

learn	rate set to 0.009807		
1:	learn: 0.685682	total: 52.8ms	remaining: 52.8ms
2:	learn: 0.676701	total: 56.2ms	remaining: 18.7ms
3:	learn: 0.650815	total: 57.7ms	remaining: 13.8ms
4:	learn: 0.665822	total: 59.3ms	remaining: 13.8ms
5:	learn: 0.650347	total: 60.9ms	remaining: 10.1ms
6:	learn: 0.645658	total: 62.5ms	remaining: 10.1ms
7:	learn: 0.647891	total: 63.9ms	remaining: 9.3ms
8:	learn: 0.642864	total: 65ms	remaining: 7.6ms
9:	learn: 0.639812	total: 66.2ms	remaining: 7.6ms
10:	learn: 0.632516	total: 68.2ms	remaining: 6.1ms
11:	learn: 0.628375	total: 69.3ms	remaining: 5.7ms
12:	learn: 0.621687	total: 70.7ms	remaining: 5.7ms
13:	learn: 0.618735	total: 72.3ms	remaining: 5.0ms
14:	learn: 0.613734	total: 73.7ms	remaining: 4.4ms
15:	learn: 0.608615	total: 75.8ms	remaining: 4.4ms
16:	learn: 0.605645	total: 77ms	remaining: 4.2ms
17:	learn: 0.603497	total: 78.9ms	remaining: 4.2ms
18:	learn: 0.591634	total: 79.8ms	remaining: 3.9ms
19:	learn: 0.587330	total: 81.1ms	remaining: 3.7ms
20:	learn: 0.582392	total: 82.5ms	remaining: 3.7ms
21:	learn: 0.578279	total: 84ms	remaining: 3.5ms
22:	learn: 0.575186	total: 84.8ms	remaining: 3.4ms
23:	learn: 0.572015	total: 87ms	remaining: 3.4ms
24:	learn: 0.567515	total: 87.8ms	remaining: 3.2ms
25:	learn: 0.563843	total: 89.1ms	remaining: 3.2ms
26:	learn: 0.560409	total: 92.3ms	remaining: 3.0ms
27:	learn: 0.556529	total: 93.5ms	remaining: 3.0ms
28:	learn: 0.553026	total: 93.5ms	remaining: 2.9ms
29:	learn: 0.549238	total: 96.3ms	remaining: 2.9ms
30:	learn: 0.545353	total: 97.8ms	remaining: 2.7ms
31:	learn: 0.541658	total: 100ms	remaining: 2.7ms
32:	learn: 0.538033	total: 101ms	remaining: 2.8ms
33:	learn: 0.534490	total: 101ms	remaining: 2.7ms
34:	learn: 0.530989	total: 104ms	remaining: 2.7ms
35:	learn: 0.527490	total: 104ms	remaining: 2.6ms
36:	learn: 0.523985	total: 107ms	remaining: 2.6ms
37:	learn: 0.520487	total: 107ms	remaining: 2.5ms
38:	learn: 0.516982	total: 110ms	remaining: 2.5ms
39:	learn: 0.513473	total: 111ms	remaining: 2.4ms
40:	learn: 0.509961	total: 113ms	remaining: 2.4ms
41:	learn: 0.506448	total: 113ms	remaining: 2.4ms
42:	learn: 0.502937	total: 116ms	remaining: 2.3ms
43:	learn: 0.500434	total: 118ms	remaining: 2.3ms
44:	learn: 0.496924	total: 118ms	remaining: 2.2ms
45:	learn: 0.494418	total: 121ms	remaining: 2.2ms
46:	learn: 0.491913	total: 121ms	remaining: 2.2ms
47:	learn: 0.489406	total: 122ms	remaining: 2.2ms
48:	learn: 0.486891	total: 125ms	remaining: 2.1ms
49:	learn: 0.484377	total: 125ms	remaining: 2.1ms
50:	learn: 0.481862	total: 131ms	remaining: 2.1ms
51:	learn: 0.479348	total: 131ms	remaining: 2.1ms
52:	learn: 0.476835	total: 134ms	remaining: 2.1ms
53:	learn: 0.474320	total: 135ms	remaining: 2.0ms
54:	learn: 0.471805	total: 137ms	remaining: 2.0ms
55:	learn: 0.469290	total: 137ms	remaining: 2.0ms
56:	learn: 0.466776	total: 140ms	remaining: 2.0ms
57:	learn: 0.464262	total: 141ms	remaining: 2ms
58:	learn: 0.461747	total: 142ms	remaining: 1.9ms
59:	learn: 0.459232	total: 144ms	remaining: 1.9ms
60:	learn: 0.456717	total: 144ms	remaining: 1.8ms
61:	learn: 0.454202	total: 148ms	remaining: 1.8ms
62:	learn: 0.451687	total: 148ms	remaining: 1.7ms
63:	learn: 0.449173	total: 150ms	remaining: 1.7ms
64:	learn: 0.446658	total: 152ms	remaining: 1.6ms
65:	learn: 0.444143	total: 152ms	remaining: 1.6ms
66:	learn: 0.441628	total: 155ms	remaining: 1.6ms
67:	learn: 0.439113	total: 155ms	remaining: 1.5ms
68:	learn: 0.436598	total: 156ms	remaining: 1.5ms
69:	learn: 0.434083	total: 158ms	remaining: 1.5ms
70:	learn: 0.431568	total: 160ms	remaining: 1.4ms
71:	learn: 0.429053	total: 160ms	remaining: 1.4ms
72:	learn: 0.426538	total: 163ms	remaining: 1.4ms
73:	learn: 0.424023	total: 163ms	remaining: 1.3ms
74:	learn: 0.421508	total: 166ms	remaining: 1.3ms
75:	learn: 0.418993	total: 166ms	remaining: 1.3ms
76:	learn: 0.416478	total: 169ms	remaining: 1.3ms
77:	learn: 0.413963	total: 169ms	remaining: 1.2ms
78:	learn: 0.411448	total: 172ms	remaining: 1.2ms
79:	learn: 0.408933	total: 172ms	remaining: 1.2ms
80:	learn: 0.406418	total: 175ms	remaining: 1.2ms
81:	learn: 0.403903	total: 175ms	remaining: 1.1ms
82:	learn: 0.401388	total: 178ms	remaining: 1.1ms
83:	learn: 0.398873	total: 178ms	remaining: 1.1ms
84:	learn: 0.396358	total: 181ms	remaining: 1.1ms
85:	learn: 0.393843	total: 181ms	remaining: 1.0ms
86:	learn: 0.391328	total: 184ms	remaining: 1.0ms
87:	learn: 0.388813	total: 184ms	remaining: 1.0ms
88:	learn: 0.386298	total: 187ms	remaining: 1.0ms
89:	learn: 0.383783	total: 187ms	remaining: 0.9ms
90:	learn: 0.381268	total: 190ms	remaining: 0.9ms
91:	learn: 0.378753	total: 190ms	remaining: 0.9ms
92:	learn: 0.376238	total: 193ms	remaining: 0.9ms
93:	learn: 0.373723	total: 193ms	remaining: 0.8ms
94:	learn: 0.371208	total: 196ms	remaining: 0.8ms
95:	learn: 0.368693	total: 196ms	remaining: 0.8ms
96:	learn: 0.366178	total: 199ms	remaining: 0.8ms
97:	learn: 0.363663	total: 199ms	remaining: 0.7ms
98:	learn: 0.361148	total: 202ms	remaining: 0.7ms
99:	learn: 0.358633	total: 202ms	remaining: 0.7ms
100:	learn: 0.356118	total: 204ms	remaining: 0.7ms
101:	learn: 0.353603	total: 206ms	remaining: 0.7ms
102:	learn: 0.351088	total: 208ms	remaining: 0.7ms
103:	learn: 0.348573	total: 208ms	remaining: 0.6ms
104:	learn: 0.346058	total: 211ms	remaining: 0.6ms
105:	learn: 0.343543	total: 211ms	remaining: 0.6ms
106:	learn: 0.341028	total: 214ms	remaining: 0.6ms
107:	learn: 0.338513	total: 214ms	remaining: 0.5ms
108:	learn: 0.335998	total: 215ms	remaining: 0.5ms
109:	learn: 0.333483	total: 218ms	remaining: 0.5ms
110:	learn: 0.330968	total: 218ms	remaining: 0.5ms
111:	learn: 0.328453	total: 221ms	remaining: 0.5ms
112:	learn: 0.325938	total: 221ms	remaining: 0.4ms
113:	learn: 0.323423	total: 222ms	remaining: 0.4ms
114:	learn: 0.320908	total: 225ms	remaining: 0.4ms
115:	learn: 0.318393	total: 225ms	remaining: 0.4ms
116:	learn: 0.315878	total: 228ms	remaining: 0.4ms
117:	learn: 0.313363	total: 228ms	remaining: 0.3ms
118:	learn: 0.310848	total: 231ms	remaining: 0.3ms
119:	learn: 0.308333	total: 231ms	remaining: 0.3ms
120:	learn: 0.305818	total: 234ms	remaining: 0.3ms
121:	learn: 0.303303	total: 234ms	remaining: 0.3ms
122:	learn: 0.300788	total: 237ms	remaining: 0.3ms
123:	learn: 0.298273	total: 237ms	remaining: 0.2ms
124:	learn: 0.295758	total: 240ms	remaining: 0.2ms
