TASK 2: SALES PREDICTION

OUTPUT:

TV advertising spend: [230.1 44.5 17.2 151.5 180.8 8.7 57.5 120.2 8.6 199.8 66.1 214.7

 23.8 97.5 204.1 195.4 67.8 281.4 69.2 147.3 218.4 237.4 13.2 228.3

 62.3 262.9 142.9 240.1 248.8 70.6 292.9 112.9 97.2 265.6 95.7 290.7

 266.9 74.7 43.1 228. 202.5 177. 293.6 206.9 25.1 175.1 89.7 239.9

 227.2 66.9 199.8 100.4 216.4 182.6 262.7 198.9 7.3 136.2 210.8 210.7

 53.5 261.3 239.3 102.7 131.1 69.   31.5 139.3 237.4 216.8 199.1 109.8

 26.8 129.4 213.4 16.9 27.5 120.5 5.4 116.   76.4 239.8 75.3 68.4

 213.5 193.2 76.3 110.7 88.3 109.8 134.3 28.6 217.7 250.9 107.4 163.3

 197.6 184.9 289.7 135.2 222.4 296.4 280.2 187.9 238.2 137.9 25.   90.4

 13.1 255.4 225.8 241.7 175.7 209.6 78.2 75.1 139.2 76.4 125.7 19.4

 141.3 18.8 224. 123.1 229.5 87.2 7.8 80.2 220.3 59.6 0.7 265.2

 8.4 219.8 36.9 48.3 25.6 273.7 43. 184.9 73.4 193.7 220.5 104.6

 96.2 140.3 240.1 243.2 38.   44.7 280.7 121. 197.6 171.3 187.8 4.1

 93.9 149.8 11.7 131.7 172.5 85.7 188.4 163.5 117.2 234.5 17.9 206.8

 215.4 284.3 50. 164.5 19.6 168.4 222.4 276.9 248.4 170.2 276.7 165.6

 156.6 218.5 56.2 287.6 253.8 205. 139.5 191.1 286.   18.7 39.5 75.5

 17.2 166.8 149.7 38.2 94.2 177. 283.6 232.1]

Radio advertising spend: [37.8 39.3 45.9 41.3 10.8 48.9 32.8 19.6 2.1 2.6 5.8 24. 35.1 7.6

 32.9 47.7 36.6 39.6 20.5 23.9 27.7 5.1 15.9 16.9 12.6 3.5 29.3 16.7

 27.1 16. 28.3 17.4 1.5 20.   1.4 4.1 43.8 49.4 26.7 37.7 22.3 33.4

 27.7 8.4 25.7 22.5 9.9 41.5 15.8 11.7 3.1 9.6 41.7 46.2 28.8 49.4

 28.1 19.2 49.6 29.5 2. 42.7 15.5 29.6 42.8 9.3 24.6 14.5 27.5 43.9

 30.6 14.3 33.   5.7 24.6 43.7 1.6 28.5 29.9 7.7 26.7 4.1 20.3 44.5

 43. 18.4 27.5 40.6 25.5 47.8 4.9 1.5 33.5 36.5 14. 31.6 3.5 21.

42.3 41.7 4.3 36.3 10.1 17.2 34.3 46.4 11.   0.3 0.4 26.9 8.2 38.

15.4 20.6 46.8 35. 14.3 0.8 36.9 16. 26.8 21.7 2.4 34.6 32.3 11.8

38.9 0. 49. 12. 39.6 2.9 27.2 33.5 38.6 47. 39. 28.9 25.9 43.9

17. 35.4 33.2 5.7 14.8 1.9 7.3 49. 40.3 25.8 13.9 8.4 23.3 39.7

21.1 11.6 43.5 1.3 36.9 18.4 18.1 35.8 18.1 36.8 14.7 3.4 37.6 5.2

23.6 10.6 11.6 20.9 20.1 7.1 3.4 48.9 30.2 7.8 2.3 10.   2.6 5.4

 5.7 43. 21.3 45.1 2.1 28.7 13.9 12.1 41.1 10.8 4.1 42. 35.6 3.7

 4.9 9.3 42.   8.6]

Newspaper advertising spend: [69.2 45.1 69.3 58.5 58.4 75.   23.5 11.6   1.   21.2 24.2
  4.

