X235', 'X268', 'X289', 'X290',
       'X293', 'X297', 'X330', 'X347'], dtype='<U4')

[28]: ```python
# features which are of zero variance in test data set will be dropped
test_df_num_variance_with_zero_drop=test_df_num.
 ↪drop(['X11','X93','X107','X233','X235','X268','X289','X290','X293','X297','X330','X347'],␣
 ↪axis=1)
test_df_num_variance_with_zero_drop.head()
```

[28]:

	ID	X10	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	\
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
2	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	
3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	

	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38	X39	X40	\
0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	0	
1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0	
2	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0	
3	0	1	1	1	0	1	0	0	0	1	0	1	0	0	0	
4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	

	X41	X42	X43	X44	X45	X46	X47	X48	X49	X50	X51	X52	X53	X54	X55	\
0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	

```
1     0     0     0     0     1     1     0     0     1     1     1     0     0     0     0
2     0     0     0     0     0     0     0     0     0     0     1     0     0     1     0
3     0     0     1     0     0     1     0     0     0     0     0     0     0     1     0
4     0     0     0     0     0     0     0     0     0     0     1     0     0     0     0

      X56   X57   X58   X59   X60   X61   X62   X63   X64   X65   X66   X67   X68   X69   X70   \
0     0     0     0     0     0     1     0     0     0     0     0     0     0     0     1
1     0     0     1     0     0     1     0     0     0     0     0     0     0     0     1
2     0     0     1     0     0     1     0     0     0     0     0     0     0     0     1
3     0     0     0     0     0     1     0     0     0     0     0     0     0     0     1
4     0     0     1     0     0     1     0     0     1     0     0     0     0     0     1

      X71   X73   X74   X75   X76   X77   X78   X79   X80   X81   X82   X83   X84   X85   X86   \
0     0     0     1     0     1     0     0     0     1     0     0     0     0     0     0
1     0     0     1     0     0     0     0     0     1     0     0     0     0     0     0
2     0     0     1     0     1     0     0     0     1     0     0     0     0     1     0
3     0     0     1     0     1     0     0     0     1     0     0     0     0     0     0
4     0     0     1     0     0     0     0     0     1     0     0     0     0     1     0

      X87   X88   X89   X90   X91   X92   X94   X95   X96   X97   X98   X99   X100  X101  \
0     0     0     0     0     0     0     0     0     1     0     1     0     0     1
1     0     0     0     0     0     0     0     0     0     0     1     0     0     1
2     0     0     0     0     0     0     0     0     1     0     1     0     1     1
3     0     0     0     0     0     0     0     0     1     0     1     0     0     1
4     0     0     0     0     0     0     0     0     1     0     1     0     1     1

      X102  X103  X104  X105  X106  X108  X109  X110  X111  X112  X113  X114  \
0     0     0     0     0     0     0     0     0     1     0     0     1
1     0     1     0     0     0     0     0     0     1     0     0     0
2     0     1     0     0     0     0     0     0     1     0     0     0
3     0     0     0     0     0     0     0     0     1     0     0     1
4     0     1     0     0     1     0     0     0     1     0     0     0

      X115  X116  X117  X118  X119  X120  X122  X123  X124  X125  X126  X127  \
0     0     0     0     0     0     0     0     0     0     0     0     0
1     0     1     0     1     1     1     0     0     0     0     0     1
2     0     0     0     0     0     1     0     0     0     0     0     0
3     0     0     0     0     0     1     0     0     0     0     0     0
4     0     0     0     1     1     1     0     0     0     0     0     0

      X128  X129  X130  X131  X132  X133  X134  X135  X136  X137  X138  X139  \
0     1     0     0     0     1     0     0     0     0     0     0     0
1     1     1     0     0     0     1     0     0     1     1     1     0
2     1     0     0     0     1     0     0     0     0     1     0     0
3     1     0     0     0     1     0     0     0     0     0     0     0
4     1     0     0     0     1     0     0     0     1     1     0     0
```

	X140	X141	X142	X143	X144	X145	X146	X147	X148	X150	X151	X152	\
0	0	0	0	0	1	0	0	0	1	1	0	0	
1	1	0	1	0	0	0	1	0	0	0	0	0	
2	0	0	1	0	1	0	0	0	0	1	0	0	
3	0	0	0	0	1	0	0	0	1	1	0	0	
4	0	0	1	0	1	0	0	0	0	1	1	0	

	X153	X154	X155	X156	X157	X158	X159	X160	X161	X162	X163	X164	\
0	0	0	0	0	1	1	0	0	0	1	0	0	
1	0	0	0	1	0	0	0	0	1	0	1	1	
2	0	0	0	0	1	0	1	0	0	1	0	0	
3	0	0	0	0	1	1	0	0	0	1	0	0	
4	0	0	0	1	0	0	0	0	0	0	1	0	

	X165	X166	X167	X168	X169	X170	X171	X172	X173	X174	X175	X176	\
0	0	1	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	1	0	0	0	0	0	
2	0	1	0	0	0	0	0	0	0	0	0	0	
3	0	1	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	1	0	0	0	0	0	

	X177	X178	X179	X180	X181	X182	X183	X184	X185	X186	X187	X189	\
0	0	0	1	0	0	0	0	0	1	0	0	0	
1	0	0	0	0	0	0	0	0	0	1	0	1	
2	0	0	0	0	0	0	0	0	1	0	0	0	
3	0	0	1	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	1	1	

	X190	X191	X192	X194	X195	X196	X197	X198	X199	X200	X201	X202	\
0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	1	
2	0	1	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	1	0	1	0	0	0	0	0	0	0	0	

	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	X213	X214	\
0	0	1	0	0	0	0	1	0	0	0	0	0	
1	0	1	0	0	0	1	0	0	0	0	0	0	
2	0	1	0	0	0	0	1	0	0	0	0	0	
3	0	0	1	0	0	0	1	0	0	0	0	0	
4	0	0	1	0	0	0	1	0	0	0	0	0	

	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	X225	X226	\
0	0	0	0	1	0	1	0	0	1	0	0	0	
1	1	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	0	0	1	1	0	0	
3	0	0	0	1	0	1	0	0	1	0	0	0	

```
4        0       0       0       0       0       1       0       0       1       1       0       0

    X227  X228  X229  X230  X231  X232  X234  X236  X237  X238  X239  X240  \
0      0     0     0     0     0     1     0     0     0     0     0     0
1      0     0     1     0     0     0     1     0     0     1     0     0
2      0     0     0     0     0     1     0     0     0     0     0     0
3      0     0     1     0     0     1     0     0     0     0     0     0
4      0     0     1     0     0     0     0     0     0     1     0     0

    X241  X242  X243  X244  X245  X246  X247  X248  X249  X250  X251  X252  \
0      0     0     0     0     0     1     0     0     0     1     0     0
1      0     0     0     0     0     0     1     0     0     1     0     0
2      0     0     0     0     0     0     0     0     0     0     1     0
3      0     0     0     0     0     1     0     0     0     1     0     1
4      0     0     0     0     0     1     0     0     0     0     1     0

    X253  X254  X255  X256  X257  X258  X259  X260  X261  X262  X263  X264  \
0      0     0     0     1     0     0     0     0     0     0     0     0
1      0     0     0     0     0     0     0     0     0     0     1     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     1     0     0     0     0     0     0     0     0
4      0     0     0     0     0     0     0     0     1     0     1     0

    X265  X266  X267  X269  X270  X271  X272  X273  X274  X275  X276  X277  \
0      0     0     0     0     0     0     1     1     0     0     1     0
1      1     0     0     0     0     0     0     1     0     1     0     0
2      0     0     0     0     0     0     0     0     1     0     1     0
3      0     0     0     0     0     0     1     1     0     0     1     0
4      1     0     0     0     0     0     0     1     0     1     0     0

    X278  X279  X280  X281  X282  X283  X284  X285  X286  X287  X288  X291  \
0      0     1     0     0     0     0     0     0     1     0     0     0
1      0     0     0     0     0     0     0     0     0     0     0     0
2      0     1     0     0     0     0     0     1     0     0     0     0
3      0     1     0     0     0     0     0     0     1     0     0     0
4      0     0     0     0     0     0     0     1     0     0     0     0

    X292  X294  X295  X296  X298  X299  X300  X301  X302  X304  X305  X306  \
0      0     0     0     0     0     0     0     0     0     1     0     0
1      0     1     0     0     0     0     0     0     0     1     0     0
2      0     0     0     0     0     0     0     0     0     1     0     0
3      1     0     0     0     0     0     0     0     0     1     0     0
4      0     0     0     0     0     0     1     0     0     1     0     0

    X307  X308  X309  X310  X311  X312  X313  X314  X315  X316  X317  X318  \
0      0     0     0     0     0     0     0     0     0     0     0     0
1      0     0     0     0     1     0     0     0     0     1     0     0
```

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2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	0	0	1	0	0	0	0

	X319	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	X331	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	1	0	0	1	0	0	0	
2	0	0	0	0	0	1	0	0	0	1	1	0	
3	0	0	0	0	0	0	0	0	0	1	0	0	
4	0	0	0	0	0	1	0	0	0	0	1	0	

	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	X342	X343	\
0	0	0	1	0	0	0	0	0	0	0	0	0	
1	0	0	1	0	0	0	0	0	0	0	0	0	
2	0	0	1	0	0	0	0	0	0	0	0	1	
3	0	0	1	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	1	1	0	0	0	0	0	0	

	X344	X345	X346	X348	X349	X350	X351	X352	X353	X354	X355	X356	\
0	0	0	0	1	0	1	0	0	0	0	0	0	
1	0	0	0	1	0	0	0	0	0	0	0	1	
2	0	0	0	1	0	1	0	0	0	0	0	0	
3	0	0	0	1	0	1	0	0	0	0	0	0	
4	0	0	0	1	0	1	1	0	0	0	0	0	

	X357	X358	X359	X360	X361	X362	X363	X364	X365	X366	X367	X368	\
0	0	1	0	0	1	0	1	0	0	0	0	0	
1	0	0	0	0	1	1	0	0	0	0	0	1	
2	0	0	0	0	1	0	1	0	0	0	0	0	
3	0	1	0	0	1	0	1	0	0	0	0	0	
4	0	1	0	0	1	0	1	0	0	0	0	0	

	X369	X370	X371	X372	X373	X374	X375	X376	X377	X378	X379	X380	\
0	0	0	0	0	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	0	1	0	0	0	
2	0	0	0	0	0	0	0	0	0	1	0	0	
3	0	0	0	0	0	0	0	0	0	1	0	0	
4	0	0	0	0	0	0	1	0	0	0	0	0	

	X382	X383	X384	X385
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0

```
[29]: test_df_num_variance_with_zero_drop.describe()
```

```
[29]:                ID           X10          X12          X13          X14   \
       count   4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
       mean    4211.039202      0.019007      0.074364      0.061060      0.427893
       std     2423.078926      0.136565      0.262394      0.239468      0.494832
       min        1.000000      0.000000      0.000000      0.000000      0.000000
       25%     2115.000000      0.000000      0.000000      0.000000      0.000000
       50%     4202.000000      0.000000      0.000000      0.000000      0.000000
       75%     6310.000000      0.000000      0.000000      0.000000      1.000000
       max     8416.000000      1.000000      1.000000      1.000000      1.000000

                      X15          X16          X17          X18          X19   \
       count   4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
       mean       0.000713      0.002613      0.008791      0.010216      0.111665
       std        0.026691      0.051061      0.093357      0.100570      0.314992
       min        0.000000      0.000000      0.000000      0.000000      0.000000
       25%        0.000000      0.000000      0.000000      0.000000      0.000000
       50%        0.000000      0.000000      0.000000      0.000000      0.000000
       75%        0.000000      0.000000      0.000000      0.000000      0.000000
       max        1.000000      1.000000      1.000000      1.000000      1.000000

                      X20          X21          X22          X23          X24   \
       count   4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
       mean       0.139463      0.001663      0.082442      0.020195      0.002376
       std        0.346470      0.040752      0.275070      0.140683      0.048691
       min        0.000000      0.000000      0.000000      0.000000      0.000000
       25%        0.000000      0.000000      0.000000      0.000000      0.000000
       50%        0.000000      0.000000      0.000000      0.000000      0.000000
       75%        0.000000      0.000000      0.000000      0.000000      0.000000
       max        1.000000      1.000000      1.000000      1.000000      1.000000

                      X26          X27          X28          X29          X30   \
       count   4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
       mean       0.009028      0.681159      0.026847      0.038964      0.005464
       std        0.094599      0.466082      0.161656      0.193532      0.073729
       min        0.000000      0.000000      0.000000      0.000000      0.000000
       25%        0.000000      0.000000      0.000000      0.000000      0.000000
       50%        0.000000      1.000000      0.000000      0.000000      0.000000
       75%        0.000000      1.000000      0.000000      0.000000      0.000000
       max        1.000000      1.000000      1.000000      1.000000      1.000000