125:	learn: 0.293243	total: 240ms	remaining: 0.2ms
126:	learn: 0.290728	total: 243ms	remaining: 0.2ms
127:	learn: 0.288213	total: 243ms	remaining: 0.2ms
128:	learn: 0.285698	total: 246ms	remaining: 0.2ms
129:	learn: 0.283183	total: 246ms	remaining: 0.1ms
130:	learn: 0.280668	total: 249ms	remaining: 0.1ms
131:	learn: 0.278153	total: 249ms	remaining: 0.1ms
132:	learn: 0.275638	total: 252ms	remaining: 0.1ms
133:	learn: 0.273123	total: 252ms	remaining: 0.1ms
134:	learn: 0.270608	total: 255ms	remaining: 0.1ms
135:	learn: 0.268093	total: 255ms	remaining: 0.1ms
136:	learn: 0.265578	total: 258ms	remaining: 0.1ms
137:	learn: 0.263063	total: 258ms	remaining: 0.1ms
138:	learn: 0.260548	total: 261ms	remaining: 0.1ms
139:	learn: 0.258033	total: 261ms	remaining: 0.1ms
140:	learn: 0.255518	total: 264ms	remaining: 0.1ms
141:	learn: 0.253003	total: 264ms	remaining: 0.1ms
142:	learn: 0.250488	total: 267ms	remaining: 0.1ms
143:	learn: 0.247973	total: 267ms	remaining: 0.1ms
144:	learn: 0.245458	total: 270ms	remaining: 0.1ms
145:	learn: 0.242943	total: 270ms	remaining: 0.1ms
146:	learn: 0.240428	total: 273ms	remaining: 0.1ms
147:	learn: 0.237913	total: 273ms	remaining: 0.1ms
148:	learn: 0.235398	total: 276ms	remaining: 0.1ms
149:	learn: 0.232883	total: 276ms	remaining: 0.1ms
150:	learn: 0.230368	total: 279ms	remaining: 0.1ms
151:	learn: 0.227853	total: 279ms	remaining: 0.1ms
152:	learn: 0.225338	total: 282ms	remaining: 0.1ms
153:	learn: 0.222823	total: 282ms	remaining: 0.1ms
154:	learn: 0.220308	total: 285ms	remaining: 0.1ms
155:	learn: 0.217793	total: 285ms	remaining: 0.1ms
156:	learn: 0.215278	total: 288ms	remaining: 0.1ms
157:	learn: 0.212763	total: 288ms	remaining: 0.1ms
158:	learn: 0.210248	total: 291ms	remaining: 0.1ms
159:	learn: 0.207733	total: 291ms	remaining: 0.1ms
160:	learn: 0.205218	total: 294ms	remaining: 0.1ms
161:	learn: 0.202703	total: 294ms	remaining: 0.1ms
162:	learn: 0.200188	total: 297ms	remaining: 0.1ms
163:	learn: 0.197673	total: 297ms	remaining: 0.1ms
164:	learn: 0.195158	total: 300ms	remaining: 0.1ms
165:	learn: 0.192643	total: 300ms	remaining: 0.1ms
166:	learn: 0.190128	total: 303ms	remaining: 0.1ms
167:	learn: 0.187613	total: 303ms	remaining: 0.1ms
168:	learn: 0.185098	total: 306ms	remaining: 0.1ms
169:	learn: 0.182583	total: 306ms	remaining: 0.1ms
170:	learn: 0.180068	total: 309ms	remaining: 0.1ms
171:	learn: 0.177553	total: 309ms	remaining: 0.1ms
172:	learn: 0.175038	total: 312ms	remaining: 0.1ms
173:	learn: 0.172523	total: 312ms	remaining: 0.1ms
174:	learn: 0.170008	total: 315ms	remaining: 0.1ms
175:	learn: 0.167493	total: 315ms	remaining: 0.1ms
176:	learn: 0.164978	total: 318ms	remaining: 0.1ms
177:	learn: 0.162463	total: 318ms	remaining: 0.1ms
178:	learn: 0.159948	total: 321ms	remaining: 0.1ms
179:	learn: 0.157433	total: 321ms	remaining: 0.1ms
180:	learn: 0.154918	total: 324ms	remaining: 0.1ms
181:	learn: 0.152403	total: 324ms	remaining: 0.1ms
182:	learn: 0.149888	total: 327ms	remaining: 0.1ms
183:	learn: 0.147373	total: 327ms	remaining: 0.1ms
184:	learn: 0.144858	total: 330ms	remaining: 0.1ms
185:	learn: 0.142343	total: 330ms	remaining: 0.1ms
186:	learn: 0.139828	total: 333ms	remaining: 0.1ms
187:	learn: 0.137313	total: 333ms	remaining: 0.1ms
188:	learn: 0.134798	total: 336ms	remaining: 0.1ms
189:	learn: 0.132283	total: 336ms	remaining: 0.1ms
190:	learn: 0.129768	total: 339ms	remaining: 0.1ms
191:	learn: 0.127253	total: 339ms	remaining: 0.1ms
192:	learn: 0.124738	total: 342ms	remaining: 0.1ms
193:	learn: 0.122223	total: 342ms	remaining: 0.1ms
194:	learn: 0.119708	total: 345ms	remaining: 0.1ms
195:	learn: 0.117193	total: 345ms	remaining: 0.1ms
196:	learn: 0.114678	total: 348ms	remaining: 0.1ms
197:	learn: 0.112163	total: 348ms	remaining: 0.1ms
198:	learn: 0.109648	total: 351ms	remaining: 0.1ms
199:	learn: 0.107133	total: 351ms	remaining: 0.1ms
200:	learn: 0.104618	total: 354ms	remaining: 0.1ms
201:	learn: 0.102103	total: 354ms	remaining: 0.1ms
202:	learn: 0.099588	total: 357ms	remaining: 0.1ms
203:	learn: 0.097073	total: 357ms	remaining: 0.1ms
204:	learn: 0.094558	total: 360ms	remaining: 0.1ms
205:	learn: 0.092043	total: 360ms	remaining: 0.1ms
206:	learn: 0.089528	total: 363ms	remaining: 0.1ms
207:	learn: 0.087013	total: 363ms	remaining: 0.1ms
208:	learn: 0.084498	total: 366ms	remaining: 0.1ms
209:	learn: 0.081983	total: 366ms	remaining: 0.1ms
210:	learn: 0.079468	total: 369ms	remaining: 0.1ms
211:	learn: 0.076953	total: 369ms	remaining: 0.1ms
212:	learn: 0.074438	total: 372ms	remaining: 0.1ms
213:	learn: 0.071923	total: 372ms	remaining: 0.1ms
214:	learn: 0.069408	total: 375ms	remaining: 0.1ms
215:	learn: 0.066893	total: 375ms	remaining: 0.1ms
216:	learn: 0.064378	total: 378ms	remaining: 0.1ms
217:	learn: 0.061863	total: 378ms	remaining: 0.1ms
218:	learn: 0.059348	total: 381ms	remaining: 0.1ms
219:	learn: 0.056833	total: 381ms	remaining: 0.1ms
220:	learn: 0.054318	total: 384ms	remaining: 0.1ms
221:	learn: 0.051803	total: 384ms	remaining: 0.1ms
222:	learn: 0.049288	total: 387ms	remaining: 0.1ms
223:	learn: 0.046773	total: 387ms	remaining: 0.1ms
224:	learn: 0.044258	total: 390ms	remaining: 0.1ms
225:	learn: 0.041743	total: 390ms	remaining: 0.1ms
226:	learn: 0.039228	total: 393ms	remaining: 0.1ms
227:	learn: 0.036713	total: 393ms	remaining: 0.1ms
228:	learn: 0.034198	total: 396ms	remaining: 0.1ms
229:	learn: 0.031683	total: 396ms	remaining: 0.1ms
230:	learn: 0.029168	total: 399ms	remaining: 0.1ms
231:	learn: 0.026653	total: 399ms	remaining: 0.1ms
232:	learn: 0.024138	total: 402ms	remaining: 0.1ms
233:	learn: 0.021623	total: 402ms	remaining: 0.1ms
234:	learn: 0.019108	total: 405ms	remaining: 0.1ms


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899: learn: 0.2917453      total: 1.64s      remaining: 187ms
900: learn: 0.2916219      total: 1.64s      remaining: 180ms
901: learn: 0.2915342      total: 1.64s      remaining: 178ms
902: learn: 0.2914526      total: 1.64s      remaining: 176ms
903: learn: 0.2914039      total: 1.64s      remaining: 174ms
904: learn: 0.2913072      total: 1.64s      remaining: 173ms
905: learn: 0.2912691      total: 1.65s      remaining: 171ms
906: learn: 0.2911366      total: 1.65s      remaining: 168ms
907: learn: 0.2910639      total: 1.65s      remaining: 167ms