 65.9   7.2 46.   52.9 114.   55.8 18.3 19.1 53.4 23.5 49.6 26.2

 18.3 19.5 12.6 22.9 22.9 40.8 43.2 38.6 30.   0.3   7.4   8.5

  5.   45.7 35.1 32.   31.6 38.7   1.8 26.4 43.3 31.5 35.7 18.5

 49.9 36.8 34.6   3.6 39.6 58.7 15.9 60.   41.4 16.6 37.7   9.3

 21.4 54.7 27.3   8.4 28.9   0.9   2.2 10.2 11.   27.2 38.7 31.7

 19.3 31.3 13.1 89.4 20.7 14.2   9.4 23.1 22.3 36.9 32.5 35.6

 33.8 65.7 16.   63.2 73.4 51.4   9.3 33.   59.   72.3 10.9 52.9

  5.9 22.   51.2 45.9 49.8 100.9 21.4 17.9   5.3 59.   29.7 23.2

 25.6   5.5 56.5 23.2   2.4 10.7 34.5 52.7 25.6 14.8 79.2 22.3

 46.2 50.4 15.6 12.4 74.2 25.9 50.6   9.2   3.2 43.1   8.7 43.

  2.1 45.1 65.6   8.5   9.3 59.7 20.5   1.7 12.9 75.6 37.9 34.4

 38.9   9.   8.7 44.3 11.9 20.6 37.   48.7 14.2 37.7   9.5   5.7

 50.5 24.3 45.2 34.6 30.7 49.3 25.6   7.4   5.4 84.8 21.6 19.4

 57.6   6.4 18.4 47.4 17.   12.8 13.1 41.8 20.3 35.2 23.7 17.6

  8.3 27.4 29.7 71.8 30.   19.6 26.6 18.2   3.7 23.4   5.8   6.

 31.6   3.6   6.   13.8   8.1   6.4 66.2   8.7]

Sales: [22.1 10.4 9.3 18.5 12.9 7.2 11.8 13.2 4.8 10.6 8.6 17.4 9.2 9.7

19. 22.4 12.5 24.4 11.3 14.6 18. 12.5 5.6 15.5 9.7 12. 15. 15.9

18.9 10.5 21.4 11.9 9.6 17.4 9.5 12.8 25.4 14.7 10.1 21.5 16.6 17.1

20.7 12.9 8.5 14.9 10.6 23.2 14.8 9.7 11.4 10.7 22.6 21.2 20.2 23.7

```
  5.5 13.2 23.8 18.4  8.1 24.2 15.7 14.  18.   9.3  9.5 13.4 18.9 22.3

 18.3 12.4  8.8 11.  17.   8.7  6.9 14.2  5.3 11.  11.8 12.3 11.3 13.6

 21.7 15.2 12.  16.  12.9 16.7 11.2  7.3 19.4 22.2 11.5 16.9 11.7 15.5

 25.4 17.2 11.7 23.8 14.8 14.7 20.7 19.2  7.2  8.7  5.3 19.8 13.4 21.8

 14.1 15.9 14.6 12.6 12.2  9.4 15.9  6.6 15.5  7.  11.6 15.2 19.7 10.6

  6.6  8.8 24.7  9.7  1.6 12.7  5.7 19.6 10.8 11.6  9.5 20.8  9.6 20.7

 10.9 19.2 20.1 10.4 11.4 10.3 13.2 25.4 10.9 10.1 16.1 11.6 16.6 19.

 15.6  3.2 15.3 10.1  7.3 12.9 14.4 13.3 14.9 18.  11.9 11.9  8.  12.2

 17.1 15.   8.4 14.5  7.6 11.7 11.5 27.  20.2 11.7 11.8 12.6 10.5 12.2

  8.7 26.2 17.6 22.6 10.3 17.3 15.9  6.7 10.8  9.9  5.9 19.6 17.3  7.6

  9.7 12.8 25.5 13.4]
```