                      X31          X32          X33          X34          X35   \
       count   4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
       mean       0.237349      0.010454      0.000713      0.003564      0.237349
       std        0.425508      0.101720      0.026691      0.059598      0.425508
       min        0.000000      0.000000      0.000000      0.000000      0.000000
       25%        0.000000      0.000000      0.000000      0.000000      0.000000
       50%        0.000000      0.000000      0.000000      0.000000      0.000000
```

75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X36	X37	X38	X39	X40	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.002851	0.237349	0.031124	0.000713	0.001901	
std	0.053325	0.425508	0.173673	0.026691	0.043561	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X41	X42	X43	X44	X45	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.011404	0.001426	0.076978	0.006890	0.252079	
std	0.106192	0.037734	0.266588	0.082729	0.434258	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X46	X47	X48	X49	X50	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.593728	0.011167	0.023759	0.133523	0.224044	
std	0.491195	0.105093	0.152314	0.340180	0.417001	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X51	X52	X53	X54	X55	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.714659	0.042528	0.005940	0.039914	0.006415	
std	0.451630	0.201814	0.076849	0.195782	0.079845	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X56	X57	X58	X59	X60	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.024947	0.015681	0.584462	0.001188	0.001663	
std	0.155981	0.124252	0.492873	0.034450	0.040752	

min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X61	X62	X63	X64	X65 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.953433	0.005940	0.013067	0.360181	0.001901
std	0.210734	0.076849	0.113576	0.480110	0.043561
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	1.000000	0.000000	0.000000	0.000000	0.000000
50%	1.000000	0.000000	0.000000	0.000000	0.000000
75%	1.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X66	X67	X68	X69	X70 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.027085	0.002138	0.079829	0.030649	0.920409
std	0.162350	0.046198	0.271060	0.172384	0.270692
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	1.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000
75%	0.000000	0.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X71	X73	X74	X75	X76 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.107864	0.019007	0.997862	0.038727	0.039914
std	0.310246	0.136565	0.046198	0.192965	0.195782
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	1.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X77	X78	X79	X80	X81 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.011167	0.007365	0.033262	0.949632	0.219530
std	0.105093	0.085514	0.179341	0.218730	0.413977
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	1.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X82	X83	X84	X85	X86 \

```
count    4209.000000    4209.000000    4209.000000    4209.000000    4209.000000
mean        0.020670       0.001188       0.107864       0.420527       0.001426
std         0.142294       0.034450       0.310246       0.493702       0.037734
min         0.000000       0.000000       0.000000       0.000000       0.000000
25%         0.000000       0.000000       0.000000       0.000000       0.000000
50%         0.000000       0.000000       0.000000       0.000000       0.000000
75%         0.000000       0.000000       0.000000       1.000000       0.000000
max         1.000000       1.000000       1.000000       1.000000       1.000000

                X87            X88            X89            X90            X91  \
count    4209.000000    4209.000000    4209.000000    4209.000000    4209.000000
mean        0.000950       0.008316       0.001901       0.008316       0.002613
std         0.030817       0.090820       0.043561       0.090820       0.051061
min         0.000000       0.000000       0.000000       0.000000       0.000000
25%         0.000000       0.000000       0.000000       0.000000       0.000000
50%         0.000000       0.000000       0.000000       0.000000       0.000000
75%         0.000000       0.000000       0.000000       0.000000       0.000000
max         1.000000       1.000000       1.000000       1.000000       1.000000

                X92            X94            X95            X96            X97  \
count    4209.000000    4209.000000    4209.000000    4209.000000    4209.000000
mean        0.002376       0.007840       0.000713       0.747684       0.001426
std         0.048691       0.088208       0.026691       0.434393       0.037734
min         0.000000       0.000000       0.000000       0.000000       0.000000
25%         0.000000       0.000000       0.000000       0.000000       0.000000
50%         0.000000       0.000000       0.000000       1.000000       0.000000
75%         0.000000       0.000000       0.000000       1.000000       0.000000
max         1.000000       1.000000       1.000000       1.000000       1.000000

                X98            X99           X100           X101           X102  \
count    4209.000000    4209.000000    4209.000000    4209.000000    4209.000000
mean        0.942742       0.009979       0.683298       0.936802       0.005940
std         0.232363       0.099405       0.465246       0.243347       0.076849
min         0.000000       0.000000       0.000000       0.000000       0.000000
25%         1.000000       0.000000       0.000000       1.000000       0.000000
50%         1.000000       0.000000       1.000000       1.000000       0.000000
75%         1.000000       0.000000       1.000000       1.000000       0.000000
max         1.000000       1.000000       1.000000       1.000000       1.000000

               X103           X104           X105           X106           X108  \
count    4209.000000    4209.000000    4209.000000    4209.000000    4209.000000
mean        0.788311       0.002613       0.000238       0.012354       0.011642
std         0.408554       0.051061       0.015414       0.110475       0.107280
min         0.000000       0.000000       0.000000       0.000000       0.000000
25%         1.000000       0.000000       0.000000       0.000000       0.000000
50%         1.000000       0.000000       0.000000       0.000000       0.000000
75%         1.000000       0.000000       0.000000       0.000000       0.000000
```

max	1.000000	1.000000	1.000000	1.000000	1.000000

	X109	X110	X111	X112	X113 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.039439	0.001426	0.975053	0.001188	0.023759
std	0.194661	0.037734	0.155981	0.034450	0.152314
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	1.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X114	X115	X116	X117	X118 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.144928	0.293894	0.196246	0.044429	0.622238
std	0.352070	0.455598	0.397204	0.206070	0.484885
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	1.000000
75%	0.000000	1.000000	0.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X119	X120	X122	X123	X124 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.622238	0.957234	0.008316	0.003326	0.000238
std	0.484885	0.202352	0.090820	0.057584	0.015414
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%	1.000000	1.000000	0.000000	0.000000	0.000000
75%	1.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X125	X126	X127	X128	X129 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.004752	0.039914	0.486101	0.961511	0.133761
std	0.068777	0.195782	0.499866	0.192396	0.340436
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	1.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	1.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X130	X131	X132	X133	X134 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.038489	0.027322	0.687812	0.123307	0.023759
std	0.192396	0.163041	0.463441	0.328829	0.152314
min	0.000000	0.000000	0.000000	0.000000	0.000000

25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	1.000000	0.000000	0.000000
75%	0.000000	0.000000	1.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X135	X136	X137	X138	X139	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.026372	0.960323	0.590402	0.039439	0.095747	
std	0.160258	0.195222	0.491818	0.194661	0.294279	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	1.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	1.000000	0.000000	0.000000	
75%	0.000000	1.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X140	X141	X142	X143	X144	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.039439	0.016393	0.765740	0.039677	0.801378	
std	0.194661	0.126998	0.423586	0.195222	0.399010	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	1.000000	
50%	0.000000	0.000000	1.000000	0.000000	1.000000	
75%	0.000000	0.000000	1.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X145	X146	X147	X148	X150	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000713	0.039439	0.023759	0.040390	0.788073	
std	0.026691	0.194661	0.152314	0.196895	0.408722	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	1.000000	
50%	0.000000	0.000000	0.000000	0.000000	1.000000	
75%	0.000000	0.000000	0.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X151	X152	X153	X154	X155	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.087432	0.031361	0.001188	0.213352	0.079591	
std	0.282500	0.174313	0.034450	0.409723	0.270692	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X156	X157	X158	X159	X160	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	

mean	0.709907	0.290093	0.234498	0.014730	0.000950
std	0.453859	0.453859	0.423735	0.120486	0.030817
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	1.000000	0.000000	0.000000	0.000000	0.000000
75%	1.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X161	X162	X163	X164	X165	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.195058	0.035638	0.314326	0.067712	0.003564	
std	0.396293	0.185408	0.464302	0.251281	0.059598	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X166	X167	X168	X169	X170	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.027085	0.001188	0.263721	0.007365	0.026847	
std	0.162350	0.034450	0.440702	0.085514	0.161656	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X171	X172	X173	X174	X175	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.666429	0.005940	0.010216	0.019482	0.022808	
std	0.471544	0.076849	0.100570	0.138228	0.149310	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X176	X177	X178	X179	X180	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.014493	0.051794	0.560466	0.045141	0.158470	
std	0.119525	0.221637	0.496389	0.207639	0.365224	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	1.000000	0.000000	0.000000	
75%	0.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X181	X182	X183	X184	X185	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.092659	0.097648	0.002138	0.000713	0.018057	
std	0.289988	0.296873	0.046198	0.026691	0.133172	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X186	X187	X189	X190	X191	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.531955	0.428368	0.921834	0.000238	0.476123	
std	0.499037	0.494901	0.268464	0.015414	0.499489	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	0.000000	
50%	1.000000	0.000000	1.000000	0.000000	0.000000	
75%	1.000000	1.000000	1.000000	0.000000	1.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X192	X194	X195	X196	X197	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.001663	0.468282	0.012117	0.012354	0.029461	
std	0.040752	0.499052	0.109421	0.110475	0.169114	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X198	X199	X200	X201	X202	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.024947	0.001188	0.006652	0.176289	0.239724	
std	0.155981	0.034450	0.081300	0.381111	0.426966	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X203	X204	X205	X206	X207	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.011879	0.000713	0.999287	0.018769	0.001426	
std	0.108356	0.026691	0.026691	0.135725	0.037734	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	1.000000	0.000000	0.000000	

50%	0.000000	0.000000	1.000000	0.000000	0.000000	
75%	0.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X208	X209	X210	X211	X212	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.061772	0.897125	0.000238	0.017106	0.007128	
std	0.240770	0.303831	0.015414	0.129683	0.084134	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	1.000000	0.000000	0.000000	0.000000	
50%	0.000000	1.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X213	X214	X215	X216	X217	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.002138	0.005940	0.109765	0.005940	0.009028	
std	0.046198	0.076849	0.312633	0.076849	0.094599	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X218	X219	X220	X221	X222	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.321216	0.067237	0.557377	0.008316	0.023759	
std	0.466999	0.250462	0.496756	0.090820	0.152314	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	1.000000	0.000000	0.000000	
75%	1.000000	0.000000	1.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X223	X224	X225	X226	X227	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.556189	0.313376	0.086244	0.031361	0.004752	
std	0.496892	0.463921	0.280757	0.174313	0.068777	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X228	X229	X230	X231	X232	\
count	4209.000000	4209.00000	4209.000000	4209.000000	4209.000000	
mean	0.046804	0.95082	0.003801	0.017106	0.039677	

std	0.211245	0.21627	0.061545	0.129683	0.195222	
min	0.000000	0.00000	0.000000	0.000000	0.000000	
25%	0.000000	1.00000	0.000000	0.000000	0.000000	
50%	0.000000	1.00000	0.000000	0.000000	0.000000	
75%	0.000000	1.00000	0.000000	0.000000	0.000000	
max	1.000000	1.00000	1.000000	1.000000	1.000000	

	X234	X236	X237	X238	X239	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.206225	0.000238	0.005464	0.920884	0.005940	
std	0.404642	0.015414	0.073729	0.269952	0.076849	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	1.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X240	X241	X242	X243	X244	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.003564	0.104300	0.008316	0.008316	0.107864	
std	0.059598	0.305686	0.090820	0.090820	0.310246	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X245	X246	X247	X248	X249	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000950	0.416964	0.239487	0.002138	0.009503	
std	0.030817	0.493115	0.426821	0.046198	0.097033	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X250	X251	X252	X253	X254	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.555952	0.393918	0.000238	0.001663	0.003801	
std	0.496919	0.488675	0.015414	0.040752	0.061545	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	1.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X255	X256	X257	X258	X259	X260 \
count	4209.000000	4209.000000	4209.0	4209.0	4209.000000	4209.000000
mean	0.014255	0.076503	0.0	0.0	0.000238	0.000713
std	0.118555	0.265832	0.0	0.0	0.015414	0.026691
min	0.000000	0.000000	0.0	0.0	0.000000	0.000000
25%	0.000000	0.000000	0.0	0.0	0.000000	0.000000
50%	0.000000	0.000000	0.0	0.0	0.000000	0.000000
75%	0.000000	0.000000	0.0	0.0	0.000000	0.000000
max	1.000000	1.000000	0.0	0.0	1.000000	1.000000

	X261	X262	X263	X264	X265 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.437871	0.000713	0.960323	0.040865	0.912093
std	0.496184	0.026691	0.195222	0.198000	0.283193
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	1.000000	0.000000	1.000000
50%	0.000000	0.000000	1.000000	0.000000	1.000000
75%	1.000000	0.000000	1.000000	0.000000	1.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X266	X267	X269	X270	X271 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.000950	0.008078	0.000713	0.000713	0.001426
std	0.030817	0.089524	0.026691	0.026691	0.037734
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X272	X273	X274	X275	X276 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.035163	0.712283	0.011167	0.725113	0.035876
std	0.184213	0.452752	0.105093	0.446510	0.186002
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	1.000000	0.000000
75%	0.000000	1.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X277	X278	X279	X280	X281 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.001426	0.000238	0.039677	0.000238	0.003564
std	0.037734	0.015414	0.195222	0.015414	0.059598
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000

75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X282	X283	X284	X285	X286 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.002138	0.144452	0.042053	0.210501	0.046804
std	0.046198	0.351590	0.200733	0.407713	0.211245
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X287	X288	X291	X292	X294 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.015443	0.000238	0.010691	0.009266	0.122119
std	0.123322	0.015414	0.102857	0.095824	0.327462
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X295	X296	X298	X299	X300	X301 \
count	4209.0	4209.0	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.0	0.0	0.003089	0.003089	0.212640	0.055120
std	0.0	0.0	0.055496	0.055496	0.409223	0.228241
min	0.0	0.0	0.000000	0.000000	0.000000	0.000000
25%	0.0	0.0	0.000000	0.000000	0.000000	0.000000
50%	0.0	0.0	0.000000	0.000000	0.000000	0.000000
75%	0.0	0.0	0.000000	0.000000	0.000000	0.000000
max	0.0	0.0	1.000000	1.000000	1.000000	1.000000

	X302	X304	X305	X306	X307 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.006890	0.929437	0.008316	0.045141	0.003326
std	0.082729	0.256124	0.090820	0.207639	0.057584
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	1.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X308	X309	X310	X311	X312 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.007128	0.006652	0.004277	0.597529	0.003326
std	0.084134	0.081300	0.065263	0.490454	0.057584

	min	25%	50%	75%	max
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	0.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X313	X314	X315	X316	X317 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.292231	0.448325	0.025422	0.194583	0.005702
std	0.454842	0.497382	0.157421	0.395926	0.075305
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	1.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X318	X319	X320	X321	X322 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.000950	0.000475	0.007840	0.242813	0.018294
std	0.030817	0.021796	0.088208	0.428834	0.134029
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	0.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X323	X324	X325	X326	X327 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.008078	0.584462	0.005464	0.031361	0.130435
std	0.089524	0.492873	0.073729	0.174313	0.336821
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	1.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X328	X329	X331	X332	X333 \
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.036351	0.438109	0.051794	0.000713	0.019482
std	0.187183	0.496214	0.221637	0.026691	0.138228
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	0.000000	0.000000
75%	0.000000	1.000000	0.000000	0.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X334	X335	X336	X337	X338 \

count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000
mean	0.451651	0.002138	0.127584	0.526966	0.007840
std	0.497716	0.046198	0.333665	0.499332	0.088208
min	0.000000	0.000000	0.000000	0.000000	0.000000
25%	0.000000	0.000000	0.000000	0.000000	0.000000
50%	0.000000	0.000000	0.000000	1.000000	0.000000
75%	1.000000	0.000000	0.000000	1.000000	0.000000
max	1.000000	1.000000	1.000000	1.000000	1.000000

	X339	X340	X341	X342	X343	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.000238	0.020432	0.009979	0.020195	0.069613	
std	0.015414	0.141491	0.099405	0.140683	0.254523	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	0.000000	0.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X344	X345	X346	X348	X349	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.009503	0.024709	0.044904	0.950107	0.041815	
std	0.097033	0.155255	0.207117	0.217750	0.200190	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	1.000000	0.000000	
50%	0.000000	0.000000	0.000000	1.000000	0.000000	
75%	0.000000	0.000000	0.000000	1.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X350	X351	X352	X353	X354	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.341174	0.287242	0.050131	0.002613	0.203849	
std	0.474160	0.452529	0.218240	0.051061	0.402906	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	1.000000	0.000000	0.000000	0.000000	
max	1.000000	1.000000	1.000000	1.000000	1.000000	

	X355	X356	X357	X358	X359	\
count	4209.000000	4209.000000	4209.000000	4209.000000	4209.000000	
mean	0.377762	0.184129	0.002376	0.433595	0.036826	
std	0.484885	0.387636	0.048691	0.495630	0.188356	
min	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	0.000000	0.000000	0.000000	0.000000	0.000000	
50%	0.000000	0.000000	0.000000	0.000000	0.000000	
75%	1.000000	0.000000	0.000000	1.000000	0.000000	