908: learn: 0.2910040      total: 1.65s      remaining: 165ms
909: learn: 0.2909422      total: 1.65s      remaining: 163ms
910: learn: 0.2908553      total: 1.65s      remaining: 161ms
911: learn: 0.2906955      total: 1.65s      remaining: 160ms
912: learn: 0.2906428      total: 1.66s      remaining: 158ms
913: learn: 0.2905681      total: 1.66s      remaining: 156ms
914: learn: 0.2905027      total: 1.66s      remaining: 154ms
915: learn: 0.2904313      total: 1.66s      remaining: 152ms
916: learn: 0.2902394      total: 1.66s      remaining: 150ms
917: learn: 0.2901391      total: 1.66s      remaining: 149ms
918: learn: 0.2901225      total: 1.67s      remaining: 147ms
919: learn: 0.2900303      total: 1.67s      remaining: 145ms
920: learn: 0.2899985      total: 1.67s      remaining: 143ms
921: learn: 0.2899359      total: 1.67s      remaining: 141ms
922: learn: 0.2897966      total: 1.67s      remaining: 139ms
923: learn: 0.2896399      total: 1.67s      remaining: 138ms
924: learn: 0.2893584      total: 1.68s      remaining: 136ms
925: learn: 0.2894693      total: 1.68s      remaining: 134ms
926: learn: 0.2893584      total: 1.68s      remaining: 132ms
927: learn: 0.2893298      total: 1.68s      remaining: 130ms
928: learn: 0.2892607      total: 1.68s      remaining: 128ms
929: learn: 0.2892009      total: 1.68s      remaining: 127ms
930: learn: 0.2890386      total: 1.69s      remaining: 125ms
931: learn: 0.2888686      total: 1.69s      remaining: 123ms
932: learn: 0.2888301      total: 1.69s      remaining: 121ms
933: learn: 0.2887367      total: 1.69s      remaining: 120ms
934: learn: 0.2886862      total: 1.69s      remaining: 118ms
935: learn: 0.2885696      total: 1.69s      remaining: 116ms
936: learn: 0.2883853      total: 1.69s      remaining: 114ms
937: learn: 0.2882182      total: 1.7s      remaining: 112ms
938: learn: 0.2881587      total: 1.7s      remaining: 110ms
939: learn: 0.2879424      total: 1.7s      remaining: 108ms
940: learn: 0.2878307      total: 1.7s      remaining: 107ms
941: learn: 0.2876648      total: 1.7s      remaining: 105ms
942: learn: 0.2875931      total: 1.7s      remaining: 103ms
943: learn: 0.2875435      total: 1.7s      remaining: 101ms
944: learn: 0.2875103      total: 1.71s      remaining: 99.3ms
945: learn: 0.2874394      total: 1.71s      remaining: 97.5ms
946: learn: 0.2872882      total: 1.71s      remaining: 95.6ms
947: learn: 0.2872233      total: 1.71s      remaining: 93.8ms
948: learn: 0.2870986      total: 1.71s      remaining: 90.2ms
949: learn: 0.2870594      total: 1.71s      remaining: 88.4ms
950: learn: 0.2869984      total: 1.72s      remaining: 86.4ms
951: learn: 0.2869421      total: 1.72s      remaining: 84.8ms
952: learn: 0.2868698      total: 1.72s      remaining: 82.9ms
953: learn: 0.2868062      total: 1.72s      remaining: 81.1ms
954: learn: 0.2867359      total: 1.72s      remaining: 79.3ms
955: learn: 0.2866766      total: 1.72s      remaining: 77.5ms
956: learn: 0.2866335      total: 1.73s      remaining: 75.7ms
957: learn: 0.2865038      total: 1.73s      remaining: 73.9ms
958: learn: 0.2864267      total: 1.73s      remaining: 72ms
959: learn: 0.2863735      total: 1.73s      remaining: 70.2ms
960: learn: 0.2863038      total: 1.73s      remaining: 68.4ms
961: learn: 0.2862036      total: 1.73s      remaining: 66.6ms
962: learn: 0.2861043      total: 1.73s      remaining: 64.8ms
963: learn: 0.2860385      total: 1.74s      remaining: 63ms
964: learn: 0.2859759      total: 1.74s      remaining: 61.2ms
965: learn: 0.2859279      total: 1.74s      remaining: 59.4ms
966: learn: 0.2858535      total: 1.74s      remaining: 57.7ms
967: learn: 0.2857737      total: 1.74s      remaining: 55.9ms
968: learn: 0.2857152      total: 1.74s      remaining: 54.1ms
969: learn: 0.2856550      total: 1.74s      remaining: 52.3ms
970: learn: 0.2854894      total: 1.74s      remaining: 50.5ms
971: learn: 0.2854424      total: 1.75s      remaining: 48.7ms
972: learn: 0.2852532      total: 1.75s      remaining: 46.9ms
973: learn: 0.2851799      total: 1.75s      remaining: 45.1ms
974: learn: 0.2849984      total: 1.75s      remaining: 43.3ms
975: learn: 0.2849321      total: 1.75s      remaining: 41.5ms
976: learn: 0.2849136      total: 1.75s      remaining: 39.7ms
977: learn: 0.2847643      total: 1.76s      remaining: 37.9ms
978: learn: 0.2846474      total: 1.76s      remaining: 36.1ms
979: learn: 0.2845011      total: 1.76s      remaining: 34.3ms
980: learn: 0.2843430      total: 1.76s      remaining: 32.5ms
981: learn: 0.2842028      total: 1.76s      remaining: 30.7ms
982: learn: 0.2841577      total: 1.77s      remaining: 28.9ms
983: learn: 0.2840650      total: 1.77s      remaining: 27.1ms
984: learn: 0.2840147      total: 1.77s      remaining: 25.3ms
985: learn: 0.2839225      total: 1.77s      remaining: 23.5ms
986: learn: 0.2838433      total: 1.77s      remaining: 21.7ms
987: learn: 0.2838127      total: 1.78s      remaining: 19.9ms
988: learn: 0.2837646      total: 1.78s      remaining: 18.1ms
989: learn: 0.2837450      total: 1.78s      remaining: 16.3ms
990: learn: 0.2836436      total: 1.78s      remaining: 14.5ms
991: learn: 0.2834878      total: 1.78s      remaining: 12.7ms
992: learn: 0.2834355      total: 1.78s      remaining: 10.9ms
993: learn: 0.2833380      total: 1.78s      remaining: 9.1ms
994: learn: 0.2832964      total: 1.78s      remaining: 7.3ms
995: learn: 0.2832752      total: 1.78s      remaining: 5.5ms
996: learn: 0.2832341      total: 1.78s      remaining: 3.7ms
997: learn: 0.2831142      total: 1.79s      remaining: 1.9ms
998: learn: 0.2830096      total: 1.79s      remaining: 0.1ms
999: learn: 0.2828315      total: 1.79s      remaining: 0s
catboost.core.CatBoostClassifier at 0x7f7030221110>
```

Out[33]:

```
In [34]: from sklearn.metrics import confusion_matrix, accuracy_score
y_pred = classifier.predict(X_test)
cm = confusion_matrix(y_test, y_pred)
print(cm)
accuracy_score(y_test, y_pred)
```

Out[34]:

```
(1246, 20)
[[ 33 119]]
0.8732057416267942
```

In [35]:

```
from sklearn.model_selection import cross_val_score
accuracies = cross_val_score(estimator = classifier, X = X_train, y = y_train, cv = 10)
print("Accuracy: %s" % accuracies.mean()*100, 2f) %
