## Loading and processing the credit card fraud detectio

#### INPUT:

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

#### INPUT:

```
credit_card_data =
pd.read_csv("/kaggle/input/creditcardfraud/creditcard.csv")
```

### INPUT:

credit\_card\_data.info()

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 284807 entries, 0 to 284806
Data columns (total 31 columns):
# Column Non-Null Count Dtype
--- -----
0 Time 284807 non-null float64
1 V1 284807 non-null float64
2 V2
           284807 non-null float64
           284807 non-null float64
3 V3
           284807 non-null float64
4 V4
5 V5
         284807 non-null float64
6 V6
         284807 non-null float64
           284807 non-null float64
7 V7
8 V8
           284807 non-null float64
```

9	V9	284807	non-null	float64
10	V10	284807	non-null	float64
11	V11	284807	non-null	float64
12	V12	284807	non-null	float64
13	V13	284807	non-null	float64
14	V14	284807	non-null	float64
15	V15	284807	non-null	float64
16	V16	284807	non-null	float64
17	V17	284807	non-null	float64
18	V18	284807	non-null	float64
19	V19	284807	non-null	float64
20	V20	284807	non-null	float64
21	V21	284807	non-null	float64
22	V22	284807	non-null	float64
23	V23	284807	non-null	float64
24	V24	284807	non-null	float64
25	V25	284807	non-null	float64
26	V26	284807	non-null	float64
27	V27	284807	non-null	float64
28	V28	284807	non-null	float64
29	Amount	284807	non-null	float64
30	Class	284807	non-null	int64

dtypes: float64(30), int64(1)

memory usage: 67.4 MB

## INPUT:

credit\_card\_data.describe()

# Output:

s t d	m e a n	c o u n t	T i m
4 7 4 8 8 1 4 5 9 5 5	9 4 8 1 3. 8 5 9 5 7 5	2 8 4 8 0 7. 0 0 0 0	V 1
1. 9 5 8 6 9 6 e + 0 0	1. 1 6 8 3 7 5 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 2
1. 6 5 1 3 0 9 e + 0 0	3. 4 1 6 9 0 8 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 3
1. 5 1 6 2 5 5 e + 0 0	-1 .3 7 9 5 3 7 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 4
1. 4 1 5 8 6 9 e + 0 0	2. 0 7 4 0 9 5 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 5
1. 3 8 0 2 4 7 e + 0	9. 6 0 4 0 6 6 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 6
1. 3 3 2 7 1 e + 0	1. 4 8 7 3 1 3 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 7
1. 2 3 7 0 9 4 e + 0 0	-5 .5 5 6 4 6 7 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 8
1. 1 9 4 3 5 3 e + 0 0	1. 2 1 3 4 8 1 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 9
1. 0 9 8 6 3 2 e + 0	-2 .4 0 6 3 3 1 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	
			V 2 1
7. 3 4 5 2 4 0 e- 0 1	1. 6 5 4 0 6 7 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 2 2
7. 2 5 7 0 1 6 e- 0 1	-3 5 6 8 5 9 3 e 1 6	2. 8 4 8 0 7 0 e + 0 5	V 2 3
6. 2 4 6 0 3 e- 0 1	2. 5 7 8 6 4 8 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 2 4
6. 0 5 6 4 7 1 e- 0 1	4. 4 7 3 2 6 6 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 2 5
5. 2 1 2 7 8 1 e- 0 1	5. 3 4 0 9 1 5 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 2 6
4. 8 2 2 2 7 0 e 0 1	1. 6 8 3 4 3 7 e- 1 5	2. 8 4 8 0 7 0 e + 0 5	V 2 7
4. 0 3 6 3 2 5 e 0 1	-3 .6 6 0 9 1 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	V 2 8
3. 3 0 0 8 3 3 e- 0 1	-1 .2 2 7 3 9 0 e- 1 6	2. 8 4 8 0 7 0 e + 0 5	A m o u nt
2 5 0 1 2 0 1 0 9	8 8. 3 4 9 6 1 9	2 8 4 8 0 7. 0 0 0 0	CI as s
0. 0 4 1 5 2 7	0. 0 0 1 7 2 7	2 8 4 8 0 7. 0 0 0 0	

1 1. 8. 9 1 3 5 7 0. 4 3 3 0 6 2 5 2 9 0 0 0 1			1
3 1 3 5 7 6 4 3 9 e + e-	8 4 6 9 2. 0 0 0 0 0	5 4 2 0 1. 5 0 0 0 0	0. 0 0 0 0
0 3 7 2 3 9 e-	1. 8 1 0 8 8 0 e- 0 2	-9 .2 0 3 7 3 4 e- 0	-5 .6 4 0 7 5 1 e + 0 1
	6. 5 4 5 5 6 e- 0 2	-5 .9 8 5 4 9 e- 0	-7 .2 7 1 5 7 3 e + 0
1. 0 2 7 1 9 6 e + 0	1. 7 9 8 4 6 3 e- 0	-8 .9 0 3 6 4 8 e- 0	-4 .8 3 2 5 5 9 e + 0
7. 4 3 3 4 1 3 e- 0	-1 .9 8 4 6 5 3 e- 0 2	-8 .4 8 6 4 0 1 e- 0	-5 .6 8 3 1 7 1 e + 0 0
6. 11 9 2 6 4 e- 0	-5 .4 3 5 8 3 e- 0 2	-6 .9 1 5 9 7 1 e- 0	-1 .1 3 7 4 3 8 + 0 2
3. 9 8 5 6 4 9 e- 0	-2 .7 4 1 8 7 1 e- 0	-7 .6 8 2 9 5 6 e- 0	-2 .6 1 6 0 5 1 e + 0
5. 7 0 4 3 6 1 e- 0	4. 0 1 0 3 0 8 e- 0 2	-5 .5 4 0 7 5 9 e- 0	-4 .3 5 5 7 2 4 e + 0
3. 2 7 3 4 5 9 e- 0	2. 2 3 5 8 0 4 e- 0 2	-2 .0 8 6 2 9 7 e- 0	-7 .3 2 1 6 7 2 e + 0
5. 9 7 1 3 9 0 e- 0	-5 .1 4 2 8 7 3 e- 0 2	-6 .4 3 0 9 7 6 e- 0	-1 .3 4 3 4 0 7 e + 0
1. 8 6 3 7 7 2 e- 0	-2 .9 4 5 0 1 7 e- 0 2	-2 .2 8 3 9 4 9 e- 0 1	-3 .4 8 3 0 3 8 e + 0
5. 2 8 5 5 3 6 e- 0	6. 7 8 1 9 4 3 e- 0 3	-5 .4 2 3 5 0 4 e- 0	-1 .0 9 3 1 4 e + 0 1
1. 4 7 6 4 2 1 e- 0	-1 .1 1 9 2 9 3 e- 0 2	-1 .6 1 8 4 6 3 e- 0	-4 .4 8 0 7 7 4 e + 0