```
max       1.000000      1.000000      1.000000      1.000000      1.000000


               X360          X361          X362          X363          X364  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.079591      0.962461      0.517938      0.745308      0.003564
std       0.270692      0.190100      0.499738      0.435740      0.059598
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      1.000000      0.000000      0.000000      0.000000
50%       0.000000      1.000000      1.000000      1.000000      0.000000
75%       0.000000      1.000000      1.000000      1.000000      0.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000


               X365          X366          X367          X368    X369  \
count  4209.000000   4209.000000   4209.000000   4209.000000  4209.0
mean      0.003326      0.001663      0.048230      0.063198     0.0
std       0.057584      0.040752      0.214277      0.243347     0.0
min       0.000000      0.000000      0.000000      0.000000     0.0
25%       0.000000      0.000000      0.000000      0.000000     0.0
50%       0.000000      0.000000      0.000000      0.000000     0.0
75%       0.000000      0.000000      0.000000      0.000000     0.0
max       1.000000      1.000000      1.000000      1.000000     0.0


               X370          X371          X372          X373          X374  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.005702      0.011404      0.000238      0.014493      0.235923
std       0.075305      0.106192      0.015414      0.119525      0.424625
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      0.000000
50%       0.000000      0.000000      0.000000      0.000000      0.000000
75%       0.000000      0.000000      0.000000      0.000000      0.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000


               X375          X376          X377          X378          X379  \
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.325968      0.049656      0.311951      0.019244      0.011879
std       0.468791      0.217258      0.463345      0.137399      0.108356
min       0.000000      0.000000      0.000000      0.000000      0.000000
25%       0.000000      0.000000      0.000000      0.000000      0.000000
50%       0.000000      0.000000      0.000000      0.000000      0.000000
75%       1.000000      0.000000      1.000000      0.000000      0.000000
max       1.000000      1.000000      1.000000      1.000000      1.000000


               X380          X382          X383          X384          X385
count  4209.000000   4209.000000   4209.000000   4209.000000   4209.000000
mean      0.008078      0.008791      0.000475      0.000713      0.001663
std       0.089524      0.093357      0.021796      0.026691      0.040752
min       0.000000      0.000000      0.000000      0.000000      0.000000
```

```
25%        0.000000     0.000000     0.000000     0.000000     0.000000
50%        0.000000     0.000000     0.000000     0.000000     0.000000
75%        0.000000     0.000000     0.000000     0.000000     0.000000
max        1.000000     1.000000     1.000000     1.000000     1.000000
```

[30]: `test_df_num_variance_with_zero_drop.shape`

[30]: (4209, 357)

[31]: `test_df_num.shape`

[31]: (4209, 369)

[32]: `test_df_cat.shape`

[32]: (4209, 8)

1 Check for Null and Unique Values for train and test data

[33]: `df_test.isnull().sum()`

```
[33]: ID      0
      X0      0
      X1      0
      X2      0
      X3      0
              ..
      X380    0
      X382    0
      X383    0
      X384    0
      X385    0
      Length: 377, dtype: int64
```

[34]: `df_train.isnull().sum()`

```
[34]: ID      0
      y       0
      X0      0
      X1      0
      X2      0
              ..
      X380    0
      X382    0
      X383    0
```

```
X384    0
X385    0
Length: 378, dtype: int64
```

1.1 Check Unique Values for Train and Test sets

[35]: `df_test.nunique()`

```
[35]: ID      4209
      X0        49
      X1        27
      X2        45
      X3         7
             …
      X380       2
      X382       2
      X383       2
      X384       2
      X385       2
      Length: 377, dtype: int64
```

[36]: `df_train.nunique()`

```
[36]: ID      4209
      y       2545
      X0        47
      X1        27
      X2        44
             …
      X380       2
      X382       2
      X383       2
      X384       2
      X385       2
      Length: 378, dtype: int64
```

1.2 Apply Label Encoder

[37]:
```python
from sklearn.preprocessing import OneHotEncoder
# applyOHE- One Hot Encoding
ohe=OneHotEncoder(handle_unknown="ignore")
```

[38]:
```python
# for train data
df_cat_dum=ohe.fit_transform(df_cat).toarray()
```

```python
col_names=ohe.get_feature_names()
col_names=np.array(col_names).ravel()
df_cat_oh=pd.DataFrame(df_cat_dum,columns=col_names)
```

[39]: `df_cat_oh.head()`

[39]:
	x0_a	x0_aa	x0_ab	x0_ac	x0_ad	x0_af	x0_ai	x0_aj	x0_ak	x0_al	x0_am	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x0_ao	x0_ap	x0_aq	x0_as	x0_at	x0_au	x0_aw	x0_ax	x0_ay	x0_az	x0_b	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	

	x0_ba	x0_bc	x0_c	x0_d	x0_e	x0_f	x0_g	x0_h	x0_i	x0_j	x0_k	x0_l	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x0_m	x0_n	x0_o	x0_q	x0_r	x0_s	x0_t	x0_u	x0_v	x0_w	x0_x	x0_y	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x0_z	x1_a	x1_aa	x1_ab	x1_b	x1_c	x1_d	x1_e	x1_f	x1_g	x1_h	x1_i	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x1_j	x1_k	x1_l	x1_m	x1_n	x1_o	x1_p	x1_q	x1_r	x1_s	x1_t	x1_u	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

```
    x1_v  x1_w  x1_y  x1_z  x2_a  x2_aa  x2_ac  x2_ae  x2_af  x2_ag  x2_ah  \
0   1.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0
1   0.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0
2   0.0   1.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0
3   0.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0
4   1.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0    0.0    0.0

    x2_ai  x2_ak  x2_al  x2_am  x2_an  x2_ao  x2_ap  x2_aq  x2_ar  x2_as  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

    x2_at  x2_au  x2_av  x2_aw  x2_ay  x2_b  x2_c  x2_d  x2_e  x2_f  x2_g  \
0    1.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    0.0    0.0    1.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x2_h  x2_i  x2_j  x2_k  x2_l  x2_m  x2_n  x2_o  x2_p  x2_q  x2_r  x2_s  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0

    x2_t  x2_x  x2_y  x2_z  x3_a  x3_b  x3_c  x3_d  x3_e  x3_f  x3_g  x4_a  \
0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0

    x4_b  x4_c  x4_d  x5_aa  x5_ab  x5_ac  x5_ad  x5_ae  x5_af  x5_ag  x5_ah  \
0   0.0   0.0   1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1   0.0   0.0   1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2   0.0   0.0   1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3   0.0   0.0   1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4   0.0   0.0   1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

    x5_c  x5_d  x5_f  x5_g  x5_h  x5_i  x5_j  x5_k  x5_l  x5_m  x5_n  x5_o  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
```

3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x5_p	x5_q	x5_r	x5_s	x5_u	x5_v	x5_w	x5_x	x5_y	x6_a	x6_b	x6_c \
0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x6_d	x6_e	x6_f	x6_g	x6_h	x6_i	x6_j	x6_k	x6_l	x7_a	x7_b	x7_c \
0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0
4	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x7_d	x7_e	x7_f	x7_g	x7_h	x7_i	x7_j	x7_k	x7_l	x7_m	x7_n	x7_o \
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0

	x7_p	x7_q	x7_r	x7_s	x7_t	x7_u	x7_v	x7_w	x7_x	x7_y
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```python
# concatenate the both categorical and numerical features of train data
df_train_final=pd.concat([df_num_variance_with_zero_drop, df_cat_oh],axis=1)
```

```python
df_train_final.head()
```

[41]:

	ID	y	X10	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22 \
0	0	130.81	0	0	1	0	0	0	0	1	0	0	1	0
1	6	88.53	0	0	0	0	0	0	0	1	0	0	0	0
2	7	76.26	0	0	0	0	0	0	1	0	0	0	0	0
3	9	80.62	0	0	0	0	0	0	0	0	0	0	0	0
4	13	78.02	0	0	0	0	0	0	0	0	0	0	0	0

