

File - fadml_project_dpsvm_p2_(with_libraries)

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1 C:\Users\Lenovo\anaconda3\python.exe "D:\PycharmProjects\FADML_project\fadml_project_dpsvm_p2_(with_libraries).py"
2 ##### Loading and Exploratory Data Analysis #####
3
4 Pregnancies Glucose BloodPressure ... DiabetesPedigreeFunction Age Outcome
5 0       6   148      72 ...        0.627 50    1
6 1       1   85       66 ...        0.351 31    0
7 2       8   183      64 ...        0.672 32    1
8 3       1   89       66 ...        0.167 21    0
9 4       0   137      40 ...        2.288 33    1
10
11 [5 rows x 9 columns]
12
13 Shape: (768, 9)
14
15 Check nulls:
16 Pregnancies      0
17 Glucose          0
18 BloodPressure    0
19 SkinThickness    0
20 Insulin          0
21 BMI              0
22 DiabetesPedigreeFunction 0
23 Age              0
24 Outcome          0
25 dtype: int64
26
27 Check # unique items:
28 Pregnancies      17
29 Glucose          136
30 BloodPressure    47
31 SkinThickness    51
32 Insulin          186
33 BMI              248
34 DiabetesPedigreeFunction 517
35 Age              52
36 Outcome          2
37 dtype: int64
38
39 Check Outcome values:
40 [1 0]
41
42
43 ##### Preprocessing #####
44
45 X_train: (614, 8)
46 y_train: (614,)
47 X_test: (154, 8)
48 y_test: (154,)
49
50 Before Normalization
51 Mean: [ 3.74267101 120.85504886 69.41530945 20.3990228 81.43811075
52 31.98338762 0.46916775 32.90716612]
53
54 Std Dev: [ 3.31056497 32.00895893 18.49751705 15.42140098 116.14014299
55 7.73431907 0.33657233 11.49406506]
56
57 After Normalization
58 Mean: [ 0. -0. 0. -0. -0. 0. 0. -0.]
59
60 Std Dev: [1. 1. 1. 1. 1. 1. 1.]
61
62
63 ##### Training SVM and Hyperparameter Tuning #####
64
65 C=0.5, kernel=linear, gamma=None, degree=None || acc=0.7671, prec=0.7589, rec=0.4962, f1=0.5901
66 C=0.5, kernel=poly, gamma=None, degree=2 || acc=0.7671, prec=0.8272, rec=0.4183, f1=0.5473
67 C=0.5, kernel=poly, gamma=None, degree=3 || acc=0.7460, prec=0.8035, rec=0.3496, f1=0.4798
68 C=0.5, kernel=poly, gamma=None, degree=4 || acc=0.7361, prec=0.7835, rec=0.3298, f1=0.4586
69 C=0.5, kernel=rbf, gamma=0.001, degree=None || acc=0.6530, prec=0.0000, rec=0.0000, f1=0.0000
70 C=0.5, kernel=rbf, gamma=0.005, degree=None || acc=0.7329, prec=0.7966, rec=0.3128, f1=0.4408
71 C=0.5, kernel=rbf, gamma=0.01, degree=None || acc=0.7557, prec=0.7823, rec=0.4137, f1=0.5313
72 C=0.5, kernel=rbf, gamma=0.02, degree=None || acc=0.7622, prec=0.7711, rec=0.4535, f1=0.5621
73 C=0.5, kernel=rbf, gamma=0.03, degree=None || acc=0.7606, prec=0.7640, rec=0.4577, f1=0.5647
74 C=0.5, kernel=rbf, gamma=0.04, degree=None || acc=0.7639, prec=0.7696, rec=0.4621, f1=0.5692
75 C=0.5, kernel=rbf, gamma=0.05, degree=None || acc=0.7639, prec=0.7629, rec=0.4658, f1=0.5701
76 C=0.5, kernel=rbf, gamma=0.060000000000000005, degree=None || acc=0.7623, prec=0.7510, rec=0.4800, f1=0.5763