Min sales: 1.6

Sum of sales: 2804.5

Index of min sales: 130

Index of max sales: 175

Variance of sales: 27.085743750000002

Median of sales: 12.9

Mean of sales: 14.0225

Max sales: 27.0

75th percentile of sales: 17.4

Relational Operations:

TV ad spend < 100: [False True True False False True True False True False True False

 True True False False True False True False False False True False
```

True False False False False  True False False  True False  True False

False  True  True False False False False False  True False  True False

False  True False False False False False False  True False False False

True False False False False  True  True False False False False False

True False False  True  True False  True False  True False  True  True

False False  True False  True False False  True False False False False

False False False False False False False False False False  True  True

True False False False False False  True  True False  True False  True

False  True False False False  True  True  True False  True  True False

True False  True  True  True False  True False  True False False False

True False False False  True  True False False False False False  True

True False  True False False  True False False False False  True False

False False  True False  True False False False False False False False

False False  True False False False False False False  True  True  True

True False False  True  True False False False]

Radio ad spend <= 50:  [ True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True  True  True  True  True

True  True  True  True  True  True  True  True]

Newspaper ad spend > 30:  [ True  True  True  True  True  True False False False False False
False

True False  True  True  True  True False False  True False  True False

False False False False False  True  True  True False False False False

False  True  True  True  True  True False False  True  True  True False

True  True  True False  True  True False  True  True False  True False

False  True False False False False False False False False  True  True

False  True False  True False False False False False  True  True  True

True  True False  True  True  True False  True  True  True False  True

False False  True  True  True  True False False False  True False False

False False  True False False False  True  True False False  True False

True  True False False  True False  True False False  True False  True

False  True  True False False  True False False False  True  True  True

True False False  True False False  True  True False  True False False

True False  True  True  True  True False False False  True False False

True False False  True False False False  True False  True False False

False False False  True False False False False False False False False

True False False False False False  True False]

Sales >= 200:  [False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False]

Sales == 150:  [False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False False False False False

False False False False False False False False]

TV ad spend != 75:  [ True  True  True  True  True  True  True  True  True  True  True  True

 True  True  True  True  True  True  True  True  True  True  True  True

 True  True  True  True  True  True  True  True  True  True  True  True

 True  True  True  True  True  True  True  True  True  True  True  True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True True True True True