	X23	X24	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38 \
0	0	0	0	0	0	0	0	1	0	0	0	1	0	1	0
1	0	0	0	1	0	0	0	1	0	0	0	1	0	1	0
2	0	0	0	1	1	1	0	1	0	0	0	1	0	1	0

```
3    0    0    0    1    1    1    0    1    0    0    0    1    0    1    0
4    0    0    0    1    1    1    0    1    0    0    0    1    0    1    0

     X39  X40  X41  X42  X43  X44  X45  X46  X47  X48  X49  X50  X51  X52  X53  \
0    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0
1    0    0    0    0    0    0    0    0    0    0    0    0    1    0    0
2    0    0    0    0    1    0    0    1    0    0    0    0    1    0    0
3    0    0    0    0    1    0    0    1    0    0    0    0    0    0    0
4    0    0    0    0    1    0    0    1    0    0    0    0    1    0    0

     X54  X55  X56  X57  X58  X59  X60  X61  X62  X63  X64  X65  X66  X67  X68  \
0    0    0    0    0    1    0    0    0    0    0    0    0    0    0    1
1    0    0    0    0    0    0    0    1    0    0    0    0    0    0    0
2    1    0    0    0    1    0    0    1    0    0    0    0    0    0    1
3    1    0    0    0    0    0    0    1    0    0    0    0    0    0    0
4    1    0    0    0    0    0    0    1    0    0    0    0    0    0    0

     X69  X70  X71  X73  X74  X75  X76  X77  X78  X79  X80  X81  X82  X83  X84  \
0    0    1    0    0    1    0    0    0    0    0    0    0    0    0    0
1    0    1    0    0    1    0    0    0    0    0    1    0    0    0    0
2    0    1    1    0    1    1    1    0    0    0    1    0    0    0    1
3    0    1    1    0    1    0    1    0    0    0    1    0    0    0    1
4    0    1    0    0    1    0    1    0    0    0    1    0    0    0    0

     X85  X86  X87  X88  X89  X90  X91  X92  X94  X95  X96  X97  X98  X99  X100  \
0    1    0    0    0    0    0    0    0    0    0    0    0    0    0    0
1    1    0    0    0    0    0    0    0    0    0    1    0    1    0    1
2    1    0    0    0    0    0    0    0    0    0    1    0    1    0    0
3    0    0    0    0    0    0    0    0    0    0    1    0    1    0    0
4    0    0    0    0    0    0    0    0    0    0    1    0    1    0    0

     X101  X102  X103  X104  X105  X106  X108  X109  X110  X111  X112  X113  \
0    0     0     0     0     0     0     0     0     0     1     0     0
1    1     0     0     0     0     0     0     0     0     1     0     0
2    1     0     0     0     0     0     0     0     0     1     0     0
3    1     0     0     0     0     0     1     0     0     1     0     0
4    1     0     0     0     0     0     1     0     0     1     0     0

     X114  X115  X116  X117  X118  X119  X120  X122  X123  X124  X125  X126  \
0    1     0     1     0     1     1     1     0     0     0     0     0
1    0     0     0     0     1     1     1     0     0     0     0     0
2    0     0     0     0     0     0     1     0     0     0     0     0
3    1     0     0     0     0     0     1     0     0     0     0     0
4    1     0     0     0     0     0     1     0     0     0     0     0

     X127  X128  X129  X130  X131  X132  X133  X134  X135  X136  X137  X138  \
0    0     1     0     0     1     0     0     0     0     1     1     0
```

```
1     1     1     0     0     0     1     0     0     0     1     0     0
2     0     1     0     0     0     1     0     0     0     0     1     0
3     0     1     0     0     0     1     0     0     0     0     0     0
4     0     1     0     0     0     1     0     0     0     0     0     0

   X139  X140  X141  X142  X143  X144  X145  X146  X147  X148  X150  X151  \
0     0     0     0     1     0     1     0     0     0     0     1     0
1     0     0     0     1     0     1     0     0     0     0     1     0
2     0     0     0     0     0     1     0     0     0     1     1     0
3     0     0     0     1     0     1     0     0     0     1     1     0
4     0     0     0     0     0     1     0     0     0     1     1     0

   X152  X153  X154  X155  X156  X157  X158  X159  X160  X161  X162  X163  \
0     0     0     0     0     1     0     0     0     0     0     0     0
1     0     0     0     0     1     0     0     0     0     0     0     0
2     0     0     0     0     0     1     1     0     0     0     1     1
3     0     0     0     0     0     1     0     0     0     0     1     0
4     0     0     0     0     0     1     1     0     0     0     1     0

   X164  X165  X166  X167  X168  X169  X170  X171  X172  X173  X174  X175  \
0     0     0     0     0     0     0     1     0     0     0     0     0
1     0     1     0     0     0     0     0     0     0     0     0     0
2     0     0     0     0     0     1     0     0     0     0     0     0
3     0     0     1     0     0     0     0     0     0     0     1     0
4     0     0     1     0     0     0     0     0     0     0     0     0

   X176  X177  X178  X179  X180  X181  X182  X183  X184  X185  X186  X187  \
0     0     0     0     1     0     0     0     0     1     0     0     1
1     0     0     1     0     0     0     0     0     0     0     0     1
2     0     0     0     1     0     0     0     0     0     0     0     0
3     0     0     0     1     0     0     0     0     0     0     0     0
4     0     0     0     1     0     0     0     0     0     0     0     0

   X189  X190  X191  X192  X194  X195  X196  X197  X198  X199  X200  X201  \
0     1     0     0     0     1     0     0     0     0     0     0     0
1     1     0     0     0     1     0     0     0     0     0     0     0
2     0     0     0     0     1     0     0     0     0     0     0     0
3     0     0     0     0     1     0     0     0     0     0     0     0
4     0     0     0     0     1     0     0     0     0     0     0     0

   X202  X203  X204  X205  X206  X207  X208  X209  X210  X211  X212  X213  \
0     0     0     1     0     0     0     0     1     0     0     0     0
1     0     0     0     1     0     0     0     1     0     0     0     0
2     0     0     0     1     1     0     0     1     0     0     0     0
3     0     0     0     1     0     0     0     1     0     0     0     0
4     0     0     0     1     0     0     0     1     0     0     0     0
```

	X214	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	X225	\
0	0	0	0	0	0	0	1	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	0	0	1	1	1	0	0	1	1	0	
3	0	0	0	0	1	0	1	0	0	1	0	0	
4	0	0	0	0	1	0	1	0	0	1	0	0	

	X226	X227	X228	X229	X230	X231	X232	X234	X236	X237	X238	X239	\
0	0	0	0	0	0	0	0	1	0	1	0	0	
1	0	0	0	1	0	0	0	0	0	0	1	0	
2	0	0	1	0	0	0	1	0	0	0	0	0	
3	0	0	0	1	0	0	1	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	0	0	0	

	X240	X241	X242	X243	X244	X245	X246	X247	X248	X249	X250	X251	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	1	0	
2	0	1	0	0	1	0	1	0	0	0	1	0	
3	0	1	0	0	1	0	1	0	0	0	1	0	
4	0	0	0	0	0	0	1	0	0	0	1	0	

	X252	X253	X254	X255	X256	X257	X258	X259	X260	X261	X262	X263	\
0	0	0	0	0	0	0	0	0	0	0	1	1	
1	0	0	0	0	0	0	0	0	0	0	0	1	
2	1	0	0	0	1	0	0	0	0	0	0	0	
3	1	0	0	0	1	0	0	0	0	0	0	0	
4	1	0	0	0	1	0	0	0	0	0	0	0	

	X264	X265	X266	X267	X269	X270	X271	X272	X273	X274	X275	X276	\
0	0	0	1	0	0	0	0	0	1	0	1	0	
1	0	1	0	0	0	0	0	0	1	0	1	0	
2	0	0	0	0	0	0	0	1	1	1	0	1	
3	0	0	0	0	0	0	0	1	1	0	0	1	
4	0	0	0	0	0	0	0	1	1	0	0	1	

	X277	X278	X279	X280	X281	X282	X283	X284	X285	X286	X287	X288	\
0	0	0	0	0	0	0	0	0	1	0	0	0	
1	0	0	0	0	0	0	0	0	1	0	0	0	
2	0	0	1	0	0	0	0	0	0	1	0	0	
3	0	0	1	0	0	0	0	0	0	1	0	0	
4	0	0	1	0	0	0	0	0	0	1	0	0	

	X291	X292	X294	X295	X296	X298	X299	X300	X301	X302	X304	X305	\
0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	1	0	
2	0	0	0	0	0	0	0	0	0	0	1	0	
3	1	0	0	0	0	0	0	0	0	0	1	0	

```
4      0      0      0      0      0      0      0      0      0      0      1      0

    X306  X307  X308  X309  X310  X311  X312  X313  X314  X315  X316  X317  \
0      1     0     0     0     0     0     0     0     0     0     1     0
1      0     0     0     0     0     1     0     0     0     0     1     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     0     0     0     0     0     0     0     0     0
4      0     0     0     0     0     0     0     0     0     0     0     0

    X318  X319  X320  X321  X322  X323  X324  X325  X326  X327  X328  X329  \
0      0     0     0     0     0     0     1     0     0     1     0     1
1      0     0     0     0     0     0     0     0     0     0     0     1
2      0     0     0     0     0     0     1     0     0     0     1     0
3      0     0     0     0     0     0     0     0     0     0     1     0
4      0     0     0     0     0     0     0     0     0     0     1     0

    X331  X332  X333  X334  X335  X336  X337  X338  X339  X340  X341  X342  \
0      0     0     0     1     0     0     0     0     0     0     0     0
1      0     0     0     0     0     1     1     0     0     0     0     0
2      0     0     0     1     0     0     0     0     0     0     0     0
3      0     0     0     0     0     0     0     0     0     0     0     0
4      0     0     0     1     0     0     0     0     0     0     0     0

    X343  X344  X345  X346  X348  X349  X350  X351  X352  X353  X354  X355  \
0      0     0     0     0     0     0     0     0     0     0     1     0
1      0     0     0     0     1     0     0     0     0     0     0     0
2      0     0     0     0     1     0     1     0     0     0     1     0
3      0     0     0     0     1     0     1     0     0     0     0     0
4      0     0     0     0     1     0     1     0     0     0     0     0

    X356  X357  X358  X359  X360  X361  X362  X363  X364  X365  X366  X367  \
0      0     0     0     0     0     1     0     0     0     0     0     0
1      0     0     0     0     0     1     0     1     0     0     0     0
2      0     0     1     0     0     1     0     1     0     0     0     0
3      0     0     1     0     0     1     0     1     0     0     0     0
4      0     0     1     0     0     1     0     1     0     0     0     0

    X368  X369  X370  X371  X372  X373  X374  X375  X376  X377  X378  X379  \
0      0     0     0     0     0     0     0     0     0     1     0     0
1      0     0     0     0     0     0     0     1     0     0     0     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     0     1     0     0     0     0     0     0     0
4      0     0     0     1     0     0     0     0     0     0     0     0

    X380  X382  X383  X384  X385  x0_a  x0_aa  x0_ab  x0_ac  x0_ad  x0_af  \
0      0     0     0     0     0    0.0    0.0    0.0    0.0    0.0    0.0
1      0     0     0     0     0    0.0    0.0    0.0    0.0    0.0    0.0
```

```
2      0      1       0       0      0    0.0      0.0      0.0     0.0      0.0      0.0
3      0      0       0       0      0    0.0      0.0      0.0     0.0      0.0      0.0
4      0      0       0       0      0    0.0      0.0      0.0     0.0      0.0      0.0

   x0_ai  x0_aj  x0_ak  x0_al  x0_am  x0_ao  x0_ap  x0_aq  x0_as  x0_at  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

   x0_au  x0_aw  x0_ax  x0_ay  x0_az  x0_b  x0_ba  x0_bc  x0_c  x0_d  x0_e  \
0    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0

   x0_f  x0_g  x0_h  x0_i  x0_j  x0_k  x0_l  x0_m  x0_n  x0_o  x0_q  x0_r  \
0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

   x0_s  x0_t  x0_u  x0_v  x0_w  x0_x  x0_y  x0_z  x1_a  x1_aa  x1_ab  x1_b  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0

   x1_c  x1_d  x1_e  x1_f  x1_g  x1_h  x1_i  x1_j  x1_k  x1_l  x1_m  x1_n  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

   x1_o  x1_p  x1_q  x1_r  x1_s  x1_t  x1_u  x1_v  x1_w  x1_y  x1_z  x2_a  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0

   x2_aa  x2_ac  x2_ae  x2_af  x2_ag  x2_ah  x2_ai  x2_ak  x2_al  x2_am  \
```

0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x2_an	x2_ao	x2_ap	x2_aq	x2_ar	x2_as	x2_at	x2_au	x2_av	x2_aw	\
0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x2_ay	x2_b	x2_c	x2_d	x2_e	x2_f	x2_g	x2_h	x2_i	x2_j	x2_k	x2_l	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x2_m	x2_n	x2_o	x2_p	x2_q	x2_r	x2_s	x2_t	x2_x	x2_y	x2_z	x3_a	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x3_b	x3_c	x3_d	x3_e	x3_f	x3_g	x4_a	x4_b	x4_c	x4_d	x5_aa	x5_ab	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
1	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
2	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	

	x5_ac	x5_ad	x5_ae	x5_af	x5_ag	x5_ah	x5_c	x5_d	x5_f	x5_g	x5_h	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	

	x5_i	x5_j	x5_k	x5_l	x5_m	x5_n	x5_o	x5_p	x5_q	x5_r	x5_s	x5_u	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

```
      x5_v  x5_w  x5_x  x5_y  x6_a  x6_b  x6_c  x6_d  x6_e  x6_f  x6_g  x6_h  \
   0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   1   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   2   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   3   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0

      x6_i  x6_j  x6_k  x6_l  x7_a  x7_b  x7_c  x7_d  x7_e  x7_f  x7_g  x7_h  \
   0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   1   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   2   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   3   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
   4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

      x7_i  x7_j  x7_k  x7_l  x7_m  x7_n  x7_o  x7_p  x7_q  x7_r  x7_s  x7_t  \
   0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0
   1   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0
   2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
   4   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0

      x7_u  x7_v  x7_w  x7_x  x7_y
   0   0.0   0.0   0.0   0.0   0.0
   1   0.0   0.0   0.0   0.0   0.0
   2   0.0   0.0   0.0   1.0   0.0
   3   0.0   0.0   0.0   0.0   0.0
   4   0.0   0.0   0.0   0.0   0.0
```

[42]: `df_train_final.shape`

[42]: (4209, 553)

[43]:
```python
# for test data
test_df_cat_dum=ohe.fit_transform(test_df_cat).toarray()
test_col_names=ohe.get_feature_names()
test_col_names=np.array(test_col_names).ravel()
test_df_cat_oh=pd.DataFrame(test_df_cat_dum,columns=test_col_names)
```

[44]: `test_df_cat_oh.head()`

[44]:
```
      x0_a  x0_ad  x0_ae  x0_af  x0_ag  x0_ai  x0_aj  x0_ak  x0_al  x0_am  x0_an  \
   0   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
   1   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
   2   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
   3   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
   4   0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
```

```
     x0_ao  x0_ap  x0_aq  x0_as  x0_at  x0_au  x0_av  x0_aw  x0_ax  x0_ay  \
0     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

     x0_az  x0_b  x0_ba  x0_bb  x0_bc  x0_c  x0_d  x0_e  x0_f  x0_g  x0_h  x0_i  \
0     1.0   0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2     1.0   0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     1.0   0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0   0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x0_j  x0_k  x0_l  x0_m  x0_n  x0_o  x0_p  x0_r  x0_s  x0_t  x0_u  x0_v  \
0     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0
2     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x0_w  x0_x  x0_y  x0_z  x1_a  x1_aa  x1_ab  x1_b  x1_c  x1_d  x1_e  x1_f  \
0     0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0    0.0    0.0   1.0   0.0   0.0   0.0   0.0
2     0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
3     0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
4     1.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0

     x1_g  x1_h  x1_i  x1_j  x1_k  x1_l  x1_m  x1_n  x1_o  x1_p  x1_q  x1_r  \
0     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x1_s  x1_t  x1_u  x1_v  x1_w  x1_y  x1_z  x2_a  x2_ab  x2_ac  x2_ad  x2_ae  \
0     0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0
2     0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0
3     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0
4     1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0    0.0    0.0

     x2_af  x2_ag  x2_ah  x2_ai  x2_aj  x2_ak  x2_al  x2_am  x2_an  x2_ao  \
0     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1     0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0
2     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
```

```
3    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
4    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

    x2_ap  x2_aq  x2_as  x2_at  x2_au  x2_av  x2_aw  x2_ax  x2_ay  x2_b  x2_d  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0
2    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0
4    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0

    x2_e  x2_f  x2_g  x2_h  x2_i  x2_j  x2_k  x2_m  x2_n  x2_p  x2_q  x2_r  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x2_s  x2_t  x2_u  x2_w  x2_x  x2_y  x2_z  x3_a  x3_b  x3_c  x3_d  x3_e  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0

    x3_f  x3_g  x4_a  x4_b  x4_c  x4_d  x5_a  x5_aa  x5_ab  x5_ac  x5_ad  \
0   1.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0    0.0    0.0    0.0
1   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0    0.0    0.0    0.0
2   1.0   0.0   0.0   0.0   0.0   1.0   1.0   0.0    0.0    0.0    0.0
3   1.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0    0.0    0.0    0.0
4   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0    0.0    0.0    0.0

    x5_ae  x5_af  x5_ag  x5_ah  x5_b  x5_c  x5_d  x5_f  x5_g  x5_h  x5_i  x5_j  \
0   0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0    0.0    0.0    0.0    1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x5_k  x5_l  x5_m  x5_n  x5_o  x5_p  x5_q  x5_r  x5_s  x5_t  x5_v  x5_w  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x5_x  x5_y  x5_z  x6_a  x6_b  x6_c  x6_d  x6_e  x6_f  x6_g  x6_h  x6_i  \
0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
```

