Support Vector Machine Results

Digit Recognition:

Accuracy:

1. **Linear Kernal:**
    - Training dataset – 100%
    - Validation dataset – 97.3%.
2. **Sigmoid Kernal:**
    - Training dataset – 10.70%
    - Validation dataset – 10.80%.
3. **Poly Kernal:**
    - Training dataset – 100%
    - Validation dataset – 98.69%.
4. **RBF Kernal:**
    - Training dataset – 100%
    - Validation dataset – 57%.

Based on the above results we have chosen POLY kernel with C = 10 and gamma = 'auto'.

Accuracy on testing dataset with the chosen values = 98.27%.

a. What is the number of attributes in each dataset?

There are 64 attributes in the dataset; they represent each pixel in the given image which is represented as an 8x8 input matrix.

b. What is the number of observations?

One observation, where the labels are in the range of 0-9.

c. What is the mean and standard deviation of each attribute?

Attribute	Mean	Standard deviation
1	0	0
2	0.3013	0.8670
3	5.4818	4.6316
4	11.8059	4.2598
5	11.4515	4.5376
6	5.5054	5.6131

7	1.3874	3.3714
8	0.1423	1.0516
9	0.0021	0.0886
10	1.9605	3.0524
11	10.5773	5.4355
12	11.7154	4.0122
13	10.6249	4.7881
14	8.2956	5.9356
15	2.2001	4.0622
16	0.1520	0.9888
17	0.0050	0.1199
18	2.5959	3.4541
19	9.5807	5.8861
20	6.7350	5.9183
21	7.1865	6.1427
22	8.0484	6.2915
23	2.0460	3.5817
24	0.0492	0.4355
25	0.0010	0.0323
26	2.3356	3.0859
27	9.2391	6.1281
28	9.1337	5.9026
29	9.6733	6.2829
30	7.8676	6.0024
31	2.3403	3.6247
32	0.0031	0.0646
33	0.0013	0.0361
34	2.0429	3.2117
35	7.6594	6.2596
36	9.2380	6.1902
37	10.3476	5.9201
38	9.2001	5.8793
39	2.9126	3.4863
40	0	0
41	0.0275	0.3162
42	1.4057	2.9342
43	6.4567	6.5054
44	7.1873	6.4691
45	7.9215	6.3164
46	8.6749	5.8059
47	3.5103	4.3691
48	0.0199	0.2137
49	0.0178	0.2691
50	0.8200	2.0090
51	7.8690	5.6666
52	9.8857	5.1416
53	9.7648	5.3150
54	9.2833	5.9409

55	3.7439	4.9017
56	0.1483	0.7678
57	0.0003	0.0162
58	0.2830	0.9280
59	5.8559	4.9800
60	11.9430	4.3345
61	11.4612	4.9919
62	6.7005	5.7758
63	2.1057	4.0283
64	0.2022	1.1507
65	4.4973	2.8698

Amazon Reviews:

a. What is the number of attributes in each dataset?

There are three attributes in this dataset they are- Product, Review and Rating.

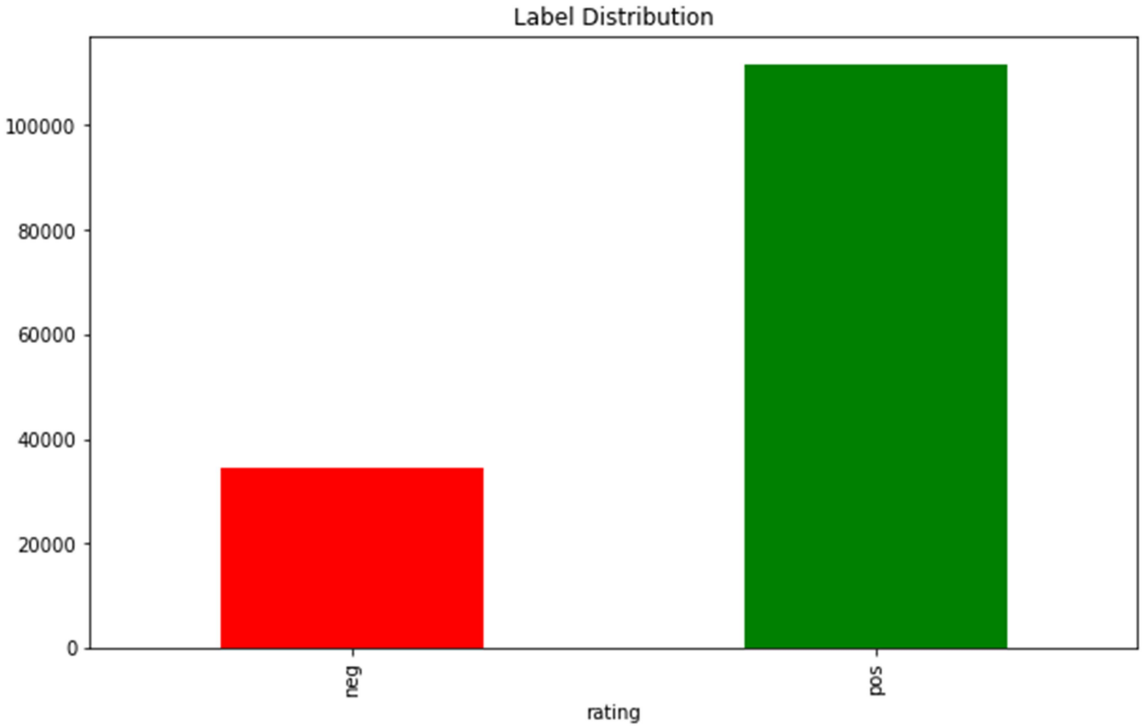
b. What is the number of observations?