print("Standard Deviation: ( %s" % accuracies.std()*100, 2f) %
```


learn: rate set to 0.009371			
1: learn: 0.686563	total: 4.21ms	remaining: 4.2ms	
2: learn: 0.673988	total: 5.67ms	remaining: 1.89s	
3: learn: 0.646559	total: 1.46ms	remaining: 1.46ms	
4: learn: 0.663892	total: 7.84ms	remaining: 1.56s	
5: learn: 0.658263	total: 8.84ms	remaining: 1.46s	
6: learn: 0.646136	total: 1.46ms	remaining: 1.46ms	
7: learn: 0.647030	total: 11.7ms	remaining: 1.46s	
8: learn: 0.643737	total: 12.7ms	remaining: 1.4s	
9: learn: 0.639217	total: 12.7ms	remaining: 1.46s	
10: learn: 0.631084	total: 14.9ms	remaining: 1.34s	
11: learn: 0.626440	total: 16.2ms	remaining: 1.33s	
12: learn: 0.626440	total: 16.2ms	remaining: 1.33s	
13: learn: 0.616211	total: 19.4ms	remaining: 1.30s	
14: learn: 0.613752	total: 20.5ms	remaining: 1.35s	
15: learn: 0.613752	total: 20.5ms	remaining: 1.35s	
16: learn: 0.602143	total: 23.4ms	remaining: 1.35s	
17: learn: 0.597872	total: 25.4ms	remaining: 1.32s	
18: learn: 0.597872	total: 25.4ms	remaining: 1.32s	
19: learn: 0.589166	total: 28.4ms	remaining: 1.39s	
20: learn: 0.585582	total: 29.9ms	remaining: 1.37s	
21: learn: 0.585582	total: 29.9ms	remaining: 1.37s	
22: learn: 0.577088	total: 32.3ms	remaining: 1.37s	
23: learn: 0.572593	total: 33.5ms	remaining: 1.36s	
24: learn: 0.572593	total: 33.5ms	remaining: 1.36s	
25: learn: 0.567655	total: 35.4ms	remaining: 1.32s	
26: learn: 0.562652	total: 36.2ms	remaining: 1.38s	
27: learn: 0.562652	total: 36.2ms	remaining: 1.38s	
28: learn: 0.555731	total: 38.3ms	remaining: 1.28s	
29: learn: 0.552325	total: 39.7ms	remaining: 1.28s	
30: learn: 0.552325	total: 39.7ms	remaining: 1.28s	
31: learn: 0.548209	total: 41.2ms	remaining: 1.25s	
32: learn: 0.542780	total: 42.4ms	remaining: 1.24s	
33: learn: 0.542780	total: 42.4ms	remaining: 1.24s	
34: learn: 0.537032	total: 44.9ms	remaining: 1.24s	
35: learn: 0.533640	total: 46.3ms	remaining: 1.24s	
36: learn: 0.533640	total: 46.3ms	remaining: 1.24s	
37: learn: 0.527805	total: 49.1ms	remaining: 1.24s	
38: learn: 0.524567	total: 50.8ms	remaining: 1.25s	
39: learn: 0.524567	total: 50.8ms	remaining: 1.25s	
40: learn: 0.518640	total: 53.9ms	remaining: 1.26s	
41: learn: 0.515543	total: 55.5ms	remaining: 1.25s	
42: learn: 0.515543	total: 55.5ms	remaining: 1.25s	
43: learn: 0.509584	total: 57.5ms	remaining: 1.25s	
44: learn: 0.506855	total: 59.1ms	remaining: 1.25s	
45: learn: 0.506855	total: 59.1ms	remaining: 1.25s	
46: learn: 0.501932	total: 61.6ms	remaining: 1.25s	
47: learn: 0.495020	total: 63.1ms	remaining: 1.25s	
48: learn: 0.495020	total: 63.1ms	remaining: 1.25s	
49: learn: 0.494712	total: 65.4ms	remaining: 1.24s	
50: learn: 0.488500	total: 66.3ms	remaining: 1.23s	
51: learn: 0.488500	total: 66.3ms	remaining: 1.23s	
52: learn: 0.484883	total: 69.1ms	remaining: 1.23s	
53: learn: 0.486955	total: 70.4ms	remaining: 1.23s	
54: learn: 0.486955	total: 70.4ms	remaining: 1.23s	
55: learn: 0.482037	total: 71.1ms	remaining: 1.23s	
56: learn: 0.480721	total: 74.7ms	remaining: 1.24s	
57: learn: 0.480721	total: 74.7ms	remaining: 1.24s	
58: learn: 0.474037	total: 78.1ms	remaining: 1.22s	
59: learn: 0.474037	total: 78.1ms	remaining: 1.22s	
60: learn: 0.471635	total: 80.2ms	remaining: 1.21s	
61: learn: 0.470261	total: 81.4ms	remaining: 1.21s	
62: learn: 0.470261	total: 81.4ms	remaining: 1.21s	
63: learn: 0.467153	total: 84.2ms	remaining: 1.21s	
64: learn: 0.465027	total: 85.2ms	remaining: 1.21s	
65: learn: 0.465027	total: 85.2ms	remaining: 1.21s	
66: learn: 0.461492	total: 87.6ms	remaining: 1.21s	
67: learn: 0.459889	total: 91.5ms	remaining: 1.2s	
68: learn: 0.459889	total: 91.5ms	remaining: 1.2s	
69: learn: 0.456201	total: 92.6ms	remaining: 1.19s	
70: learn: 0.456201	total: 92.6ms	remaining: 1.19s	
71: learn: 0.453628	total: 95.5ms	remaining: 1.19s	
72: learn: 0.449643	total: 96.7ms	remaining: 1.19s	
73: learn: 0.449643	total: 96.7ms	remaining: 1.19s	
74: learn: 0.447522	total: 98.7ms	remaining: 1.18s	
75: learn: 0.446173	total: 99.9ms	remaining: 1.18s	
76: learn: 0.446173	total: 99.9ms	remaining: 1.18s	
77: learn: 0.443808	total: 102ms	remaining: 1.18s	
78: learn: 0.442685	total: 103ms	remaining: 1.17s	
79: learn: 0.442685	total: 103ms	remaining: 1.17s	
80: learn: 0.440391	total: 106ms	remaining: 1.17s	
81: learn: 0.439327	total: 107ms	remaining: 1.17s	
82: learn: 0.439327	total: 107ms	remaining: 1.17s	
83: learn: 0.436632	total: 111ms	remaining: 1.17s	
84: learn: 0.435323	total: 113ms	remaining: 1.17s	
85: learn: 0.435323	total: 113ms	remaining: 1.17s	
86: learn: 0.432643	total: 115ms	remaining: 1.16s	
87: learn: 0.432643	total: 115ms	remaining: 1.16s	
88: learn: 0.430283	total: 118ms	remaining: 1.17s	
89: learn: 0.430283	total: 118ms	remaining: 1.17s	
90: learn: 0.427079	total: 122ms	remaining: 1.17s	
91: learn: 0.429259	total: 122ms	remaining: 1.17s	
92: learn: 0.429259	total: 122ms	remaining: 1.17s	
93: learn: 0.427384	total: 122ms	remaining: 1.16s	
94: learn: 0.426902	total: 122ms	remaining: 1.16s	
95: learn: 0.426902	total: 122ms	remaining: 1.16s	
96: learn: 0.424741	total: 125ms	remaining: 1.15s	
97: learn: 0.423543	total: 127ms	remaining: 1.15s	
98: learn: 0.423543	total: 127ms	remaining: 1.15s	
99: learn: 0.421638	total: 129ms	remaining: 1.15s	
100: learn: 0.422430	total: 130ms	remaining: 1.14s	
101: learn: 0.421638	total: 132ms	remaining: 1.14s	
102: learn: 0.419642	total: 133ms	remaining: 1.13s	
103: learn: 0.418788	total: 135ms	remaining: 1.13s	
104: learn: 0.418788	total: 135ms	remaining: 1.13s	
105: learn: 0.416941	total: 137ms	remaining: 1.13s	
106: learn: 0.416941	total: 137ms	remaining: 1.13s	
107: learn: 0.413970	total: 139ms	remaining: 1.13s	
108: learn: 0.413970	total: 139ms	remaining: 1.13s	
109: learn: 0.411975	total: 143ms	remaining: 1.13s	
110: learn: 0.413524	total: 144ms	remaining: 1.12s	
111: learn: 0.413524	total: 144ms	remaining: 1.12s	
112: learn: 0.411841	total: 145ms	remaining: 1.13s	
113: learn: 0.412013	total: 147ms	remaining: 1.13s	
114: learn: 0.412013	total: 147ms	remaining: 1.13s	
115: learn: 0.409575	total: 148ms	remaining: 1.13s	
116: learn: 0.408921	total: 152ms	remaining: 1.13s	
117: learn: 0.408921	total: 152ms	remaining: 1.13s	
118: learn: 0.407234	total: 154ms	remaining: 1.13s	
119: learn: 0.406980	total: 154ms	remaining: 1.13s	