True True True True True True True True]

Adding 10 to TV ad spend: [240.1  54.5  27.2 161.5 190.8  18.7  67.5 130.2  18.6 209.8  76.1 224.7

 33.8 107.5 214.1 205.4  77.8 291.4  79.2 157.3 228.4 247.4  23.2 238.3

 72.3 272.9 152.9 250.1 258.8  80.6 302.9 122.9 107.2 275.6 105.7 300.7

276.9  84.7  53.1 238.  212.5 187.  303.6 216.9  35.1 185.1  99.7 249.9

237.2  76.9 209.8 110.4 226.4 192.6 272.7 208.9  17.3 146.2 220.8 220.7

 63.5 271.3 249.3 112.7 141.1  79.   41.5 149.3 247.4 226.8 209.1 119.8

 36.8 139.4 223.4  26.9  37.5 130.5  15.4 126.   86.4 249.8  85.3  78.4

223.5 203.2  86.3 120.7  98.3 119.8 144.3  38.6 227.7 260.9 117.4 173.3

207.6 194.9 299.7 145.2 232.4 306.4 290.2 197.9 248.2 147.9  35.  100.4

 23.1 265.4 235.8 251.7 185.7 219.6  88.2  85.1 149.2  86.4 135.7  29.4

151.3  28.8 234.  133.1 239.5  97.2  17.8  90.2 230.3  69.6  10.7 275.2

 18.4 229.8  46.9  58.3  35.6 283.7  53.  194.9  83.4 203.7 230.5 114.6

106.2 150.3 250.1 253.2  48.   54.7 290.7 131.  207.6 181.3 197.8  14.1

103.9 159.8  21.7 141.7 182.5  95.7 198.4 173.5 127.2 244.5  27.9 216.8

225.4 294.3  60.  174.5  29.6 178.4 232.4 286.9 258.4 180.2 286.7 175.6

166.6 228.5  66.2 297.6 263.8 215.  149.5 201.1 296.   28.7  49.5  85.5

 27.2 176.8 159.7  48.2 104.2 187.  293.6 242.1]

Multiplying radio ad spend by 2: [75.6 78.6 91.8 82.6 21.6 97.8 65.6 39.2  4.2  5.2 11.6 48.
70.2 15.2

65.8 95.4 73.2 79.2 41.  47.8 55.4 10.2 31.8 33.8 25.2  7.  58.6 33.4

54.2 32.  56.6 34.8  3.  40.   2.8  8.2 87.6 98.8 53.4 75.4 44.6 66.8

55.4 16.8 51.4 45.  19.8 83.  31.6 23.4  6.2 19.2 83.4 92.4 57.6 98.8

56.2 38.4 99.2 59.   4.  85.4 31.  59.2 85.6 18.6 49.2 29.  55.  87.8

61.2 28.6 66.  11.4 49.2 87.4  3.2 57.  59.8 15.4 53.4  8.2 40.6 89.

86.  36.8 55.  81.2 51.  95.6  9.8  3.  67.  73.  28.  63.2  7.  42.

84.6 83.4  8.6 72.6 20.2 34.4 68.6 92.8 22.   0.6  0.8 53.8 16.4 76.

30.8 41.2 93.6 70.  28.6  1.6 73.8 32.  53.6 43.4  4.8 69.2 64.6 23.6

77.8  0.  98.  24.  79.2  5.8 54.4 67.  77.2 94.  78.  57.8 51.8 87.8

34.  70.8 66.4 11.4 29.6  3.8 14.6 98.  80.6 51.6 27.8 16.8 46.6 79.4

42.2 23.2 87.   2.6 73.8 36.8 36.2 71.6 36.2 73.6 29.4  6.8 75.2 10.4

47.2 21.2 23.2 41.8 40.2 14.2  6.8 97.8 60.4 15.6  4.6 20.   5.2 10.8

11.4 86.  42.6 90.2  4.2 57.4 27.8 24.2 82.2 21.6  8.2 84.  71.2  7.4

 9.8 18.6 84.  17.2]

Selecting sales values greater than 250: []

Randomly selected sales data:

|     | Unnamed: 0 | TV    | Radio | Newspaper | Sales |
| --- | --- | --- | --- | --- | --- |
| 130 | 131 | 0.7   | 39.6  | 8.7  | 1.6  |
| 199 | 200 | 232.1 | 8.6   | 8.7  | 13.4 |
| 60  | 61  | 53.5  | 2.0   | 21.4 | 8.1  |
| 94  | 95  | 107.4 | 14.0  | 10.9 | 11.5 |

5      6  8.7  48.9      75.0  7.2

Vector of 20 evenly spaced values between min and max of Sales:

[ 1.6      2.93684211  4.27368421  5.61052632  6.94736842  8.28421053

 9.62105263 10.95789474 12.29473684 13.63157895 14.96842105 16.30526316

 17.64210526 18.97894737 20.31578947 21.65263158 22.98947368 24.32631579

 25.66315789 27.      ]

Original Sales range: [ 1.6 , 27.0 ]

Vector of 20 evenly spaced normalized values between 0 and 1:

[0.      0.05263158 0.10526316 0.15789474 0.21052632 0.26315789

 0.31578947 0.36842105 0.42105263 0.47368421 0.52631579 0.57894737

 0.63157895 0.68421053 0.73684211 0.78947368 0.84210526 0.89473684

 0.94736842 1.      ]

TV DataFrame:

      TV

0   230.1

1   44.5

2   17.2