1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0

	x6_j	x6_k	x6_l	x7_a	x7_b	x7_c	x7_d	x7_e	x7_f	x7_g	x7_h	x7_i	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x7_j	x7_k	x7_l	x7_m	x7_n	x7_o	x7_p	x7_q	x7_r	x7_s	x7_t	x7_u	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x7_v	x7_w	x7_x	x7_y
0	0.0	1.0	0.0	0.0
1	0.0	0.0	0.0	1.0
2	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0

[45]:
```python
# concatenate both categorical and numerical features of test data
df_test_final=pd.concat([test_df_num_variance_with_zero_drop,
                         test_df_cat_oh],axis=1)
```

[46]:
```python
df_test_final.head()
```

[46]:

	ID	X10	X12	X13	X14	X15	X16	X17	X18	X19	X20	X21	X22	X23	X24	\
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0
3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38	X39	X40	\
0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	0
1	0	1	0	0	0	1	0	0	0	1	0	1	0	0	0
2	0	1	0	1	0	1	0	0	0	1	0	1	0	0	0
3	0	1	1	1	0	1	0	0	0	1	0	1	0	0	0
4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

	X41	X42	X43	X44	X45	X46	X47	X48	X49	X50	X51	X52	X53	X54	X55	\

0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0
1	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0
2	0	0	0	0	0	0	0	0	0	1	0	0	1	0
3	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0
4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0

	X56	X57	X58	X59	X60	X61	X62	X63	X64	X65	X66	X67	X68	X69	X70	\
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
2	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
4	0	0	1	0	0	1	0	0	1	0	0	0	0	0	1

	X71	X73	X74	X75	X76	X77	X78	X79	X80	X81	X82	X83	X84	X85	X86	\
0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
2	0	0	1	0	1	0	0	0	1	0	0	0	0	1	0
3	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0
4	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0

	X87	X88	X89	X90	X91	X92	X94	X95	X96	X97	X98	X99	X100	X101	\
0	0	0	0	0	0	0	0	0	1	0	1	0	0	1
1	0	0	0	0	0	0	0	0	0	0	1	0	0	1
2	0	0	0	0	0	0	0	0	1	0	1	0	1	1
3	0	0	0	0	0	0	0	0	1	0	1	0	0	1
4	0	0	0	0	0	0	0	0	1	0	1	0	1	1

	X102	X103	X104	X105	X106	X108	X109	X110	X111	X112	X113	X114	\
0	0	0	0	0	0	0	0	0	1	0	0	1
1	0	1	0	0	0	0	0	0	1	0	0	0
2	0	1	0	0	0	0	0	0	1	0	0	0
3	0	0	0	0	0	0	0	0	1	0	0	1
4	0	1	0	0	1	0	0	0	1	0	0	0

	X115	X116	X117	X118	X119	X120	X122	X123	X124	X125	X126	X127	\
0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	0	1	1	1	0	0	0	0	0	1
2	0	0	0	0	0	1	0	0	0	0	0	0
3	0	0	0	0	0	1	0	0	0	0	0	0
4	0	0	0	1	1	1	0	0	0	0	0	0

	X128	X129	X130	X131	X132	X133	X134	X135	X136	X137	X138	X139	\
0	1	0	0	0	1	0	0	0	0	0	0	0
1	1	1	0	0	0	1	0	0	1	1	1	0
2	1	0	0	0	1	0	0	0	0	1	0	0
3	1	0	0	0	1	0	0	0	0	0	0	0
4	1	0	0	0	1	0	0	0	1	1	0	0

	X140	X141	X142	X143	X144	X145	X146	X147	X148	X150	X151	X152	\
0	0	0	0	0	1	0	0	0	1	1	0	0	
1	1	0	1	0	0	0	1	0	0	0	0	0	
2	0	0	1	0	1	0	0	0	0	1	0	0	
3	0	0	0	0	1	0	0	0	1	1	0	0	
4	0	0	1	0	1	0	0	0	0	1	1	0	

	X153	X154	X155	X156	X157	X158	X159	X160	X161	X162	X163	X164	\
0	0	0	0	0	1	1	0	0	0	1	0	0	
1	0	0	0	1	0	0	0	0	1	0	1	1	
2	0	0	0	0	1	0	1	0	0	1	0	0	
3	0	0	0	0	1	1	0	0	0	1	0	0	
4	0	0	0	1	0	0	0	0	0	0	1	0	

	X165	X166	X167	X168	X169	X170	X171	X172	X173	X174	X175	X176	\
0	0	1	0	0	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	1	0	0	0	0	0	
2	0	1	0	0	0	0	0	0	0	0	0	0	
3	0	1	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	1	0	0	0	0	0	

	X177	X178	X179	X180	X181	X182	X183	X184	X185	X186	X187	X189	\
0	0	0	1	0	0	0	0	0	1	0	0	0	
1	0	0	0	0	0	0	0	0	0	1	0	1	
2	0	0	0	0	0	0	0	0	1	0	0	0	
3	0	0	1	0	0	0	0	0	1	0	0	0	
4	0	0	0	0	0	0	0	0	0	0	1	1	

	X190	X191	X192	X194	X195	X196	X197	X198	X199	X200	X201	X202	\
0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	1	
2	0	1	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	1	0	1	0	0	0	0	0	0	0	0	

	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	X213	X214	\
0	0	1	0	0	0	0	1	0	0	0	0	0	
1	0	1	0	0	0	1	0	0	0	0	0	0	
2	0	1	0	0	0	0	1	0	0	0	0	0	
3	0	0	1	0	0	0	1	0	0	0	0	0	
4	0	0	1	0	0	0	1	0	0	0	0	0	

	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	X225	X226	\
0	0	0	0	1	0	1	0	0	1	0	0	0	
1	1	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	0	0	1	1	0	0	

```
3        0        0        0        1        0        1        0        0        1        0        0        0
4        0        0        0        0        0        1        0        0        1        1        0        0

    X227  X228  X229  X230  X231  X232  X234  X236  X237  X238  X239  X240  \
0      0     0     0     0     0     1     0     0     0     0     0     0
1      0     0     1     0     0     0     1     0     0     1     0     0
2      0     0     0     0     0     1     0     0     0     0     0     0
3      0     0     1     0     0     1     0     0     0     0     0     0
4      0     0     1     0     0     0     0     0     0     1     0     0

    X241  X242  X243  X244  X245  X246  X247  X248  X249  X250  X251  X252  \
0      0     0     0     0     0     1     0     0     0     1     0     0
1      0     0     0     0     0     0     1     0     0     1     0     0
2      0     0     0     0     0     0     0     0     0     0     1     0
3      0     0     0     0     0     1     0     0     0     1     0     1
4      0     0     0     0     0     1     0     0     0     0     1     0

    X253  X254  X255  X256  X257  X258  X259  X260  X261  X262  X263  X264  \
0      0     0     0     1     0     0     0     0     0     0     0     0
1      0     0     0     0     0     0     0     0     0     0     1     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     1     0     0     0     0     0     0     0     0
4      0     0     0     0     0     0     0     0     1     0     1     0

    X265  X266  X267  X269  X270  X271  X272  X273  X274  X275  X276  X277  \
0      0     0     0     0     0     0     1     1     0     0     1     0
1      1     0     0     0     0     0     0     1     0     1     0     0
2      0     0     0     0     0     0     0     0     1     0     1     0
3      0     0     0     0     0     0     1     1     0     0     1     0
4      1     0     0     0     0     0     0     1     0     1     0     0

    X278  X279  X280  X281  X282  X283  X284  X285  X286  X287  X288  X291  \
0      0     1     0     0     0     0     0     0     1     0     0     0
1      0     0     0     0     0     0     0     0     0     0     0     0
2      0     1     0     0     0     0     0     1     0     0     0     0
3      0     1     0     0     0     0     0     0     1     0     0     0
4      0     0     0     0     0     0     0     1     0     0     0     0

    X292  X294  X295  X296  X298  X299  X300  X301  X302  X304  X305  X306  \
0      0     0     0     0     0     0     0     0     0     1     0     0
1      0     1     0     0     0     0     0     0     0     1     0     0
2      0     0     0     0     0     0     0     0     0     1     0     0
3      1     0     0     0     0     0     0     0     0     1     0     0
4      0     0     0     0     0     0     1     0     0     1     0     0

    X307  X308  X309  X310  X311  X312  X313  X314  X315  X316  X317  X318  \
0      0     0     0     0     0     0     0     0     0     0     0     0
```

1	0	0	0	0	1	0	0	0	0	1	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	0	0	1	0	0	0	0

	X319	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	X331	\
0	0	0	0	0	0	0	0	0	0	1	0	0
1	0	0	0	0	0	1	0	0	1	0	0	0
2	0	0	0	0	0	1	0	0	0	1	1	0
3	0	0	0	0	0	0	0	0	0	1	0	0
4	0	0	0	0	0	1	0	0	0	0	1	0

	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	X342	X343	\
0	0	0	1	0	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0	0	0	0	1
3	0	0	1	0	0	0	0	0	0	0	0	0
4	0	0	0	0	1	1	0	0	0	0	0	0

	X344	X345	X346	X348	X349	X350	X351	X352	X353	X354	X355	X356	\
0	0	0	0	1	0	1	0	0	0	0	0	0
1	0	0	0	1	0	0	0	0	0	0	0	1
2	0	0	0	1	0	1	0	0	0	0	0	0
3	0	0	0	1	0	1	0	0	0	0	0	0
4	0	0	0	1	0	1	1	0	0	0	0	0

	X357	X358	X359	X360	X361	X362	X363	X364	X365	X366	X367	X368	\
0	0	1	0	0	1	0	1	0	0	0	0	0
1	0	0	0	0	1	1	0	0	0	0	0	1
2	0	0	0	0	1	0	1	0	0	0	0	0
3	0	1	0	0	1	0	1	0	0	0	0	0
4	0	1	0	0	1	0	1	0	0	0	0	0

	X369	X370	X371	X372	X373	X374	X375	X376	X377	X378	X379	X380	\
0	0	0	0	0	0	0	0	0	0	1	0	0
1	0	0	0	0	0	0	0	0	1	0	0	0
2	0	0	0	0	0	0	0	0	0	1	0	0
3	0	0	0	0	0	0	0	0	0	1	0	0
4	0	0	0	0	0	0	1	0	0	0	0	0

	X382	X383	X384	X385	x0_a	x0_ad	x0_ae	x0_af	x0_ag	x0_ai	x0_aj	\
0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
    x0_ak  x0_al  x0_am  x0_an  x0_ao  x0_ap  x0_aq  x0_as  x0_at  x0_au  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

    x0_av  x0_aw  x0_ax  x0_ay  x0_az  x0_b  x0_ba  x0_bb  x0_bc  x0_c  x0_d  \
0    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0    0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0    0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0    0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0    0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0    0.0   0.0   0.0

    x0_e  x0_f  x0_g  x0_h  x0_i  x0_j  x0_k  x0_l  x0_m  x0_n  x0_o  x0_p  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x0_r  x0_s  x0_t  x0_u  x0_v  x0_w  x0_x  x0_y  x0_z  x1_a  x1_aa  x1_ab  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0
1    0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0
4    0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0    0.0    0.0

    x1_b  x1_c  x1_d  x1_e  x1_f  x1_g  x1_h  x1_i  x1_j  x1_k  x1_l  x1_m  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0
4    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x1_n  x1_o  x1_p  x1_q  x1_r  x1_s  x1_t  x1_u  x1_v  x1_w  x1_y  x1_z  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4    0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0

    x2_a  x2_ab  x2_ac  x2_ad  x2_ae  x2_af  x2_ag  x2_ah  x2_ai  x2_aj  x2_ak  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
```