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77 C=0.5, kernel=rbf, gamma=0.0699999999999999, degree=None || acc=0.7639, prec=0.7545, rec=0.4800, f1=0.5776
78 C=0.5, kernel=rbf, gamma=0.08, degree=None || acc=0.7623, prec=0.7503, rec=0.4800, f1=0.5758
79 C=0.5, kernel=rbf, gamma=0.09, degree=None || acc=0.7639, prec=0.7508, rec=0.4846, f1=0.5785
80 C=0.5, kernel=rbf, gamma=0.0999999999999999, degree=None || acc=0.7672, prec=0.7537, rec=0.4940, f1=0.5856
81 C=0.5, kernel=rbf, gamma=0.5, degree=None || acc=0.7363, prec=0.6988, rec=0.4255, f1=0.5196
82 C=0.5, kernel=rbf, gamma=1, degree=None || acc=0.6776, prec=0.6494, rec=0.1574, f1=0.2405
83 C=1, kernel=linear, gamma=None, degree=None || acc=0.7671, prec=0.7589, rec=0.4962, f1=0.5901
84 C=1, kernel=poly, gamma=None, degree=2 || acc=0.7638, prec=0.7957, rec=0.4307, f1=0.5463
85 C=1, kernel=poly, gamma=None, degree=3 || acc=0.7443, prec=0.7578, rec=0.3906, f1=0.5069
86 C=1, kernel=poly, gamma=None, degree=4 || acc=0.7411, prec=0.7432, rec=0.3822, f1=0.5021
87 C=1, kernel=rbf, gamma=0.001, degree=None || acc=0.6807, prec=0.7800, rec=0.0990, f1=0.1694
88 C=1, kernel=rbf, gamma=0.005, degree=None || acc=0.7492, prec=0.7759, rec=0.3945, f1=0.5127
89 C=1, kernel=rbf, gamma=0.01, degree=None || acc=0.7606, prec=0.7639, rec=0.4585, f1=0.5634
90 C=1, kernel=rbf, gamma=0.02, degree=None || acc=0.7622, prec=0.7651, rec=0.4620, f1=0.5684
91 C=1, kernel=rbf, gamma=0.03, degree=None || acc=0.7639, prec=0.7612, rec=0.4721, f1=0.5746
92 C=1, kernel=rbf, gamma=0.04, degree=None || acc=0.7655, prec=0.7598, rec=0.4806, f1=0.5801
93 C=1, kernel=rbf, gamma=0.05, degree=None || acc=0.7623, prec=0.7534, rec=0.4756, f1=0.5743
94 C=1, kernel=rbf, gamma=0.06000000000000005, degree=None || acc=0.7607, prec=0.7470, rec=0.4798, f1=0.5744
95 C=1, kernel=rbf, gamma=0.0699999999999999, degree=None || acc=0.7639, prec=0.7467, rec=0.4945, f1=0.5837
96 C=1, kernel=rbf, gamma=0.08, degree=None || acc=0.7623, prec=0.7381, rec=0.5045, f1=0.5868
97 C=1, kernel=rbf, gamma=0.09, degree=None || acc=0.7640, prec=0.7372, rec=0.5138, f1=0.5925
98 C=1, kernel=rbf, gamma=0.0999999999999999, degree=None || acc=0.7640, prec=0.7305, rec=0.5228, f1=0.5952
99 C=1, kernel=rbf, gamma=0.5, degree=None || acc=0.7655, prec=0.7201, rec=0.5452, f1=0.6178
100 C=1, kernel=rbf, gamma=1, degree=None || acc=0.6889, prec=0.5947, rec=0.3026, f1=0.3956
101 C=5, kernel=linear, gamma=None, degree=None || acc=0.7671, prec=0.7589, rec=0.4962, f1=0.5901
102 C=5, kernel=poly, gamma=None, degree=2 || acc=0.7638, prec=0.7577, rec=0.4796, f1=0.5756
103 C=5, kernel=poly, gamma=None, degree=3 || acc=0.7150, prec=0.6408, rec=0.4575, f1=0.5243
104 C=5, kernel=poly, gamma=None, degree=4 || acc=0.7296, prec=0.6610, rec=0.4522, f1=0.5329
105 C=5, kernel=rbf, gamma=0.001, degree=None || acc=0.7475, prec=0.7691, rec=0.3945, f1=0.5109
106 C=5, kernel=rbf, gamma=0.005, degree=None || acc=0.7622, prec=0.7601, rec=0.4727, f1=0.5737
107 C=5, kernel=rbf, gamma=0.01, degree=None || acc=0.7655, prec=0.7681, rec=0.4719, f1=0.5768
108 C=5, kernel=rbf, gamma=0.02, degree=None || acc=0.7623, prec=0.7557, rec=0.4713, f1=0.5722
109 C=5, kernel=rbf, gamma=0.03, degree=None || acc=0.7574, prec=0.7396, rec=0.4751, f1=0.5702
110 C=5, kernel=rbf, gamma=0.04, degree=None || acc=0.7574, prec=0.7255, rec=0.4988, f1=0.5802
111 C=5, kernel=rbf, gamma=0.05, degree=None || acc=0.7590, prec=0.7215, rec=0.5196, f1=0.5930
112 C=5, kernel=rbf, gamma=0.06000000000000005, degree=None || acc=0.7623, prec=0.7182, rec=0.5377, f1=0.6027
113 C=5, kernel=rbf, gamma=0.0699999999999999, degree=None || acc=0.7623, prec=0.7120, rec=0.5523, f1=0.6111
114 C=5, kernel=rbf, gamma=0.08, degree=None || acc=0.7689, prec=0.7095, rec=0.5759, f1=0.6263
115 C=5, kernel=rbf, gamma=0.09, degree=None || acc=0.7623, prec=0.7010, rec=0.5628, f1=0.6142
116 C=5, kernel=rbf, gamma=0.0999999999999999, degree=None || acc=0.7656, prec=0.7044, rec=0.5679, f1=0.6192
117 C=5, kernel=rbf, gamma=0.5, degree=None || acc=0.7395, prec=0.6467, rec=0.5684, f1=0.6018
118 C=5, kernel=rbf, gamma=1, degree=None || acc=0.6987, prec=0.5930, rec=0.4132, f1=0.4836
119 C=10, kernel=linear, gamma=None, degree=None || acc=0.7671, prec=0.7589, rec=0.4962, f1=0.5901
120 C=10, kernel=poly, gamma=None, degree=2 || acc=0.7606, prec=0.7370, rec=0.4840, f1=0.5749
121 C=10, kernel=poly, gamma=None, degree=3 || acc=0.7037, prec=0.5973, rec=0.4786, f1=0.5232
122 C=10, kernel=poly, gamma=None, degree=4 || acc=0.7249, prec=0.6330, rec=0.4949, f1=0.5522
123 C=10, kernel=rbf, gamma=0.001, degree=None || acc=0.7606, prec=0.7565, rec=0.4681, f1=0.5674
124 C=10, kernel=rbf, gamma=0.005, degree=None || acc=0.7639, prec=0.7619, rec=0.4719, f1=0.5744
125 C=10, kernel=rbf, gamma=0.01, degree=None || acc=0.7590, prec=0.7513, rec=0.4680, f1=0.5681
126 C=10, kernel=rbf, gamma=0.02, degree=None || acc=0.7622, prec=0.7481, rec=0.4849, f1=0.5802
127 C=10, kernel=rbf, gamma=0.03, degree=None || acc=0.7574, prec=0.7263, rec=0.4997, f1=0.5832
128 C=10, kernel=rbf, gamma=0.04, degree=None || acc=0.7558, prec=0.7139, rec=0.5188, f1=0.5882
129 C=10, kernel=rbf, gamma=0.05, degree=None || acc=0.7655, prec=0.7243, rec=0.5475, f1=0.6127
130 C=10, kernel=rbf, gamma=0.06000000000000005, degree=None || acc=0.7656, prec=0.7074, rec=0.5674, f1=0.6206
131 C=10, kernel=rbf, gamma=0.0699999999999999, degree=None || acc=0.7623, prec=0.7010, rec=0.5628, f1=0.6142
132 C=10, kernel=rbf, gamma=0.08, degree=None || acc=0.7608, prec=0.6836, rec=0.5822, f1=0.6216
133 C=10, kernel=rbf, gamma=0.09, degree=None || acc=0.7543, prec=0.6752, rec=0.5674, f1=0.6090
134 C=10, kernel=rbf, gamma=0.0999999999999999, degree=None || acc=0.7494, prec=0.6663, rec=0.5674, f1=0.6042
135 C=10, kernel=rbf, gamma=0.5, degree=None || acc=0.7281, prec=0.6254, rec=0.5693, f1=0.5931
136 C=10, kernel=rbf, gamma=1, degree=None || acc=0.6988, prec=0.5910, rec=0.4276, f1=0.4928
137
138 Best params: {'kernel': 'rbf', 'C': 5, 'gamma': 0.08, 'degree': None}
139 Best scores: {'acc': 0.7688789000528821, 'prec': 0.7095208908028601, 'rec': 0.5759073077951796, 'f1': 0.6263441873233182}
140
141
142 ##### Testing and Evaluation #####
143
144 Test Accuracy: 0.7337662337662337
145 Test Precision: 0.6521739130434783
146 Test Recall: 0.5454545454545454
147 Test F1 Score: 0.594059405940594
148
149 Classification Report:
150      precision    recall   f1-score   support
151
152      -1       0.77     0.84     0.80      99