4. 3 9 5 2 6 6 e- 0	4. 0 9 7 6 0 6 e- 0 2	-3 .5 4 5 8 6 1 e- 0	-2 .8 3 6 6 2 7 e + 0
3. 5 0 7 1 5 6 e- 0	1. 6 5 9 3 5 0 e- 0 2	-3 .1 7 1 4 5 1 e- 0	-1 .0 2 9 5 4 0 e + 0
2. 4 0 9 5 2 e- 0	-5 .2 1 3 9 11 e- 0 2	-3 .2 6 9 8 3 9 e- 0	-2 .6 0 4 5 5 1 e + 0 0
9. 1 0 4 5 1 2 e- 0	1. 3 4 2 1 4 6 e- 0 3	-7 .0 8 3 9 5 3 e- 0 2	-2 .2 5 6 5 6 8 e + 0 1
7. 8 2 7 9 9 5 e- 0	1. 1 2 4 3 8 3 e- 0 2	-5 .2 9 5 9 7 9 e- 0 2	-1 .5 4 3 0 0 8 e + 0 1
7 7. 1 6 5 0 0	2 2. 0 0 0 0	5. 6 0 0 0	0. 0 0 0 0
O. O O O O O	0. 0 0 0 0	0. 0 0 0 0	0. 0 0 0 0 0

1 7 2 7 9 2 a 0 0 0 0 0 0 0 0	2. 2 0 5 7 7 3 e + 0 1	9. 3 8 2 5 5 8 e + 0 0	1. 6 8 7 5 3 4 e + 0 1	3. 4 8 0 1 6 7 e + 0	7. 3 0 1 6 3 e + 0 1	1. 2 0 5 8 9 5 e + 0 2	2. 0 0 7 2 1 e + 0	1. 5 5 9 4 9 9 e + 0 1		2. 7 2 0 2 8 4 e + 0	1. 0 5 0 3 0 9 e + 0 1	2. 2 5 2 8 4 1 e + 0 1	4. 5 8 4 5 4 9 e + 0 0	7. 5 1 9 5 8 9 e + 0 0	3. 5 1 7 3 4 6 e + 0 0	3. 1 6 1 2 2 0 e + 0 1	3. 3 8 4 7 8 1 e + 0 1	2 5 6 9 1. 1 6 0 0 0	1. 0 0 0 0 0
, 2 7 9 2. 0 0	2. 4 5 4 9 3 0 e + 0 0	4 2 5 0 4 5 9 7 3 7 0 3 e e + + 0 0	4 2 3 5 0 8 4 5 2 9 7 5 3 7 5 0 3 8 e e e e + + + + 0 0 0	4 2 3 6 5 0 8 8 4 5 2 7 9 7 5 5 3 7 5 3 0 3 8 4 e e e e e + + + + + 0 0 0 0	4     2     3     6     4       5     0     8     8     8       4     5     2     7     0       9     7     5     5     1       3     7     5     3     6       0     3     8     4     7       e     e     e     e     e       +     +     +     +     +       0     0     0     0     0	4     2     3     6     4     3       5     0     8     8     8     3       4     5     2     7     0     0       9     7     5     5     1     1       3     7     5     3     6     6       0     3     8     4     7     3       e     e     e     e     e       +     +     +     +     +     +       0     0     0     0     0     0	4     2     3     6     4     3     2       5     0     8     8     8     3     0       4     5     2     7     0     0     5       9     7     5     5     1     1     8       3     7     5     3     6     6     9       0     3     8     4     7     3     5       e     e     e     e     e     e       +     +     +     +     +     +     +       0     0     0     0     0     0	4     2     3     6     4     3     2     0       5     0     8     8     8     3     0     0       4     5     2     7     0     0     5     0       9     7     5     5     1     1     8     7       3     7     5     3     6     6     9     2       0     3     8     4     7     3     5     1       e     e     e     e     e     e       t     +     +     +     +     +     +       0     0     0     0     0     0     0	4     2     3     6     4     3     2     0     5       5     0     8     8     8     3     0     0     5       4     5     2     7     0     0     5     0     9       9     7     5     5     1     1     8     7     4       3     7     5     3     6     6     9     2     9       0     3     8     4     7     3     5     1     9       e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0	4     2     3     6     4     3     2     0     5       5     0     8     8     8     3     0     0     5       4     5     2     7     0     0     5     0     9       9     7     5     5     1     1     8     7     4     .       3     7     5     3     6     6     9     2     9     .       0     3     8     4     7     3     5     1     9     .       e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0	4     2     3     6     4     3     2     0     5     7       5     0     8     8     8     3     0     0     5     2       4     5     2     7     0     0     5     0     9     0       9     7     5     5     1     1     8     7     4     .     2       3     7     5     3     6     6     9     2     9     .     8       0     3     8     4     7     3     5     1     9     .     4       e     e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0     0	4       2       3       6       4       3       2       0       5       7       0         5       0       8       8       8       3       0       0       5       2       5         4       5       2       7       0       0       5       0       9       0       0         9       7       5       5       1       1       8       7       4       .       2       3         3       7       5       3       6       6       9       2       9       .       8       0         0       3       8       4       7       3       5       1       9       .       