```
4    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

     x2_al  x2_am  x2_an  x2_ao  x2_ap  x2_aq  x2_as  x2_at  x2_au  x2_av  \
0     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2     0.0    0.0    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0
3     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4     0.0    0.0    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0

     x2_aw  x2_ax  x2_ay  x2_b  x2_d  x2_e  x2_f  x2_g  x2_h  x2_i  x2_j  x2_k  \
0     0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2     0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x2_m  x2_n  x2_p  x2_q  x2_r  x2_s  x2_t  x2_u  x2_w  x2_x  x2_y  x2_z  \
0     0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x3_a  x3_b  x3_c  x3_d  x3_e  x3_f  x3_g  x4_a  x4_b  x4_c  x4_d  x5_a  \
0     0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0   0.0
1     1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0
2     0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0   1.0
3     0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0   0.0
4     0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0

     x5_aa  x5_ab  x5_ac  x5_ad  x5_ae  x5_af  x5_ag  x5_ah  x5_b  x5_c  x5_d  \
0     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0
1     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   1.0   0.0   0.0
2     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0
3     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0
4     0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0

     x5_f  x5_g  x5_h  x5_i  x5_j  x5_k  x5_l  x5_m  x5_n  x5_o  x5_p  x5_q  \
0     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x5_r  x5_s  x5_t  x5_v  x5_w  x5_x  x5_y  x5_z  x6_a  x6_b  x6_c  x6_d  \
0     0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0
1     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
```

2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0

	x6_e	x6_f	x6_g	x6_h	x6_i	x6_j	x6_k	x6_l	x7_a	x7_b	x7_c	x7_d	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x7_e	x7_f	x7_g	x7_h	x7_i	x7_j	x7_k	x7_l	x7_m	x7_n	x7_o	x7_p	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	

	x7_q	x7_r	x7_s	x7_t	x7_u	x7_v	x7_w	x7_x	x7_y
0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

```
[47]: df_test_final.shape
```

```
[47]: (4209, 558)
```

```
[48]: # Reset the test data features to align with train features
      test_df_newdata=df_test_final.reindex(labels=df_train_final.columns,axis=1)
      test_df_newdata.head()
```

```
[48]:    ID   y X10 X12 X13 X14 X15 X16 X17 X18 X19 X20 X21 X22 X23  \
     0   1 NaN   0   0   0   0   0   0   0   0   0   0   0   0   0
     1   2 NaN   0   0   0   0   0   0   0   0   1   0   0   0   0
     2   3 NaN   0   0   0   1   0   0   0   0   0   0   0   0   0
     3   4 NaN   0   0   0   0   0   0   0   0   0   0   0   0   0
     4   5 NaN   0   0   0   1   0   0   0   0   0   0   0   0   0

        X24 X26 X27 X28 X29 X30 X31 X32 X33 X34 X35 X36 X37 X38 X39  \
     0    0   0   1   1   1   0   1   0   0   0   1   0   1   0   0
     1    0   0   1   0   0   0   1   0   0   0   1   0   1   0   0
     2    0   0   1   0   1   0   1   0   0   0   1   0   1   0   0
     3    0   0   1   1   1   0   1   0   0   0   1   0   1   0   0
     4    0   0   1   0   0   0   0   0   0   0   0   0   0   0   0
```

	X40	X41	X42	X43	X44	X45	X46	X47	X48	X49	X50	X51	X52	X53	X54	\
0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	

	X55	X56	X57	X58	X59	X60	X61	X62	X63	X64	X65	X66	X67	X68	X69	\
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	

	X70	X71	X73	X74	X75	X76	X77	X78	X79	X80	X81	X82	X83	X84	X85	\
0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	
2	1	0	0	1	0	1	0	0	0	1	0	0	0	0	1	
3	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
4	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	

	X86	X87	X88	X89	X90	X91	X92	X94	X95	X96	X97	X98	X99	X100	\
0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	0	0	0	0	0	0	1	0	1	0	1	
3	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
4	0	0	0	0	0	0	0	0	0	1	0	1	0	1	

	X101	X102	X103	X104	X105	X106	X108	X109	X110	X111	X112	X113	\
0	1	0	0	0	0	0	0	0	0	1	0	0	
1	1	0	1	0	0	0	0	0	0	1	0	0	
2	1	0	1	0	0	0	0	0	0	1	0	0	
3	1	0	0	0	0	0	0	0	0	1	0	0	
4	1	0	1	0	0	1	0	0	0	1	0	0	

	X114	X115	X116	X117	X118	X119	X120	X122	X123	X124	X125	X126	\
0	1	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	1	0	1	1	1	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	0	0	0	
3	1	0	0	0	0	0	1	0	0	0	0	0	
4	0	0	0	0	1	1	1	0	0	0	0	0	

	X127	X128	X129	X130	X131	X132	X133	X134	X135	X136	X137	X138	\
0	0	1	0	0	0	1	0	0	0	0	0	0	
1	1	1	1	0	0	0	1	0	0	1	1	1	
2	0	1	0	0	0	1	0	0	0	0	1	0	
3	0	1	0	0	0	1	0	0	0	0	0	0	

```
4      0      1      0      0      0      1      0      0      0      1      1      0

     X139   X140   X141   X142   X143   X144   X145   X146   X147   X148   X150   X151   \
0      0      0      0      0      0      1      0      0      0      1      1      0
1      0      1      0      1      0      0      0      1      0      0      0      0
2      0      0      0      1      0      1      0      0      0      0      1      0
3      0      0      0      0      0      1      0      0      0      1      1      0
4      0      0      0      1      0      1      0      0      0      0      1      1

     X152   X153   X154   X155   X156   X157   X158   X159   X160   X161   X162   X163   \
0      0      0      0      0      0      1      1      0      0      0      1      0
1      0      0      0      0      1      0      0      0      0      1      0      1
2      0      0      0      0      0      1      0      1      0      0      1      0
3      0      0      0      0      0      1      1      0      0      0      1      0
4      0      0      0      0      1      0      0      0      0      0      0      1

     X164   X165   X166   X167   X168   X169   X170   X171   X172   X173   X174   X175   \
0      0      0      1      0      0      0      0      0      0      0      0      0
1      1      0      0      0      0      0      0      1      0      0      0      0
2      0      0      1      0      0      0      0      0      0      0      0      0
3      0      0      1      0      0      0      0      0      0      0      0      0
4      0      0      0      0      0      0      0      1      0      0      0      0

     X176   X177   X178   X179   X180   X181   X182   X183   X184   X185   X186   X187   \
0      0      0      0      1      0      0      0      0      0      1      0      0
1      0      0      0      0      0      0      0      0      0      0      1      0
2      0      0      0      0      0      0      0      0      0      1      0      0
3      0      0      0      1      0      0      0      0      0      1      0      0
4      0      0      0      0      0      0      0      0      0      0      0      1

     X189   X190   X191   X192   X194   X195   X196   X197   X198   X199   X200   X201   \
0      0      0      0      0      1      0      0      0      0      0      0      0
1      1      0      0      0      0      0      0      0      0      0      0      0
2      0      0      1      0      1      0      0      0      0      0      0      0
3      0      0      0      0      1      0      0      0      0      0      0      0
4      1      0      1      0      1      0      0      0      0      0      0      0

     X202   X203   X204   X205   X206   X207   X208   X209   X210   X211   X212   X213   \
0      0      0      1      0      0      0      0      1      0      0      0      0
1      1      0      1      0      0      0      1      0      0      0      0      0
2      0      0      1      0      0      0      0      1      0      0      0      0
3      0      0      0      1      0      0      0      1      0      0      0      0
4      0      0      0      1      0      0      0      1      0      0      0      0

     X214   X215   X216   X217   X218   X219   X220   X221   X222   X223   X224   X225   \
0      0      0      0      0      1      0      1      0      0      1      0      0
1      0      1      0      0      1      0      0      0      0      0      0      0
```

```
2       0       0       0       0       1       0       0       0       0       1       1       0
3       0       0       0       0       1       0       1       0       0       1       0       0
4       0       0       0       0       0       0       1       0       0       1       1       0

     X226   X227   X228   X229   X230   X231   X232   X234   X236   X237   X238   X239  \
0       0      0      0      0      0      0      1      0      0      0      0      0
1       0      0      0      1      0      0      0      1      0      0      1      0
2       0      0      0      0      0      0      1      0      0      0      0      0
3       0      0      0      1      0      0      1      0      0      0      0      0
4       0      0      0      1      0      0      0      0      0      0      1      0

     X240   X241   X242   X243   X244   X245   X246   X247   X248   X249   X250   X251  \
0       0      0      0      0      0      0      1      0      0      0      1      0
1       0      0      0      0      0      0      0      1      0      0      1      0
2       0      0      0      0      0      0      0      0      0      0      0      1
3       0      0      0      0      0      0      1      0      0      0      1      0
4       0      0      0      0      0      0      1      0      0      0      0      1

     X252   X253   X254   X255   X256   X257   X258   X259   X260   X261   X262   X263  \
0       0      0      0      0      1      0      0      0      0      0      0      0
1       0      0      0      0      0      0      0      0      0      0      0      1
2       0      0      0      0      0      0      0      0      0      0      0      0
3       1      0      0      0      1      0      0      0      0      0      0      0
4       0      0      0      0      0      0      0      0      0      1      0      1

     X264   X265   X266   X267   X269   X270   X271   X272   X273   X274   X275   X276  \
0       0      0      0      0      0      0      0      1      1      0      0      1
1       0      1      0      0      0      0      0      0      1      0      1      0
2       0      0      0      0      0      0      0      0      0      1      0      1
3       0      0      0      0      0      0      0      1      1      0      0      1
4       0      1      0      0      0      0      0      0      1      0      1      0

     X277   X278   X279   X280   X281   X282   X283   X284   X285   X286   X287   X288  \
0       0      0      1      0      0      0      0      0      0      1      0      0
1       0      0      0      0      0      0      0      0      0      0      0      0
2       0      0      1      0      0      0      0      0      1      0      0      0
3       0      0      1      0      0      0      0      0      0      1      0      0
4       0      0      0      0      0      0      0      0      1      0      0      0

     X291   X292   X294   X295   X296   X298   X299   X300   X301   X302   X304   X305  \
0       0      0      0      0      0      0      0      0      0      0      1      0
1       0      0      1      0      0      0      0      0      0      0      1      0
2       0      0      0      0      0      0      0      0      0      0      1      0
3       0      1      0      0      0      0      0      0      0      0      1      0
4       0      0      0      0      0      0      0      1      0      0      1      0

     X306   X307   X308   X309   X310   X311   X312   X313   X314   X315   X316   X317  \
```

```
0      0     0     0     0     0     0     0     0     0     0     0     0
1      0     0     0     0     0     1     0     0     0     0     1     0
2      0     0     0     0     0     0     0     0     0     0     0     0
3      0     0     0     0     0     0     0     0     0     0     0     0
4      0     0     0     0     0     1     0     0     1     0     0     0
```

	X318	X319	X320	X321	X322	X323	X324	X325	X326	X327	X328	X329	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	0	0	0	0	0	0	1	0	0	1	0	0	
2	0	0	0	0	0	0	1	0	0	0	1	1	
3	0	0	0	0	0	0	0	0	0	0	1	0	
4	0	0	0	0	0	0	1	0	0	0	0	1	

	X331	X332	X333	X334	X335	X336	X337	X338	X339	X340	X341	X342	\
0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	1	1	0	0	0	0	0	

	X343	X344	X345	X346	X348	X349	X350	X351	X352	X353	X354	X355	\
0	0	0	0	0	1	0	1	0	0	0	0	0	
1	0	0	0	0	1	0	0	0	0	0	0	0	
2	1	0	0	0	1	0	1	0	0	0	0	0	
3	0	0	0	0	1	0	1	0	0	0	0	0	
4	0	0	0	0	1	0	1	1	0	0	0	0	

	X356	X357	X358	X359	X360	X361	X362	X363	X364	X365	X366	X367	\
0	0	0	1	0	0	1	0	1	0	0	0	0	
1	1	0	0	0	0	1	1	0	0	0	0	0	
2	0	0	0	0	0	1	0	1	0	0	0	0	
3	0	0	1	0	0	1	0	1	0	0	0	0	
4	0	0	1	0	0	1	0	1	0	0	0	0	

	X368	X369	X370	X371	X372	X373	X374	X375	X376	X377	X378	X379	\
0	0	0	0	0	0	0	0	0	0	0	1	0	
1	1	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	0	0	0	0	0	0	0	1	0	
3	0	0	0	0	0	0	0	0	0	0	1	0	
4	0	0	0	0	0	0	0	1	0	0	0	0	

	X380	X382	X383	X384	X385	x0_a	x0_aa	x0_ab	x0_ac	x0_ad	x0_af	\
0	0	0	0	0	0	0.0	NaN	NaN	NaN	0.0	0.0	
1	0	0	0	0	0	0.0	NaN	NaN	NaN	0.0	0.0	
2	0	0	0	0	0	0.0	NaN	NaN	NaN	0.0	0.0	
3	0	0	0	0	0	0.0	NaN	NaN	NaN	0.0	0.0	
4	0	0	0	0	0	0.0	NaN	NaN	NaN	0.0	0.0	

```
    x0_ai  x0_aj  x0_ak  x0_al  x0_am  x0_ao  x0_ap  x0_aq  x0_as  x0_at  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

    x0_au  x0_aw  x0_ax  x0_ay  x0_az  x0_b  x0_ba  x0_bc  x0_c  x0_d  x0_e  \
0    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0

    x0_f  x0_g  x0_h  x0_i  x0_j  x0_k  x0_l  x0_m  x0_n  x0_o  x0_q  x0_r  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN   0.0
4    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN   0.0

    x0_s  x0_t  x0_u  x0_v  x0_w  x0_x  x0_y  x0_z  x1_a  x1_aa  x1_ab  x1_b  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
1    0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   1.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
4    0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0

    x1_c  x1_d  x1_e  x1_f  x1_g  x1_h  x1_i  x1_j  x1_k  x1_l  x1_m  x1_n  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0
4    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x1_o  x1_p  x1_q  x1_r  x1_s  x1_t  x1_u  x1_v  x1_w  x1_y  x1_z  x2_a  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4    0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

    x2_aa  x2_ac  x2_ae  x2_af  x2_ag  x2_ah  x2_ai  x2_ak  x2_al  x2_am  \
0    NaN    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    NaN    0.0    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0
2    NaN    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
```