120: learn: 0.406980	total: 154ms	remaining: 1.13s	
121: learn: 0.406085	total: 157ms	remaining: 1.13s	
122: learn: 0.405862	total: 158ms	remaining: 1.12s	
123: learn: 0.405862	total: 158ms	remaining: 1.12s	
124: learn: 0.404639	total: 160ms	remaining: 1.12s	
125: learn: 0.403797	total: 162ms	remaining: 1.12s	
126: learn: 0.403797	total: 162ms	remaining: 1.12s	
127: learn: 0.402575	total: 164ms	remaining: 1.12s	
128: learn: 0.401950	total: 166ms	remaining: 1.12s	
129: learn: 0.401950	total: 166ms	remaining: 1.12s	
130: learn: 0.400941	total: 167ms	remaining: 1.12s	
131: learn: 0.400708	total: 170ms	remaining: 1.12s	
132: learn: 0.400708	total: 170ms	remaining: 1.12s	
133: learn: 0.399632	total: 173ms	remaining: 1.11s	
134: learn: 0.399632	total: 173ms	remaining: 1.11s	
135: learn: 0.398253	total: 175ms	remaining: 1.12s	
136: learn: 0.398253	total: 175ms	remaining: 1.12s	
137: learn: 0.396938	total: 180ms	remaining: 1.12s	
138: learn: 0.396938	total: 180ms	remaining: 1.12s	
139: learn: 0.396703	total: 182ms	remaining: 1.13s	
140: learn: 0.396402	total: 184ms	remaining: 1.13s	
141: learn: 0.396402	total: 184ms	remaining: 1.13s	
142: learn: 0.395602	total: 189ms	remaining: 1.15s	
143: learn: 0.395602	total: 189ms	remaining: 1.15s	
144: learn: 0.394938	total: 191ms	remaining: 1.15s	
145: learn: 0.394938	total: 191ms	remaining: 1.15s	
146: learn: 0.393988	total: 192ms	remaining: 1.14s	
147: learn: 0.393988	total: 192ms	remaining: 1.14s	
148: learn: 0.393645	total: 195ms	remaining: 1.14s	
149: learn: 0.393645	total: 195ms	remaining: 1.14s	
150: learn: 0.392616	total: 200ms	remaining: 1.14s	
151: learn: 0.392616	total: 200ms	remaining: 1.14s	
152: learn: 0.390884	total: 202ms	remaining: 1.14s	
153: learn: 0.390884	total: 202ms	remaining: 1.14s	
154: learn: 0.389929	total: 206ms	remaining: 1.15s	
155: learn: 0.389929	total: 206ms	remaining: 1.15s	
156: learn: 0.388747	total: 211ms	remaining: 1.15s	
157: learn: 0.388747	total: 211ms	remaining: 1.15s	
158: learn: 0.388016	total: 216ms	remaining: 1.15s	
159: learn: 0.388016	total: 216ms	remaining: 1.15s	
160: learn: 0.387522	total: 223ms	remaining: 1.16s	
161: learn: 0.386996	total: 224ms	remaining: 1.16s	
162: learn: 0.386996	total: 224ms	remaining: 1.16s	
163: learn: 0.386491	total: 228ms	remaining: 1.16s	
164: learn: 0.386491	total: 228ms	remaining: 1.16s	
165: learn: 0.385705	total: 230ms	remaining: 1.17s	
166: learn: 0.385705	total: 230ms	remaining: 1.17s	
167: learn: 0.384843	total: 232ms	remaining: 1.17s	
168: learn: 0.384843	total: 232ms	remaining: 1.17s	
169: learn: 0.383410	total: 236ms	remaining: 1.17s	
170: learn: 0.383410	total: 236ms	remaining: 1.17s	
171: learn: 0.382728	total: 240ms	remaining: 1.18s	
172: learn: 0.382728	total: 240ms	remaining: 1.18s	
173: learn: 0.382484	total: 242ms	remaining: 1.18s	
174: learn: 0.382484	total: 242ms	remaining: 1.18s	
175: learn: 0.381606	total: 254ms	remaining: 1.19s	
176: learn: 0.381606	total: 254ms	remaining: 1.19s	
177: learn: 0.380436	total: 256ms	remaining: 1.19s	
178: learn: 0.380436	total: 256ms	remaining: 1.19s	
179: learn: 0.380139	total: 262ms	remaining: 1.19s	
180: learn: 0.380139	total: 262ms	remaining: 1.19s	
181: learn: 0.380043	total: 264ms	remaining: 1.19s	
182: learn: 0.379577	total: 268ms	remaining: 1.18s	
183: learn: 0.379577	total: 268ms	remaining: 1.18s	
184: learn: 0.379202	total: 269ms	remaining: 1.18s	
185: learn: 0.378815	total: 271ms	remaining: 1.19s	
186: learn: 0.378815	total: 271ms	remaining: 1.19s	
187: learn: 0.378405	total: 272ms	remaining: 1.18s	
188: learn: 0.378405	total: 272ms	remaining: 1.18s	
189: learn: 0.377512	total: 278ms	remaining: 1.18s	
190: learn: 0.377512	total: 278ms	remaining: 1.18s	
191: learn: 0.377188	total: 281ms	remaining: 1.18s	
192: learn: 0.376928	total: 284ms	remaining: 1.18s	
193: learn: 0.376928	total: 284ms	remaining: 1.18s	
194: learn: 0.376130	total: 287ms	remaining: 1.19s	
195: learn: 0.376130	total: 287ms	remaining: 1.19s	
196: learn: 0.375650	total: 292ms	remaining: 1.19s	
197: learn: 0.375650	total: 292ms	remaining: 1.19s	
198: learn: 0.374932	total: 295ms	remaining: 1.18s	
199: learn: 0.374932	total: 295ms	remaining: 1.18s	
200: learn: 0.374420	total: 304ms	remaining: 1.19s	
201: learn: 0.374420	total: 304ms	remaining: 1.19s	
202: learn: 0.373797	total: 306ms	remaining: 1.19s	
203: learn: 0.373797	total: 306ms	remaining: 1.19s	
204: learn: 0.373039	total: 311ms	remaining: 1.19s	
205: learn: 0.373039	total: 311ms	remaining: 1.19s	
206: learn: 0.372438	total: 316ms	remaining: 1.19s	
207: learn: 0.372438	total: 316ms	remaining: 1.19s	
208: learn: 0.371981	total: 317ms	remaining: 1.19s	
209: learn: 0.371981	total: 317ms	remaining: 1.19s	
210: learn: 0.371764	total: 323ms	remaining: 1.19s	
211: learn: 0.371764	total: 323ms	remaining: 1.19s	
212: learn: 0.371672	total: 328ms	remaining: 1.19s	
213: learn: 0.371672	total: 328ms	remaining: 1.19s	
214: learn: 0.370934	total: 332ms	remaining: 1.2s	
215: learn: 0.370934	total: 332ms	remaining: 1.2s	
216: learn: 0.370737	total: 333ms	remaining: 1.19s	
217: learn: 0.370737	total: 333ms	remaining: 1.19s	
218: learn: 0.370092	total: 338ms	remaining: 1.19s	
219: learn: 0.370092	total: 338ms	remaining: 1.19s	
220: learn: 0.369368	total: 341ms	remaining: 1.19s	
221: learn: 0.369368	total: 341ms	remaining: 1.19s	
222: learn: 0.368908	total: 345ms	remaining: 1.19s	
223: learn: 0.368908	total: 345ms	remaining: 1.19s	
224: learn: 0.368237	total: 347ms	remaining: 1.19s	
225: learn: 0.368237	total: 347ms	remaining: 1.19s	
226: learn: 0.367583	total: 351ms	remaining: 1.19s	
227: learn: 0.367583	total: 351ms	remaining: 1.19s	
228: learn: 0.367298	total: 353ms	remaining: 1.19s	
229: learn: 0.367298	total: 353ms	remaining: 1.19s</	

[illegible]

788:	learn: 0.303408	total: 1.178	remaining: 295ms
789:	learn: 0.303408	total: 1.178	remaining: 295ms
790:	learn: 0.303408	total: 1.178	remaining: 292ms
801:	learn: 0.304023	total: 1.188	remaining: 291ms
802:	learn: 0.304023	total: 1.188	remaining: 291ms
803:	learn: 0.303805	total: 1.188	remaining: 298ms
804:	learn: 0.303805	total: 1.188	remaining: 298ms
805:	learn: 0.303805	total: 1.188	remaining: 298ms
806:	learn: 0.303765	total: 1.188	remaining: 293ms
807:	learn: 0.303616	total: 1.198	remaining: 292ms