4       9         e       e       e       e       e       e       e       e       e         +	4       2       3       6       4       3       2       0       5       7       0       2         5       0       8       8       8       3       0       0       5       2       5       5         4       5       2       7       0       0       5       0       9       0       0       2         9       7       5       5       1       1       8       7       4       .       2       3       8         3       7       5       3       6       6       9       2       9       .       8       0       4         0       3       8       4       7       3       5       1       9       .       4       9       1         e       <	4       2       3       6       4       3       2       0       5       7       0       2       5         5       0       8       8       8       3       0       0       5       2       5       5       8         4       5       2       7       0       0       5       0       9       0       0       0       2       4         9       7       5       5       1       1       8       7       4       .       2       3       8       5         3       7       5       3       6       6       9       2       9       .       8       0       4       4         0       3       8       4       7       3       5       1       9       .       4       9       1       9         e       <	4       2       3       6       4       3       2       0       5       7       0       2       5       5         5       0       8       8       8       3       0       0       5       2       5       5       8       1         4       5       2       7       0       0       5       0       9       0       0       2       4       9         9       7       5       5       1       1       8       7       4       .       2       3       8       5       5         3       7       5       3       6       6       9       2       9       .       8       0       4       4       8         0       3       8       4       7       3       5       1       9       .       4       9       1       9       9         e       <	4       2       3       6       4       3       2       0       5       7       0       2       5       5       5         5       0       8       8       8       3       0       0       5       2       5       5       8       1       1         4       5       2       7       0       0       5       0       9       0       0       2       4       9       7         9       7       5       5       1       1       8       7       4       .       2       3       8       5       5       3         3       7       5       3       6       6       9       2       9       .       8       0       4       4       8       4         0       3       8       4       7       3       5       1       9       .       4       9       1       9       9       6         e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       <	4       2       3       6       4       3       2       0       5       7       0       2       5       5       5       1         5       0       8       8       8       3       0       0       5       2       5       5       8       1       1       6         4       5       2       7       0       0       5       0       9       0       0       2       4       9       7       1       6       6       9       2       9       0       0       2       4       9       7       1       6       3       2       3       8       5       5       3       2       3       3       8       5       5       3       2       3       3       8       5       5       3       2       3       8       4       2       2       9       8       0       4       4       8       4       2         0       3       8       4       7       3       5       1       9       .       4       9       1       9       9       6       0         e       e	4       2       3       6       4       3       2       0       5       7       0       2       5       5       5       1       3         5       0       8       8       8       3       0       0       5       2       5       5       8       1       1       6       8         4       5       2       7       0       0       5       0       9       0       0       2       4       9       7       1       4         9       7       5       5       1       1       8       7       4       2       2       3       8       5       5       3       2       7         3       7       5       3       6       6       9       2       9       8       0       4       4       8       4       2       8         0       3       8       4       7       3       5       1       9       .       