The observations are the ratings possible that is 1-5.

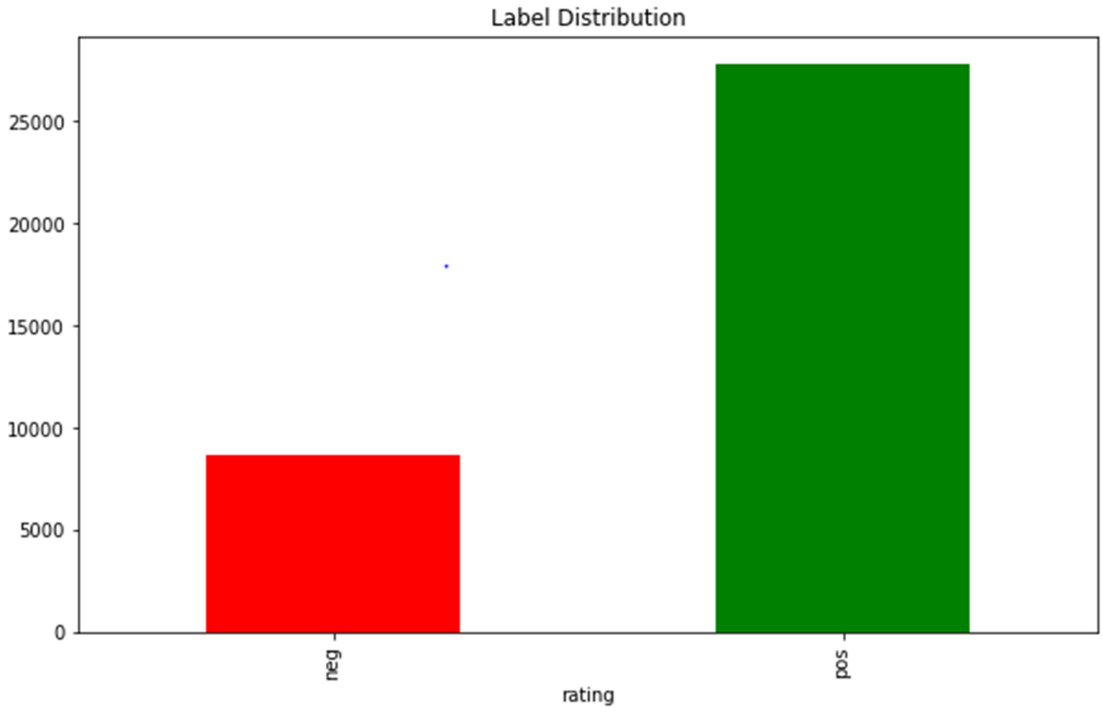
c. What is the mean and standard deviation of each attribute?

The mean and standard deviation for the ratings attribute is 4.120430078052725 and 1.2853703237434095 respectively.

d. What is the distribution of the different classes in each of the datasets?



Training Dataset



Test Dataset

Accuracy:

1. Linear Kernal:

- Training dataset – 90%
- Testing dataset – 72%.

2. Sigmoid Kernal (C = 1 , gamma = 'auto'):

- Training dataset – 78%
- Testing dataset – 76.42%.

3. RBF Kernal: (for different values of gamma and C the accuracy remained same)

- Training dataset – 78%
- Validation dataset – 76.42%.

References:

1. Scikit-learn API for python and it's documentation