```
3    NaN    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    NaN    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

   x2_an  x2_ao  x2_ap  x2_aq  x2_ar  x2_as  x2_at  x2_au  x2_av  x2_aw  \
0    0.0    0.0    0.0    0.0    NaN    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    NaN    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    NaN    1.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    NaN    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    NaN    1.0    0.0    0.0    0.0    0.0

   x2_ay  x2_b  x2_c  x2_d  x2_e  x2_f  x2_g  x2_h  x2_i  x2_j  x2_k  x2_l  \
0    0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
1    0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
2    0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
3    0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
4    0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN

   x2_m  x2_n  x2_o  x2_p  x2_q  x2_r  x2_s  x2_t  x2_x  x2_y  x2_z  x3_a  \
0   0.0   1.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0
2   0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   1.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   NaN   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

   x3_b  x3_c  x3_d  x3_e  x3_f  x3_g  x4_a  x4_b  x4_c  x4_d  x5_aa  x5_ab  \
0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0    0.0    0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0    0.0    0.0
2   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0    0.0    0.0
3   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   1.0    0.0    0.0
4   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0    0.0    0.0

   x5_ac  x5_ad  x5_ae  x5_af  x5_ag  x5_ah  x5_c  x5_d  x5_f  x5_g  x5_h  \
0    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    0.0    0.0   0.0   0.0   0.0   0.0   0.0

   x5_i  x5_j  x5_k  x5_l  x5_m  x5_n  x5_o  x5_p  x5_q  x5_r  x5_s  x5_u  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   NaN

   x5_v  x5_w  x5_x  x5_y  x6_a  x6_b  x6_c  x6_d  x6_e  x6_f  x6_g  x6_h  \
0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
```

```
1    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     1.0     0.0
2    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
3    0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
4    0.0     0.0     0.0     1.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

     x6_i  x6_j  x6_k  x6_l  x7_a  x7_b  x7_c  x7_d  x7_e  x7_f  x7_g  x7_h  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4    1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x7_i  x7_j  x7_k  x7_l  x7_m  x7_n  x7_o  x7_p  x7_q  x7_r  x7_s  x7_t  \
0    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2    0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0
4    0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

     x7_u  x7_v  x7_w  x7_x  x7_y
0    0.0   0.0   1.0   0.0   0.0
1    0.0   0.0   0.0   0.0   1.0
2    0.0   0.0   0.0   0.0   0.0
3    0.0   0.0   0.0   0.0   0.0
4    0.0   0.0   0.0   0.0   0.0
```

```python
[81]: # Fill NAN values with 0 to fit to PCA
      test_df_newdata["y"]=test_df_newdata["y"].fillna(0)
      test_df_newdata["x0_aa"]=test_df_newdata["x0_aa"].fillna(0)
      test_df_newdata["x0_ab"]=test_df_newdata["x0_ab"].fillna(0)
      test_df_newdata["x0_ac"]=test_df_newdata["x0_ac"].fillna(0)
      test_df_newdata["x0_q"]=test_df_newdata["x0_q"].fillna(0)
      test_df_newdata["x2_aa"]=test_df_newdata["x2_aa"].fillna(0)
      test_df_newdata["x2_ar"]=test_df_newdata["x2_ar"].fillna(0)
      test_df_newdata["x2_c"]=test_df_newdata["x2_c"].fillna(0)
      test_df_newdata["x2_l"]=test_df_newdata["x2_l"].fillna(0)
      test_df_newdata["x2_o"]=test_df_newdata["x2_o"].fillna(0)
      test_df_newdata["x5_u"]=test_df_newdata["x5_u"].fillna(0)
      test_df_newdata.head()
```

```
[81]:    ID    y  X10  X12  X13  X14  X15  X16  X17  X18  X19  X20  X21  X22  X23  \
      0   1  0.0    0    0    0    0    0    0    0    0    0    0    0    0    0
      1   2  0.0    0    0    0    0    0    0    0    0    1    0    0    0    0
      2   3  0.0    0    0    0    1    0    0    0    0    0    0    0    0    0
      3   4  0.0    0    0    0    0    0    0    0    0    0    0    0    0    0
      4   5  0.0    0    0    0    1    0    0    0    0    0    0    0    0    0
```

	X24	X26	X27	X28	X29	X30	X31	X32	X33	X34	X35	X36	X37	X38	X39	\
0	0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	
1	0	0	1	0	0	0	1	0	0	0	1	0	1	0	0	
2	0	0	1	0	1	0	1	0	0	0	1	0	1	0	0	
3	0	0	1	1	1	0	1	0	0	0	1	0	1	0	0	
4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	

	X40	X41	X42	X43	X44	X45	X46	X47	X48	X49	X50	X51	X52	X53	X54	\
0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
1	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	
2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
3	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	
4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	

	X55	X56	X57	X58	X59	X60	X61	X62	X63	X64	X65	X66	X67	X68	X69	\
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	
3	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	
4	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	

	X70	X71	X73	X74	X75	X76	X77	X78	X79	X80	X81	X82	X83	X84	X85	\
0	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
1	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	
2	1	0	0	1	0	1	0	0	0	1	0	0	0	0	1	
3	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0	
4	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	

	X86	X87	X88	X89	X90	X91	X92	X94	X95	X96	X97	X98	X99	X100	\
0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
2	0	0	0	0	0	0	0	0	0	1	0	1	0	1	
3	0	0	0	0	0	0	0	0	0	1	0	1	0	0	
4	0	0	0	0	0	0	0	0	0	1	0	1	0	1	

	X101	X102	X103	X104	X105	X106	X108	X109	X110	X111	X112	X113	\
0	1	0	0	0	0	0	0	0	0	1	0	0	
1	1	0	1	0	0	0	0	0	0	1	0	0	
2	1	0	1	0	0	0	0	0	0	1	0	0	
3	1	0	0	0	0	0	0	0	0	1	0	0	
4	1	0	1	0	0	1	0	0	0	1	0	0	

	X114	X115	X116	X117	X118	X119	X120	X122	X123	X124	X125	X126	\
0	1	0	0	0	0	0	0	0	0	0	0	0	
1	0	0	1	0	1	1	1	0	0	0	0	0	
2	0	0	0	0	0	0	1	0	0	0	0	0	
3	1	0	0	0	0	0	1	0	0	0	0	0	

4	0	0	0	0	1	1	1	0	0	0	0	0

	X127	X128	X129	X130	X131	X132	X133	X134	X135	X136	X137	X138	\
0	0	1	0	0	0	1	0	0	0	0	0	0	
1	1	1	1	0	0	0	1	0	0	1	1	1	
2	0	1	0	0	0	1	0	0	0	0	1	0	
3	0	1	0	0	0	1	0	0	0	0	0	0	
4	0	1	0	0	0	1	0	0	0	1	1	0	

	X139	X140	X141	X142	X143	X144	X145	X146	X147	X148	X150	X151	\
0	0	0	0	0	0	1	0	0	0	1	1	0	
1	0	1	0	1	0	0	0	1	0	0	0	0	
2	0	0	0	1	0	1	0	0	0	0	1	0	
3	0	0	0	0	0	1	0	0	0	1	1	0	
4	0	0	0	1	0	1	0	0	0	0	1	1	

	X152	X153	X154	X155	X156	X157	X158	X159	X160	X161	X162	X163	\
0	0	0	0	0	0	1	1	0	0	0	1	0	
1	0	0	0	0	1	0	0	0	0	1	0	1	
2	0	0	0	0	0	1	0	1	0	0	1	0	
3	0	0	0	0	0	1	1	0	0	0	1	0	
4	0	0	0	0	1	0	0	0	0	0	0	1	

	X164	X165	X166	X167	X168	X169	X170	X171	X172	X173	X174	X175	\
0	0	0	1	0	0	0	0	0	0	0	0	0	
1	1	0	0	0	0	0	0	1	0	0	0	0	
2	0	0	1	0	0	0	0	0	0	0	0	0	
3	0	0	1	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	0	0	0	1	0	0	0	0	

	X176	X177	X178	X179	X180	X181	X182	X183	X184	X185	X186	X187	\
0	0	0	0	1	0	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	1	0	
2	0	0	0	0	0	0	0	0	0	1	0	0	
3	0	0	0	1	0	0	0	0	0	1	0	0	
4	0	0	0	0	0	0	0	0	0	0	0	1	

	X189	X190	X191	X192	X194	X195	X196	X197	X198	X199	X200	X201	\
0	0	0	0	0	1	0	0	0	0	0	0	0	
1	1	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	1	0	1	0	0	0	0	0	0	0	
3	0	0	0	0	1	0	0	0	0	0	0	0	
4	1	0	1	0	1	0	0	0	0	0	0	0	

	X202	X203	X204	X205	X206	X207	X208	X209	X210	X211	X212	X213	\
0	0	0	1	0	0	0	0	1	0	0	0	0	
1	1	0	1	0	0	0	1	0	0	0	0	0	

	X209	X210	X211	X212	X213							
2	0	0	1	0	0	0	0	1	0	0	0	0
3	0	0	0	1	0	0	0	1	0	0	0	0
4	0	0	0	1	0	0	0	1	0	0	0	0

	X214	X215	X216	X217	X218	X219	X220	X221	X222	X223	X224	X225	\
0	0	0	0	0	1	0	1	0	0	1	0	0
1	0	1	0	0	1	0	0	0	0	0	0	0
2	0	0	0	0	1	0	0	0	0	1	1	0
3	0	0	0	0	1	0	1	0	0	1	0	0
4	0	0	0	0	0	0	1	0	0	1	1	0

	X226	X227	X228	X229	X230	X231	X232	X234	X236	X237	X238	X239	\
0	0	0	0	0	0	0	1	0	0	0	0	0
1	0	0	0	1	0	0	0	1	0	0	1	0
2	0	0	0	0	0	0	1	0	0	0	0	0
3	0	0	0	1	0	0	1	0	0	0	0	0
4	0	0	0	1	0	0	0	0	0	0	1	0

	X240	X241	X242	X243	X244	X245	X246	X247	X248	X249	X250	X251	\
0	0	0	0	0	0	0	1	0	0	0	1	0
1	0	0	0	0	0	0	0	1	0	0	1	0
2	0	0	0	0	0	0	0	0	0	0	0	1
3	0	0	0	0	0	0	1	0	0	0	1	0
4	0	0	0	0	0	0	1	0	0	0	0	1

	X252	X253	X254	X255	X256	X257	X258	X259	X260	X261	X262	X263	\
0	0	0	0	0	1	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	1	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	1	0	1

	X264	X265	X266	X267	X269	X270	X271	X272	X273	X274	X275	X276	\
0	0	0	0	0	0	0	0	1	1	0	0	1
1	0	1	0	0	0	0	0	0	1	0	1	0
2	0	0	0	0	0	0	0	0	0	1	0	1
3	0	0	0	0	0	0	0	1	1	0	0	1
4	0	1	0	0	0	0	0	0	1	0	1	0

	X277	X278	X279	X280	X281	X282	X283	X284	X285	X286	X287	X288	\
0	0	0	1	0	0	0	0	0	0	1	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	1	0	0	0	0	0	1	0	0	0
3	0	0	1	0	0	0	0	0	0	1	0	0
4	0	0	0	0	0	0	0	0	1	0	0	0

	X291	X292	X294	X295	X296	X298	X299	X300	X301	X302	X304	X305	\

```
0      0      0      0      0      0      0      0      0      0      0      1      0
1      0      0      1      0      0      0      0      0      0      0      1      0
2      0      0      0      0      0      0      0      0      0      0      1      0
3      0      1      0      0      0      0      0      0      0      0      1      0
4      0      0      0      0      0      0      0      1      0      0      1      0

    X306   X307   X308   X309   X310   X311   X312   X313   X314   X315   X316   X317   \
0      0      0      0      0      0      0      0      0      0      0      0      0
1      0      0      0      0      0      1      0      0      0      0      1      0
2      0      0      0      0      0      0      0      0      0      0      0      0
3      0      0      0      0      0      0      0      0      0      0      0      0
4      0      0      0      0      0      1      0      0      1      0      0      0

    X318   X319   X320   X321   X322   X323   X324   X325   X326   X327   X328   X329   \
0      0      0      0      0      0      0      0      0      0      0      1      0
1      0      0      0      0      0      0      1      0      0      1      0      0
2      0      0      0      0      0      0      1      0      0      0      1      1
3      0      0      0      0      0      0      0      0      0      0      1      0
4      0      0      0      0      0      0      1      0      0      0      0      1

    X331   X332   X333   X334   X335   X336   X337   X338   X339   X340   X341   X342   \
0      0      0      0      1      0      0      0      0      0      0      0      0
1      0      0      0      1      0      0      0      0      0      0      0      0
2      0      0      0      1      0      0      0      0      0      0      0      0
3      0      0      0      1      0      0      0      0      0      0      0      0
4      0      0      0      0      0      1      1      0      0      0      0      0

    X343   X344   X345   X346   X348   X349   X350   X351   X352   X353   X354   X355   \
0      0      0      0      0      1      0      1      0      0      0      0      0
1      0      0      0      0      1      0      0      0      0      0      0      0
2      1      0      0      0      1      0      1      0      0      0      0      0
3      0      0      0      0      1      0      1      0      0      0      0      0
4      0      0      0      0      1      0      1      1      0      0      0      0