```
3    151.5
4    180.8
..    ...
195   38.2
196   94.2
197  177.0
198  283.6
199  232.1

[200 rows x 1 columns]


Sales DataFrame:
     Sales
0    22.1
1    10.4
2     9.3
3    18.5
4    12.9
..    ...
195   7.6
196   9.7
197  12.8
198  25.5
199  13.4

[200 rows x 1 columns]


Joined DataFrame:
      TV  Sales
```

```
0    230.1  22.1
1     44.5  10.4
2     17.2   9.3
3    151.5  18.5
4    180.8  12.9
..     ...   ...
195   38.2   7.6
196   94.2   9.7
197  177.0  12.8
198  283.6  25.5
199  232.1  13.4
```

[200 rows x 2 columns]

Pivot table - Average Sales by TV Advertising:

```
       Sales
TV
0.7     1.6
4.1     3.2
5.4     5.3
7.3     5.5
7.8     6.6
...     ...
289.7  25.4
290.7  12.8
292.9  21.4
293.6  20.7
```

296.4 23.8

[190 rows x 1 columns]

Rows swapped in reverse order:

	Unnamed: 0	TV	Radio	Newspaper	Sales	TV_Range
199	200	232.1	8.6	8.7	13.4	Above 150
198	199	283.6	42.0	66.2	25.5	Above 150
197	198	177.0	9.3	6.4	12.8	Above 150
196	197	94.2	4.9	8.1	9.7	50-100
195	196	38.2	3.7	13.8	7.6	Below 50
..	...	...	...	...	...	...
4	5	180.8	10.8	58.4	12.9	Above 150
3	4	151.5	41.3	58.5	18.5	Above 150
2	3	17.2	45.9	69.3	9.3	Below 50
1	2	44.5	39.3	45.1	10.4	Below 50
0	1	230.1	37.8	69.2	22.1	Above 150

[200 rows x 6 columns]

Columns swapped in reverse order:

	TV_Range	Sales	Newspaper	Radio	TV	Unnamed: 0
0	Above 150	22.1	69.2	37.8	230.1	1
1	Below 50	10.4	45.1	39.3	44.5	2
2	Below 50	9.3	69.3	45.9	17.2	3
3	Above 150	18.5	58.5	41.3	151.5	4
4	Above 150	12.9	58.4	10.8	180.8	5

```
..    ...   ...   ...  ...  ...      ...
195  Below 50   7.6     13.8   3.7  38.2       196
196   50-100   9.7      8.1   4.9  94.2       197
197  Above 150  12.8      6.4   9.3 177.0       198
198  Above 150  25.5     66.2  42.0 283.6       199
199  Above 150  13.4      8.7   8.6 232.1       200
```

[200 rows x 6 columns]

Both rows and columns swapped in reverse order:

```
    TV_Range Sales  Newspaper  Radio     TV  Unnamed: 0
199  Above 150  13.4      8.7   8.6 232.1       200
198  Above 150  25.5     66.2  42.0 283.6       199
197  Above 150  12.8      6.4   9.3 177.0       198
196   50-100   9.7      8.1   4.9  94.2       197
195  Below 50   7.6     13.8   3.7  38.2       196
..    ...   ...   ...  ...  ...      ...
4    Above 150  12.9     58.4  10.8 180.8        5
3    Above 150  18.5     58.5  41.3 151.5        4
2    Below 50   9.3     69.3  45.9  17.2        3
1    Below 50  10.4     45.1  39.3  44.5        2
0    Above 150  22.1     69.2  37.8 230.1        1
```

[200 rows x 6 columns]

Lowercase:
```
 0    230.1
```

```
1      44.5

2      17.2

3      151.5

4      180.8

   ...

195    38.2

196    94.2

197    177.0

198    283.6

199    232.1

Name: TV_str, Length: 200, dtype: object
```

Length:
```
 0     5

1      4

2      4

3      5

4      5

   ..

195    4

196    4

197    5

198    5

199    5

Name: TV_str, Length: 200, dtype: int64
```

Starts with '2':
```
 0     True

1      False
```

2   False

3   False

4   False

   ...

195   False

196   False

197   False

198   True

199   True

Name: TV_str, Length: 200, dtype: bool

Split:

 0   [230.1]

1   [44.5]

2   [17.2]

3   [151.5]

4   [180.8]

   ...

195   [38.2]

196   [94.2]

197   [177.0]

198   [283.6]

199   [232.1]

Name: TV_str, Length: 200, dtype: object

Extract first digits or letters:

```
 0    NaN

1    NaN

2    NaN

3    NaN

4    NaN

    ...