808:	learn: 0.303616	total: 1.198	remaining: 292ms
809:	learn: 0.303616	total: 1.198	remaining: 292ms
810:	learn: 0.303616	total: 1.198	remaining: 292ms
811:	learn: 0.303039	total: 1.198	remaining: 278ms
812:	learn: 0.303039	total: 1.198	remaining: 278ms
813:	learn: 0.302944	total: 1.128	remaining: 275ms
814:	learn: 0.302870	total: 1.128	remaining: 274ms
815:	learn: 0.302870	total: 1.128	remaining: 274ms
816:	learn: 0.302870	total: 1.128	remaining: 274ms
817:	learn: 0.302496	total: 1.218	remaining: 270ms
818:	learn: 0.302496	total: 1.218	remaining: 270ms
819:	learn: 0.302073	total: 1.218	remaining: 265ms
820:	learn: 0.302073	total: 1.218	remaining: 265ms
821:	learn: 0.301784	total: 1.218	remaining: 263ms
822:	learn: 0.301686	total: 1.228	remaining: 261ms
823:	learn: 0.301686	total: 1.228	remaining: 261ms
824:	learn: 0.301325	total: 1.228	remaining: 258ms
825:	learn: 0.3012674	total: 1.228	remaining: 257ms
826:	learn: 0.3012674	total: 1.228	remaining: 257ms
827:	learn: 0.301095	total: 1.238	remaining: 255ms
828:	learn: 0.3010951	total: 1.238	remaining: 255ms
829:	learn: 0.301095	total: 1.238	remaining: 255ms
830:	learn: 0.300745	total: 1.238	remaining: 251ms
831:	learn: 0.300460	total: 1.238	remaining: 249ms
832:	learn: 0.300460	total: 1.238	remaining: 249ms
833:	learn: 0.300367	total: 1.248	remaining: 247ms
834:	learn: 0.300367	total: 1.248	remaining: 247ms
835:	learn: 0.300367	total: 1.248	remaining: 247ms
836:	learn: 0.300252	total: 1.248	remaining: 242ms
837:	learn: 0.299711	total: 1.248	remaining: 241ms
838:	learn: 0.299711	total: 1.248	remaining: 241ms
839:	learn: 0.299601	total: 1.258	remaining: 238ms
840:	learn: 0.299621	total: 1.258	remaining: 236ms
841:	learn: 0.299621	total: 1.258	remaining: 236ms
842:	learn: 0.299439	total: 1.258	remaining: 234ms
843:	learn: 0.299319	total: 1.268	remaining: 232ms
844:	learn: 0.299319	total: 1.268	remaining: 232ms
845:	learn: 0.299319	total: 1.268	remaining: 232ms
846:	learn: 0.299031	total: 1.268	remaining: 228ms
847:	learn: 0.298569	total: 1.268	remaining: 225ms
848:	learn: 0.298956	total: 1.278	remaining: 225ms
849:	learn: 0.298927	total: 1.278	remaining: 223ms
850:	learn: 0.298215	total: 1.278	remaining: 222ms
851:	learn: 0.298547	total: 1.278	remaining: 220ms
852:	learn: 0.298892	total: 1.278	remaining: 219ms
853:	learn: 0.297645	total: 1.278	remaining: 216ms
854:	learn: 0.298211	total: 1.278	remaining: 216ms
855:	learn: 0.298002	total: 1.288	remaining: 215ms
856:	learn: 0.297571	total: 1.288	remaining: 212ms
857:	learn: 0.297827	total: 1.288	remaining: 212ms
858:	learn: 0.297609	total: 1.298	remaining: 211ms
859:	learn: 0.297609	total: 1.298	remaining: 211ms
860:	learn: 0.297609	total: 1.298	remaining: 211ms
861:	learn: 0.297561	total: 1.298	remaining: 206ms
862:	learn: 0.297561	total: 1.298	remaining: 206ms
863:	learn: 0.297390	total: 1.298	remaining: 204ms
864:	learn: 0.297231	total: 1.298	remaining: 202ms
865:	learn: 0.297231	total: 1.298	remaining: 202ms
866:	learn: 0.297170	total: 1.338	remaining: 199ms
867:	learn: 0.297027	total: 1.338	remaining: 198ms
868:	learn: 0.297027	total: 1.338	remaining: 198ms
869:	learn: 0.296793	total: 1.338	remaining: 195ms
870:	learn: 0.296757	total: 1.318	remaining: 194ms
871:	learn: 0.296757	total: 1.318	remaining: 194ms
872:	learn: 0.296624	total: 1.318	remaining: 191ms
873:	learn: 0.296572	total: 1.318	remaining: 189ms
874:	learn: 0.296503	total: 1.318	remaining: 187ms
875:	learn: 0.296304	total: 1.338	remaining: 186ms
876:	learn: 0.296270	total: 1.338	remaining: 185ms
877:	learn: 0.296270	total: 1.338	remaining: 185ms
878:	learn: 0.296170	total: 1.328	remaining: 182ms
879:	learn: 0.296062	total: 1.338	remaining: 180ms
880:	learn: 0.296062	total: 1.338	remaining: 180ms
881:	learn: 0.296234	total: 1.438	remaining: 179ms
882:	learn: 0.295673	total: 1.338	remaining: 177ms
883:	learn: 0.295570	total: 1.338	remaining: 176ms
884:	learn: 0.295570	total: 1.338	remaining: 176ms
885:	learn: 0.295298	total: 1.338	remaining: 173ms
886:	learn: 0.295298	total: 1.338	remaining: 173ms
887:	learn: 0.295298	total: 1.338	remaining: 173ms
888:	learn: 0.295166	total: 1.338	remaining: 168ms
889:	learn: 0.295063	total: 1.338	remaining: 167ms
890:	learn: 0.295063	total: 1.338	remaining: 167ms
891:	learn: 0.294819	total: 1.348	remaining: 164ms
892:	learn: 0.294531	total: 1.348	remaining: 162ms
893:	learn: 0.294531	total: 1.348	remaining: 162ms
894:	learn: 0.294531	total: 1.348	remaining: 162ms
895:	learn: 0.294581	total: 1.348	remaining: 159ms
896:	learn: 0.294468	total: 1.348	remaining: 158ms
897:	learn: 0.294468	total: 1.348	remaining: 158ms
898:	learn: 0.294468	total: 1.348	remaining: 158ms
899:	learn: 0.294327	total: 1.358	remaining: 155ms
900:	learn: 0.294306	total: 1.358	remaining: 153ms
901:	learn: 0.294306	total: 1.358	remaining: 153ms
902:	learn: 0.294196	total: 1.358	remaining: 150ms
903:	learn: 0.294018	total: 1.358	remaining: 149ms
904:	learn: 0.294018	total: 1.358	remaining: 149ms
905:	learn: 0.293941	total: 1.368	remaining: 146ms
906:	learn: 0.293814	total: 1.368	remaining: 145ms
907:	learn: 0.293814	total: 1.368	remaining: 145ms
908:	learn: 0.293616	total: 1.368	remaining: 141ms
909:	learn: 0.293517	total: 1.368	remaining: 139ms
910:	learn: 0.293517	total: 1.368	remaining: 139ms
911:	learn: 0.293319	total: 1.368	remaining: 136ms
912:	learn: 0.293213	total: 1.368	remaining: 135ms
913:	learn: 0.293213	total: 1.368	remaining: 135ms
914:	learn: 0.293039	total: 1.368	remaining: 132ms
915:	learn: 0.292938	total: 1.378	remaining: 130ms
916:	learn: 0.292938	total: 1.378	remaining: 130ms
917:	learn: 0.292742	total: 1.378	remaining: 127ms
918:	learn: 0.292636	total: 1.378	remaining: 126ms
919:	learn: 0.292636	total: 1.378	remaining: 126ms
920:	learn: 0.292419	total: 1.378	remaining: 123ms
921:	learn: 0.292303	total: 1.378	remaining: 122ms
922:	learn: 0.292303	total: 1.378	remaining: 122ms
923:	learn: 0.292163	total: 1.388	remaining: 121ms
924:	learn: 0.292045	total: 1.388	remaining: 120ms
925:	learn: 0.292045	total: 1.388	remaining: 120ms
926:	learn: 0.291896	total: 1.388	remaining: 117ms
927:	learn: 0.291749	total: 1.388	remaining: 114ms
928:	learn: 0.291749	total: 1.388	remaining: 114ms
929:	learn: 0.291603	total: 1.388	remaining: 112ms
930:	learn: 0.291457	total: 1.388	remaining: 110ms