    X356   X357   X358   X359   X360   X361   X362   X363   X364   X365   X366   X367   \
0      0      0      1      0      0      1      0      1      0      0      0      0
1      1      0      0      0      0      1      1      0      0      0      0      0
2      0      0      0      0      0      1      0      1      0      0      0      0
3      0      0      1      0      0      1      0      1      0      0      0      0
4      0      0      1      0      0      1      0      1      0      0      0      0

    X368   X369   X370   X371   X372   X373   X374   X375   X376   X377   X378   X379   \
0      0      0      0      0      0      0      0      0      0      0      1      0
1      1      0      0      0      0      0      0      0      0      1      0      0
2      0      0      0      0      0      0      0      0      0      0      1      0
3      0      0      0      0      0      0      0      0      0      0      1      0
4      0      0      0      0      0      0      0      1      0      0      0      0
```

```
    X380  X382  X383  X384  X385  x0_a  x0_aa  x0_ab  x0_ac  x0_ad  x0_af  \
0     0     0     0     0     0   0.0    0.0    0.0    0.0    0.0    0.0
1     0     0     0     0     0   0.0    0.0    0.0    0.0    0.0    0.0
2     0     0     0     0     0   0.0    0.0    0.0    0.0    0.0    0.0
3     0     0     0     0     0   0.0    0.0    0.0    0.0    0.0    0.0
4     0     0     0     0     0   0.0    0.0    0.0    0.0    0.0    0.0

   x0_ai  x0_aj  x0_ak  x0_al  x0_am  x0_ao  x0_ap  x0_aq  x0_as  x0_at  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

   x0_au  x0_aw  x0_ax  x0_ay  x0_az  x0_b  x0_ba  x0_bc  x0_c  x0_d  x0_e  \
0    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
1    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0
2    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
3    0.0    0.0    0.0    0.0    1.0   0.0    0.0    0.0   0.0   0.0   0.0
4    0.0    0.0    0.0    0.0    0.0   0.0    0.0    0.0   0.0   0.0   0.0

   x0_f  x0_g  x0_h  x0_i  x0_j  x0_k  x0_l  x0_m  x0_n  x0_o  x0_q  x0_r  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

   x0_s  x0_t  x0_u  x0_v  x0_w  x0_x  x0_y  x0_z  x1_a  x1_aa  x1_ab  x1_b  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
1   0.0   1.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   1.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0
4   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0    0.0    0.0   0.0

   x1_c  x1_d  x1_e  x1_f  x1_g  x1_h  x1_i  x1_j  x1_k  x1_l  x1_m  x1_n  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
3   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0
4   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

   x1_o  x1_p  x1_q  x1_r  x1_s  x1_t  x1_u  x1_v  x1_w  x1_y  x1_z  x2_a  \
0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
1   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
2   0.0   0.0   0.0   0.0   0.0   0.0   0.0   1.0   0.0   0.0   0.0   0.0
```

3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

	x2_aa	x2_ac	x2_ae	x2_af	x2_ag	x2_ah	x2_ai	x2_ak	x2_al	x2_am	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x2_an	x2_ao	x2_ap	x2_aq	x2_ar	x2_as	x2_at	x2_au	x2_av	x2_aw	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	

	x2_ay	x2_b	x2_c	x2_d	x2_e	x2_f	x2_g	x2_h	x2_i	x2_j	x2_k	x2_l	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x2_m	x2_n	x2_o	x2_p	x2_q	x2_r	x2_s	x2_t	x2_x	x2_y	x2_z	x3_a	\
0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x3_b	x3_c	x3_d	x3_e	x3_f	x3_g	x4_a	x4_b	x4_c	x4_d	x5_aa	x5_ab	\
0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	
4	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	

	x5_ac	x5_ad	x5_ae	x5_af	x5_ag	x5_ah	x5_c	x5_d	x5_f	x5_g	x5_h	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

	x5_i	x5_j	x5_k	x5_l	x5_m	x5_n	x5_o	x5_p	x5_q	x5_r	x5_s	x5_u	\
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

```
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

     x5_v   x5_w   x5_x   x5_y   x6_a   x6_b   x6_c   x6_d   x6_e   x6_f   x6_g   x6_h  \
0    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    1.0    0.0
2    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

     x6_i   x6_j   x6_k   x6_l   x7_a   x7_b   x7_c   x7_d   x7_e   x7_f   x7_g   x7_h  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
4    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

     x7_i   x7_j   x7_k   x7_l   x7_m   x7_n   x7_o   x7_p   x7_q   x7_r   x7_s   x7_t  \
0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
1    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
2    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    1.0    0.0    0.0    0.0    0.0    0.0    0.0    0.0

     x7_u   x7_v   x7_w   x7_x   x7_y
0    0.0    0.0    1.0    0.0    0.0
1    0.0    0.0    0.0    0.0    1.0
2    0.0    0.0    0.0    0.0    0.0
3    0.0    0.0    0.0    0.0    0.0
4    0.0    0.0    0.0    0.0    0.0
```

1.3 Perform Dimensionality Reduction

```python
[50]: from sklearn.decomposition import PCA
      pca=PCA(n_components=24)
```

```python
[51]: df_train.dtypes
```

```
[51]: ID        int64
      y       float64
      X0       object
      X1       object
      X2       object
              …
```

```
X380      int64
X382      int64
X383      int64
X384      int64
X385      int64
Length: 378, dtype: object
```

[52]: `x_pca=pca.fit_transform(df_train_final)`

[53]: `df_train_final.shape`

[53]: (4209, 553)

[54]:
```
df_pca=pd.DataFrame(x_pca)
df_pca.head()
```

[54]:
```
             0          1          2          3          4          5          6  \
0 -4205.969286  28.883380   1.339923   2.737665   1.017817   0.417351   0.920523
1 -4199.957075 -13.357607  -0.484331   0.681643   0.568851  -0.814644   0.193768
2 -4198.953607 -25.686252  -1.389840   2.532925  -0.519487   2.698533   2.277503
3 -4196.954789 -21.383230  -1.229972   1.834632   0.619776   3.170724   1.298491
4 -4192.954066 -23.986931  -1.328156   1.651864   0.618544   3.442714   1.182613

          7          8          9         10         11         12         13  \
0  0.413109  -0.071586  -0.932132   0.394477  -1.451094  -0.002802   1.332717
1  0.377600  -1.131315  -0.912925   0.516894   0.397195   0.670877  -1.108863
2  2.034704   0.984853   0.803844  -1.125539   0.365064  -0.299786   0.233311
3  2.752481   0.490026   0.017254  -1.211440   0.582314   0.394377   0.207296
4  2.774104   0.527274   0.164238  -1.904349   0.157995   0.461227   0.086684

         14         15         16         17         18         19         20  \
0  0.553152   0.064254  -0.492476   0.348060   0.738412  -0.455578  -0.410114
1 -0.573550   0.558790  -0.556385  -0.625973  -0.119900   0.050657   0.752998
2 -0.153104   0.157802   0.430234   0.829089   0.277166  -0.933557   0.512602
3  0.581331   0.702090   0.057590   0.364571  -0.252882  -0.833477   0.771206
4  0.152235   0.001229  -0.248642  -0.188589   0.117397  -0.256122   0.403540

         21         22         23
0  0.401214  -0.573865   1.070297
1 -0.469262  -0.656422   0.603741
2  0.941524   0.532176  -0.422120
3  0.643066  -0.736146  -0.267657
4  0.233337  -0.193519   0.443606
```

[55]: `df_pca.head()`

```
[55]:              0          1          2         3          4          5          6  \
      0 -4205.969286  28.883380   1.339923  2.737665   1.017817   0.417351   0.920523
      1 -4199.957075 -13.357607  -0.484331  0.681643   0.568851  -0.814644   0.193768
      2 -4198.953607 -25.686252  -1.389840  2.532925  -0.519487   2.698533   2.277503
      3 -4196.954789 -21.383230  -1.229972  1.834632   0.619776   3.170724   1.298491
      4 -4192.954066 -23.986931  -1.328156  1.651864   0.618544   3.442714   1.182613

               7          8          9        10         11         12         13  \
      0  0.413109  -0.071586  -0.932132  0.394477  -1.451094  -0.002802   1.332717
      1  0.377600  -1.131315  -0.912925  0.516894   0.397195   0.670877  -1.108863
      2  2.034704   0.984853   0.803844 -1.125539   0.365064  -0.299786   0.233311
      3  2.752481   0.490026   0.017254 -1.211440   0.582314   0.394377   0.207296
      4  2.774104   0.527274   0.164238 -1.904349   0.157995   0.461227   0.086684

               14         15         16         17         18         19         20  \
      0  0.553152   0.064254  -0.492476   0.348060   0.738412  -0.455578  -0.410114
      1 -0.573550   0.558790  -0.556385  -0.625973  -0.119900   0.050657   0.752998
      2 -0.153104   0.157802   0.430234   0.829089   0.277166  -0.933557   0.512602
      3  0.581331   0.702090   0.057590   0.364571  -0.252882  -0.833477   0.771206
      4  0.152235   0.001229  -0.248642  -0.188589   0.117397  -0.256122   0.403540

               21         22         23
      0  0.401214  -0.573865   1.070297
      1 -0.469262  -0.656422   0.603741
      2  0.941524   0.532176  -0.422120
      3  0.643066  -0.736146  -0.267657
      4  0.233337  -0.193519   0.443606
```

```
[56]: df_test.dtypes
```

```
[56]: ID       int64
      X0      object
      X1      object
      X2      object
      X3      object
               …
      X380     int64
      X382     int64
      X383     int64
      X384     int64
      X385     int64
      Length: 377, dtype: object
```

```
[57]: x_pca=pca.fit_transform(df_test_final)
```

```
[58]: df_test_final.shape
```

```
[58]: (4209, 558)
```

```
[59]: test_df_pca=pd.DataFrame(x_pca)
      test_df_pca.head()
```

```
[59]:              0         1         2         3         4         5         6   \
      0  4210.039141 -0.262667 -0.739124  2.735467  2.644044 -0.767886  4.094008
      1  4209.039248  3.813431  1.612829  0.207991 -0.511771  0.878393 -0.853158
      2  4208.039232 -1.228614  0.063389  0.963365  1.204790  0.299365  3.218092
      3  4207.039148 -0.291285 -0.864704  2.632125  2.670373 -0.869856  3.968418
      4  4206.039250 -2.970630  0.983718 -0.643007 -1.738312  0.348982 -0.024300

               7         8         9         10        11        12        13  \
      0 -0.728133  0.013573 -1.967329 -0.503312  0.257673  0.475181 -0.352288
      1 -1.735912 -1.246709 -1.234093  0.332571 -0.371561  0.439511  0.860394
      2 -1.125154  0.744460 -1.648318  0.214443  0.641890 -0.481825 -0.630949
      3 -0.835606 -0.013218 -2.072528 -0.545217  0.337304  0.601217 -0.569475
      4 -0.145474  0.090054  0.133451 -0.809815  0.614748  0.551410  0.248193

               14        15        16        17        18        19        20  \
      0 -0.298801  0.179571 -0.045869 -0.087618 -0.249148 -0.177562 -0.345319
      1  0.314538 -0.949595  1.002054  0.884905  0.066149  1.024066 -0.072588
      2  0.868951 -1.035579  0.409036 -1.051330  0.309785 -0.402385 -0.183911
      3 -0.351388  0.132514 -0.111777 -0.003623 -0.270651 -0.234254 -0.283818
      4 -0.239922  0.510512  0.326337  0.006108 -0.240158 -0.499001 -0.081331

               21        22        23
      0  0.030964  0.317815  0.044933
      1 -0.402020  0.917073 -0.054035
      2 -0.174423 -0.816515  0.430844
      3 -0.096225  0.319375  0.001494
      4  0.386986 -0.059112  0.131797
```

2 Prediction of test_df values using XGBoost

Apply PCA for test dataset

```
[60]: test_x_pca=pca.transform
```

```
[61]: # X_train and y values of train dataset
      X_train=df_train_final
      y_train=df_train['y']
```

```
[62]: # X_test values of test data set
      X_test=test_df_newdata
```

```
[68]: xgb=XGBRegressor()
```

```
[69]: xgb.fit(X_train, y_train)
```

```
[69]: XGBRegressor(base_score=0.5, booster=None, colsample_bylevel=1,
                    colsample_bynode=1, colsample_bytree=1, gamma=0, gpu_id=-1,
                    importance_type='gain', interaction_constraints=None,
                    learning_rate=0.300000012, max_delta_step=0, max_depth=6,
                    min_child_weight=1, missing=nan, monotone_constraints=None,
                    n_estimators=100, n_jobs=0, num_parallel_tree=1, random_state=0,
                    reg_alpha=0, reg_lambda=1, scale_pos_weight=1, subsample=1,
                    tree_method=None, validate_parameters=False, verbosity=None)
```

```
[74]: pred=xgb.predict(X_test)
      pred
```

```
[74]: array([72.50209, 72.60693, 72.38659, …, 72.47415, 72.42778, 72.45163],
            dtype=float32)
```

```
[73]: pred
```

```
[73]: array([72.50209, 72.60693, 72.38659, …, 72.47415, 72.42778, 72.45163],
            dtype=float32)
```

```
[72]: df_res=pd.DataFrame(pred, columns=["yHat"])
      df_res
```

```
[72]:           yHat
      0     72.502090
      1     72.606934
      2     72.386589
      3     72.258522
      4     72.342407
      …         …
      4204  72.408386
      4205  72.357834
      4206  72.474152
      4207  72.427780
      4208  72.451630

      [4209 rows x 1 columns]
```

```
[ ]:
```