4       9       1       9       9       6       0       1         e       e       e       e       e       e       e       e       <	4       2       3       6       4       3       2       0       5       7       0       2       5       5       5       1       3       5         5       0       8       8       8       3       0       0       5       2       5       5       8       1       1       6       8       6         4       5       2       7       0       0       5       0       9       0       0       2       4       9       7       1       4       9         9       7       5       5       1       1       8       7       4       2       3       8       5       5       3       2       7       1       4       9         3       7       5       3       6       6       9       2       9       8       0       4       4       8       4       2       8       1         0       3       8       4       7       3       5       1       9       .       4       9       1       9       9       6       0       1       6         e       <
		2 0 5 7 7 3 e +	2 3 0 8 5 2 7 5 7 5 3 8 e e + +	2 3 6 0 8 8 5 2 7 7 5 5 7 5 3 3 8 4 e e e + + + 0 0 0	2 3 6 4 0 8 8 8 5 2 7 0 7 5 5 1 7 5 3 6 3 8 4 7 e e e e + + + + + 0 0 0 0	2 3 6 4 3 0 8 8 8 8 3 5 2 7 0 0 7 5 5 1 1 7 5 3 6 6 3 8 4 7 3 e e e e e + + + + + + + 0 0 0 0 0	2 3 6 4 3 2 0 8 8 8 8 3 0 5 2 7 0 0 5 7 5 5 1 1 8 7 5 3 6 6 9 3 8 4 7 3 5 e e e e e e + + + + + + + + 0 0 0 0 0 0	2     3     6     4     3     2     0       0     8     8     8     3     0     0       5     2     7     0     0     5     0       7     5     5     1     1     8     7       7     5     3     6     6     9     2       3     8     4     7     3     5     1       e     e     e     e     e     e       +     +     +     +     +     +       0     0     0     0     0     0	2     3     6     4     3     2     0     5       0     8     8     8     3     0     0     5       5     2     7     0     0     5     0     9       7     5     5     1     1     8     7     4       7     5     3     6     6     9     2     9       3     8     4     7     3     5     1     9       e     e     e     e     e     e     e       +     +     +     +     +     +     +     +       0     0     0     0     0     0     0	2     3     6     4     3     2     0     5       0     8     8     8     3     0     0     5       5     2     7     0     0     5     0     9       7     5     5     1     1     8     7     4     .       7     5     3     6     6     9     2     9     .       3     8     4     7     3     5     1     9     .       e     e     e     e     e     e     e       +     +     +     +     +     +     +       0     0     0     0     0     0     0	2     3     6     4     3     2     0     5     7       0     8     8     8     3     0     0     5     2       5     2     7     0     0     5     0     9     0       7     5     5     1     1     8     7     4     .     2       7     5     3     6     6     9     2     9     .     8       3     8     4     7     3     5     1     9     .     4       e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0	2     3     6     4     3     2     0     5     7     0       0     8     8     8     3     0     0     5     2     5       5     2     7     0     0     5     0     9     0     0       7     5     5     1     1     8     7     4     2     3       7     5     3     6     6     9     2     9     8     0       3     8     4     7     3     5     1     9     4     9       e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0	2     3     6     4     3     2     0     5     7     0     2       0     8     8     8     3     0     0     5     2     5     5       5     2     7     0     0     5     0     9     0     0     2       7     5     5     1     1     8     7     4     2     3     8       7     5     3     6     6     9     2     9     8     0     4       3     8     4     7     3     5     1     9     4     9     1       e     e     e     e     e     e     e     e       +     +     +     +     +     +     +     +     +       0     0     0     0     0     0     0     0     0	2       3       6       4       3       2       0       5       7       0       2       5         0       8       8       8       3       0       0       5       2       5       5       8         5       2       7       0       0       5       0       9       0       0       0       2       4         7       5       5       1       1       8       7       4       .       