195   NaN

196   NaN

197   NaN

198   NaN

199   NaN
Name: TV_str, Length: 200, dtype: object
```

Find patterns that don't start/end with vowels:

```
 0    [230.1]

1     [44.5]

2     [17.2]

3    [151.5]

4    [180.8]

     ...

195    [38.2]

196    [94.2]

197   [177.0]

198   [283.6]

199   [232.1]
Name: TV_str, Length: 200, dtype: object
```

First 3 characters:

```
 0    230
```

1   44.

2   17.

3   151

4   180

   ...

195   38.

196   94.

197   177

198   283

199   232

Name: TV_str, Length: 200, dtype: object

Last split element:

 0   230.1

1   44.5

2   17.2

3   151.5

4   180.8

   ...

195   38.2

196   94.2

197   177.0

198   283.6

199   232.1

Name: TV_str, Length: 200, dtype: object

Mean of Sales: 14.0225

Median of Sales: 12.9

Standard deviation of Sales: 5.204396578855228

Variance of Sales: 27.085743750000002

Column: TV

Mean: 147.0425

Median: 149.75

Standard Deviation: 85.63933175679269

Variance: 7334.095143750001

Column: Radio

Mean: 23.264000000000006

Median: 22.9

Standard Deviation: 14.809645640595186

Variance: 219.325604

Column: Newspaper

Mean: 30.553999999999995

Median: 25.75

Standard Deviation: 21.724106057557353

Variance: 471.93678400000005

Column: Sales

Mean: 14.0225

Median: 12.9

Standard Deviation: 5.204396578855228

Variance: 27.085743750000002

Sorted Dataset by Sales:

TV	Radio	Newspaper	Sales
130	0.7	39.6	8.7	1.6
155	4.1	11.6	5.7	3.2
8	8.6	2.1	1.0	4.8
78	5.4	29.9	9.4	5.3
108	13.1	0.4	25.6	5.3
..	...	...	...	...
36	266.9	43.8	5.0	25.4
147	243.2	49.0	44.3	25.4
198	283.6	42.0	66.2	25.5
183	287.6	43.0	71.8	26.2
175	276.9	48.9	41.8	27.0

[200 rows x 4 columns]

Sorted Dataset by TV, Radio, Newspaper, and Sales:

TV	Radio	Newspaper	Sales
130	0.7	39.6	8.7	1.6
155	4.1	11.6	5.7	3.2
78	5.4	29.9	9.4	5.3
56	7.3	28.1	41.4	5.5
126	7.8	38.9	50.6	6.6

```
..   ...   ...      ...   ...

98   289.7   42.3      51.2   25.4

35   290.7   4.1       8.5   12.8

30   292.9   28.3      43.2   21.4

42   293.6   27.7       1.8   20.7

101  296.4   36.3      100.9  23.8


[200 rows x 4 columns]
```

Missing Values Before Handling:

```
Unnamed: 0   0
TV           0
Radio        0
Newspaper    0
Sales        0
TV_Range     0
TV_str       0
dtype: int64
```

Missing Values After Handling:

```
Unnamed: 0   0
TV           0
Radio        0
Newspaper    0
Sales        0
TV_Range     0
TV_str       0
dtype: int64
```

Filtered Data (Sales > 1000):

Empty DataFrame

Columns: [Unnamed: 0, TV, Radio, Newspaper, Sales, TV_Range, TV_str]

Index: []

Numeric columns detected: Index(['Unnamed: 0', 'TV', 'Radio', 'Newspaper', 'Sales'], dtype='object')

Data After Transformation (Scaling):

	Unnamed: 0	TV	Radio	Newspaper	Sales	TV_Range	TV_str
0	-1.723412	0.969852	0.981522	1.778945	1.552053	Above 150	230.1
1	-1.706091	-1.197376	1.082808	0.669579	-0.696046	Below 50	44.5
2	-1.688771	-1.516155	1.528463	1.783549	-0.907406	Below 50	17.2
3	-1.671450	0.052050	1.217855	1.286405	0.860330	Above 150	151.5
4	-1.654129	0.394182	-0.841614	1.281802	-0.215683	Above 150	180.8