931:	learn: 0.291457	total: 1.388	remaining: 110ms
932:	learn: 0.291311	total: 1.388	remaining: 107ms
933:	learn: 0.291165	total: 1.388	remaining: 105ms
934:	learn: 0.291165	total: 1.388	remaining: 105ms
935:	learn: 0.291020	total: 1.388	remaining: 102ms
936:	learn: 0.290874	total: 1.388	remaining: 100ms
937:	learn: 0.290874	total: 1.388	remaining: 100ms
938:	learn: 0.290729	total: 1.418	remaining: 97ms
939:	learn: 0.290583	total: 1.418	remaining: 95ms
940:	learn: 0.290583	total: 1.418	remaining: 95ms
941:	learn: 0.290438	total: 1.418	remaining: 92ms
942:	learn: 0.290292	total: 1.418	remaining: 90ms
943:	learn: 0.290292	total: 1.418	remaining: 90ms
944:	learn: 0.290147	total: 1.418	remaining: 87ms
945:	learn: 0.289999	total: 1.418	remaining: 85ms
946:	learn: 0.289999	total: 1.418	remaining: 85ms
947:	learn: 0.289854	total: 1.418	remaining: 82ms
948:	learn: 0.289707	total: 1.418	remaining: 80ms
949:	learn: 0.289707	total: 1.418	remaining: 80ms
950:	learn: 0.289561	total: 1.448	remaining: 77ms
951:	learn: 0.289414	total: 1.448	remaining: 75ms
952:	learn: 0.289414	total: 1.448	remaining: 75ms
953:	learn: 0.289268	total: 1.448	remaining: 72ms
954:	learn: 0.289121	total: 1.448	remaining: 70ms
955:	learn: 0.289121	total: 1.448	remaining: 70ms
956:	learn: 0.288975	total: 1.448	remaining: 67ms
957:	learn: 0.288828	total: 1.448	remaining: 65ms
958:	learn: 0.288828	total: 1.448	remaining: 65ms
959:	learn: 0.288682	total: 1.448	remaining: 62ms
960:	learn: 0.288535	total: 1.448	remaining: 60ms
961:	learn: 0.288535	total: 1.448	remaining: 60ms
962:	learn: 0.288389	total: 1.448	remaining: 57ms
963:	learn: 0.288242	total: 1.448	remaining: 55ms
964:	learn: 0.288242	total: 1.448	remaining: 55ms
965:	learn: 0.288096	total: 1.448	remaining: 52ms
966:	learn: 0.287949	total: 1.448	remaining: 50ms
967:	learn: 0.287949	total: 1.448	remaining: 50ms
968:	learn: 0.287803	total: 1.448	remaining: 47ms
969:	learn: 0.287656	total: 1.448	remaining: 45ms
970:	learn: 0.287656	total: 1.448	remaining: 45ms
971:	learn: 0.287510	total: 1.448	remaining: 42ms
972:	learn: 0.287363	total: 1.448	remaining: 40ms
973:	learn: 0.287363	total: 1.448	remaining: 40ms
974:	learn: 0.287217	total: 1.448	remaining: 37ms
975:	learn: 0.287070	total: 1.448	remaining: 35ms
976:	learn: 0.287070	total: 1.448	remaining: 35ms
977:	learn: 0.286924	total: 1.448	remaining: 32ms
978:	learn: 0.286777	total: 1.448	remaining: 30ms
979:	learn: 0.286777	total: 1.448	remaining: 30ms
980:	learn: 0.286631	total: 1.448	remaining: 27ms
981:	learn: 0.286484	total: 1.448	remaining: 25ms
982:	learn: 0.286484	total: 1.448	remaining: 25ms
983:	learn: 0.286338	total: 1.448	remaining: 22ms
984:	learn: 0.286191	total: 1.448	remaining: 20ms
985:	learn: 0.286191	total: 1.448	remaining: 20ms
986:	learn: 0.286045	total: 1.448	remaining: 17ms
987:	learn: 0.285898	total: 1.448	remaining: 15ms
988:	learn: 0.285898	total: 1.448	remaining: 15ms
989:	learn: 0.285752	total: 1.448	remaining: 12ms
990:	learn: 0.285605	total: 1.448	remaining: 10ms
991:	learn: 0.285605	total: 1.448	remaining: 10ms
992:	learn: 0.285459	total: 1.448	remaining: 7ms
993:	learn: 0.285312	total: 1.448	remaining: 5ms
994:	learn: 0.285312	total: 1.448	remaining: 5ms
995:	learn: 0.285166	total: 1.448	remaining: 2ms
996:	learn: 0.285019	total: 1.448	remaining: 0ms
997:	learn: 0.285019	total: 1.448	remaining: 0ms
998:	learn: 0.284873	total: 1.448	remaining: 0ms
999:	learn: 0.284726	total: 1.448	remaining: 0ms
0:	learn: 0.686795	total: 1.68ms	remaining: 1.67s
1:	learn: 0.685238	total: 2.54ms	remaining: 1.27s
2:	learn: 0.684682	total: 4.83ms	remaining: 1.27s
3:	learn: 0.672162	total: 4.83ms	remaining: 1.28s
4:	learn: 0.666992	total: 6.32ms	remaining: 1.26s
5:	learn: 0.666050	total: 6.32ms	remaining: 1.26s
6:	learn: 0.654705	total: 9.87ms	remaining: 1.44s
7:	learn: 0.648084	total: 11.5ms	remaining: 1.43s
8:	learn: 0.637469	total: 12.5ms	remaining: 1.43s
9:	learn: 0.630427	total: 15.2ms	remaining: 1.37s
10:	learn: 0.624948	total: 15.2ms	remaining: 1.37s
11:	learn: 0.613266	total: 19.5ms	remaining: 1.37s
12:	learn: 0.607120	total: 22.9ms	remaining: 1.41s
13:	learn: 0.598322	total: 24.6ms	remaining: 1.42s
14:	learn: 0.588808	total: 27.5ms	remaining: 1.42s
15:	learn: 0.588808	total: 27.5ms	remaining: 1.42s
16:	learn: 0.584612	total: 28.9ms	remaining: 1.42s
17:	learn: 0.577752	total: 31.8ms	remaining: 1.42s
18:	learn: 0.571505	total: 33.3ms	remaining: 1.41s
19:	learn: 0.567809	total: 36.1ms	remaining: 1.41s
20:	learn: 0.561358	total: 37.3ms	remaining: 1.48s
21:	learn: 0.555149	total: 40ms	remaining: 1.39s
22:	learn: 0.547193	total: 41.4ms	remaining: 1.35s
23:	learn: 0.541978	total: 43.3ms	remaining: 1.35s
24:	learn: 0.537798	total: 44.6ms	remaining: 1.35s
25:	learn: 0.533213	total: 47.5ms	remaining: 1.35s
26:	learn: 0.526870	total: 48.9ms	remaining: 1.35s
27:	learn: 0.520822	total: 51.6ms	remaining: 1.34s
28:	learn: 0.517038	total: 53.1ms	remaining: 1.34s
29:	learn: 0.510724	total: 55.9ms	remaining: 1.34s
30:	learn: 0.505018	total: 57.4ms	remaining: 1.32s
31:	learn: 0.500240	total: 60.8ms	remaining: 1.32s
32:	learn: 0.497181	total: 63.1ms	remaining: 1.31s
33			

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586	learn: 0.327028	total: 878ms	remaining: 590ms
587	learn: 0.326988	total: 878ms	remaining: 589ms
588	learn: 0.327000	total: 876ms	remaining: 587ms
589	learn: 0.326881	total: 878ms	remaining: 585ms
590	learn: 0.326828	total: 878ms	remaining: 584ms
591	learn: 0.326721	total: 880ms	remaining: 582ms
602	learn: 0.326433	total: 882ms	remaining: 581ms
603	learn: 0.326418	total: 882ms	remaining: 580ms
604	learn: 0.326578	total: 880ms	remaining: 578ms
605	learn: 0.325982	total: 880ms	remaining: 576ms
606	learn: 0.326475	total: 882ms	remaining: 575ms
607	learn: 0.325894	total: 888ms	remaining: 573ms
608	learn: 0.325735	total: 890ms	remaining: 572ms
609	learn: 0.326458	total: 890ms	remaining: 571ms
610	learn: 0.325618	total: 894ms	remaining: 569ms
611	learn: 0.325521	total: 895ms	remaining: 567ms
612	learn: 0.325427	total: 895ms	remaining: 566ms
613	learn: 0.325370	total: 898ms	remaining: 564ms
614	learn: 0.325186	total: 898ms	remaining: 563ms
615	learn: 0.325102	total: 901ms	remaining: 561ms
616	learn: 0.324938	total: 901ms	remaining: 559ms
617	learn: 0.324751	total: 902ms	remaining: 558ms