2       3       8       5         7       5       3       6       6       9       2       9       .       8       0       4       4         3       8       4       7       3       5       1       9       .       4       9       1       9         e       <	2       3       6       4       3       2       0       5       7       0       2       5       5         0       8       8       8       3       0       0       5       2       5       5       8       1         5       2       7       0       0       5       0       9       0       0       0       2       4       9         7       5       5       1       1       8       7       4       .       2       3       8       5       5         7       5       3       6       6       9       2       9       .       8       0       4       4       8         3       8       4       7       3       5       1       9       .       4       9       1       9       9         e       <	2       3       6       4       3       2       0       5       7       0       2       5       5       5         0       8       8       8       3       0       0       5       2       5       5       8       1       1         5       2       7       0       0       5       0       9       0       0       2       4       9       7         7       5       5       1       1       8       7       4       .       2       3       8       5       5       3         7       5       3       6       6       9       2       9       .       8       0       4       4       8       4         3       8       4       7       3       5       1       9       .       4       9       1       9       9       6         e       <	2       3       6       4       3       2       0       5       7       0       2       5       5       5       1         0       8       8       8       3       0       0       5       2       5       5       8       1       1       6         5       2       7       0       0       5       0       9       0       0       2       4       9       7       1         7       5       5       1       1       8       7       4       2       3       8       5       5       3       2         7       5       3       6       6       9       2       9       .       8       0       4       4       8       4       2         3       8       4       7       3       5       1       9       .       4       9       1       9       9       6       0         e       <	2       3       6       4       3       2       0       5       7       0       2       5       5       5       1       3         0       8       8       8       3       0       0       5       2       5       5       8       1       1       6       8         5       2       7       0       0       5       0       9       0       0       2       4       9       7       1       4         7       5       5       1       1       8       7       4       2       2       3       8       5       5       3       2       7         7       5       3       6       6       9       2       9       8       0       4       4       8       4       2       8         3       8       4       7       3       5       1       9       4       9       1       9       9       6       0       1         e       e       e       e       e       e       e       e       e       e       e       e       e       e       e       <	2       3       6       4       3       2       0       5       7       0       2       5       5       5       1       3       5         0       8       8       8       3       0       0       5       2       5       5       8       1       1       6       8       6         5       2       7       0       0       0       0       2       4       9       7       1       4       9         7       5       5       1       1       8       7       4       2       3       8       5       5       3       2       7       1       4       9         7       5       3       6       6       9       2       9       8       0       4       4       8       4       2       8       1         3       8       4       7       3       5       1       9       .       4       9       1       9       9       6       0       1       6       9         8       9       2       9       .       4       9       1       9       <