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File - fadml_project_dpsvm_p2_(with_libraries)

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153      1  0.65  0.55  0.59   55
154
155 accuracy          0.73   154
156 macro avg    0.71  0.69  0.70   154
157 weighted avg  0.73  0.73  0.73   154
158
159
160
161 ##### sklearn.svm LinearSVC #####
162
163 [LinearSVC] C=0.01 || acc=0.7572, prec=0.7091, rec=0.5308, f1=0.5986
164 [LinearSVC] C=0.05 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
165 [LinearSVC] C=0.1 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
166 [LinearSVC] C=0.5 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
167 [LinearSVC] C=1 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
168 [LinearSVC] C=2 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
169 [LinearSVC] C=5 || acc=0.7605, prec=0.7161, rec=0.5404, f1=0.6055
170 [LinearSVC] C=10 || acc=0.7622, prec=0.7236, rec=0.5354, f1=0.6054
171
172 Best params LinearSVC: {'C': 0.05}
173 Best scores LinearSVC: {'acc': 0.7604970914859862, 'prec': 0.7161260381345521, 'rec': 0.5403712096446649, 'f1': 0.6054689923355774}
174
175 SVC Test Accuracy: 0.7597402597402597
176 SVC Test Precision: 0.6607142857142857
177 SVC Test Recall: 0.6727272727272727
178 SVC Test F1 Score: 0.6666666666666666
179
180 Classification Report:
181      precision  recall  f1-score  support
182
183      -1  0.82  0.81  0.81   99
184      1  0.66  0.67  0.67   55
185
186 accuracy          0.76   154
187 macro avg    0.74  0.74  0.74   154
188 weighted avg  0.76  0.76  0.76   154
189
190
191 Process finished with exit code 0
192
```