618	learn: 0.324615	total: 904ms	remaining: 556ms
619	learn: 0.324645	total: 904ms	remaining: 554ms
620	learn: 0.324593	total: 905ms	remaining: 552ms
621	learn: 0.324475	total: 905ms	remaining: 551ms
622	learn: 0.324303	total: 908ms	remaining: 549ms
623	learn: 0.324273	total: 908ms	remaining: 548ms
624	learn: 0.324648	total: 912ms	remaining: 546ms
625	learn: 0.324234	total: 910ms	remaining: 544ms
626	learn: 0.324053	total: 912ms	remaining: 543ms
627	learn: 0.324012	total: 914ms	remaining: 541ms
628	learn: 0.323897	total: 914ms	remaining: 539ms
629	learn: 0.323514	total: 916ms	remaining: 538ms
630	learn: 0.323419	total: 916ms	remaining: 537ms
631	learn: 0.323170	total: 920ms	remaining: 536ms
632	learn: 0.323127	total: 920ms	remaining: 534ms
633	learn: 0.322917	total: 922ms	remaining: 532ms
634	learn: 0.322884	total: 924ms	remaining: 531ms
635	learn: 0.322858	total: 925ms	remaining: 529ms
636	learn: 0.322812	total: 925ms	remaining: 528ms
637	learn: 0.322690	total: 930ms	remaining: 526ms
638	learn: 0.322081	total: 932ms	remaining: 524ms
639	learn: 0.321927	total: 932ms	remaining: 523ms
640	learn: 0.321932	total: 935ms	remaining: 522ms
641	learn: 0.321705	total: 936ms	remaining: 520ms
642	learn: 0.321633	total: 936ms	remaining: 519ms
643	learn: 0.321468	total: 940ms	remaining: 518ms
644	learn: 0.321431	total: 940ms	remaining: 515ms
645	learn: 0.321395	total: 942ms	remaining: 513ms
646	learn: 0.321153	total: 944ms	remaining: 511ms
647	learn: 0.321056	total: 945ms	remaining: 510ms
648	learn: 0.321017	total: 945ms	remaining: 509ms
649	learn: 0.320861	total: 950ms	remaining: 507ms
650	learn: 0.320740	total: 951ms	remaining: 505ms
651	learn: 0.320623	total: 951ms	remaining: 503ms
652	learn: 0.320589	total: 954ms	remaining: 502ms
653	learn: 0.320501	total: 956ms	remaining: 500ms
654	learn: 0.320467	total: 956ms	remaining: 499ms
655	learn: 0.320221	total: 961ms	remaining: 497ms
656	learn: 0.320189	total: 961ms	remaining: 495ms
657	learn: 0.319827	total: 966ms	remaining: 493ms
658	learn: 0.319625	total: 968ms	remaining: 491ms
659	learn: 0.319532	total: 970ms	remaining: 489ms
660	learn: 0.319469	total: 971ms	remaining: 487ms
661	learn: 0.319323	total: 972ms	remaining: 485ms
662	learn: 0.319408	total: 973ms	remaining: 483ms
663	learn: 0.319282	total: 975ms	remaining: 481ms
664	learn: 0.319151	total: 975ms	remaining: 479ms
665	learn: 0.319164	total: 978ms	remaining: 478ms
666	learn: 0.319018	total: 978ms	remaining: 476ms
667	learn: 0.318907	total: 981ms	remaining: 474ms
668	learn: 0.318702	total: 985ms	remaining: 472ms
669	learn: 0.318639	total: 985ms	remaining: 470ms
670	learn: 0.318410	total: 988ms	remaining: 468ms
671	learn: 0.318299	total: 988ms	remaining: 467ms
672	learn: 0.318128	total: 992ms	remaining: 465ms
673	learn: 0.317988	total: 994ms	remaining: 463ms
674	learn: 0.317819	total: 994ms	remaining: 461ms
675	learn: 0.317651	total: 997ms	remaining: 459ms
676	learn: 0.317631	total: 998ms	remaining: 457ms
677	learn: 0.317438	total: 998ms	remaining: 455ms
678	learn: 0.317395	total: 1001ms	remaining: 453ms
679	learn: 0.317254	total: 1001ms	remaining: 451ms
680	learn: 0.317274	total: 1004ms	remaining: 449ms
681	learn: 0.317045	total: 1004ms	remaining: 447ms
682	learn: 0.316923	total: 1010ms	remaining: 445ms
683	learn: 0.316803	total: 1010ms	remaining: 443ms
684	learn: 0.316780	total: 1012ms	remaining: 441ms
685	learn: 0.316646	total: 1012ms	remaining: 439ms
686	learn: 0.316436	total: 1014ms	remaining: 437ms
687	learn: 0.316315	total: 1014ms	remaining: 435ms
688	learn: 0.316179	total: 1018ms	remaining: 433ms
689	learn: 0.316158	total: 1018ms	remaining: 431ms
690	learn: 0.315878	total: 1022ms	remaining: 429ms
691	learn: 0.315795	total: 1022ms	remaining: 427ms
692	learn: 0.315748	total: 1024ms	remaining: 425ms
693	learn: 0.315402	total: 1024ms	remaining: 423ms
694	learn: 0.315264	total: 1030ms	remaining: 421ms
695	learn: 0.315217	total: 1030ms	remaining: 419ms
696	learn: 0.315107	total: 1033ms	remaining: 417ms
697	learn: 0.315040	total: 1033ms	remaining: 415ms
698	learn: 0.314857	total: 1034ms	remaining: 413ms
699	learn: 0.314781	total: 1034ms	remaining: 411ms
700	learn: 0.314601	total: 1040ms	remaining: 409ms
701	learn: 0.314588	total: 1040ms	remaining: 407ms
702	learn: 0.314422	total: 1044ms	remaining: 405ms
703	learn: 0.314322	total: 1044ms	remaining: 403ms
704	learn: 0.314278	total: 1044ms	remaining: 401ms
705	learn: 0.314224	total: 1048ms	remaining: 399ms
706	learn: 0.314171	total: 1048ms	remaining: 397ms
707	learn: 0.314039	total: 1050ms	remaining: 395ms
708	learn: 0.313970	total: 1050ms	remaining: 393ms
709	learn: 0.313828	total: 1054ms	remaining: 391ms
710	learn: 0.313608	total: 1054ms	remaining: 389ms
711	learn: 0.313527	total: 1056ms	remaining: 387ms
712	learn: 0.313505	total: 1056ms	remaining: 385ms
713	learn: 0.313370	total: 1060ms	remaining: 383ms
714	learn: 0.313283	total: 1060ms	remaining: 381ms
715	learn: 0.313230	total: 1062ms	remaining: 379ms
716	learn: 0.313155	total: 1062ms	remaining: 377ms
717	learn: 0.313026	total: 1066ms	remaining: 375ms
718	learn: 0.312920	total: 1066ms	remaining: 373ms
719	learn: 0.312744	total: 1070ms	remaining: 371ms
720	learn: 0.312681	total: 1070ms	remaining: 369ms
721	learn: 0.312478	total: 1074ms	remaining: 367ms
722	learn: 0.312407	total: 1074ms	remaining: 365ms
723	learn: 0.312328	total: 1078ms	remaining: 363ms
724	learn: 0.312273	total: 1078ms	remaining: 361ms
725	learn: 0.312127	total: 1084ms	remaining: 359ms
726	learn: 0.312091	total: 1084ms	remaining: 357ms
727	learn: 0.311803	total: 1088ms	remaining: 355ms
728	learn: 0.311727	total: 1088ms	remaining: 353ms
729	learn: 0.311602	total: 1092ms	remaining: 351ms
730	learn: 0.311590	total: 1092ms	remaining: 349ms
731	learn: 0.311478	total: 1094ms	remaining: 347ms
732	learn: 0.311395	total: 1094ms	remaining: 345ms
733	learn: 0.311290	total: 1098ms	remaining: 343ms
734	learn: 0.311248	total: 1098ms	remaining: 341ms
735	learn: 0.311074	total: 1102ms	remaining: 339ms
736	learn: 0.310947	total: 1102ms	remaining: 337ms
737	learn: 0.310816	total: 1104ms	remaining: 335ms
738	learn: 0.310741	total: 1104ms	remaining: 333ms
739	learn: 0.310475	total: 1108ms	remaining: 331ms
740	learn: 0.310447	total: 1108ms	remaining: 329ms
741	learn: 0.310293	total: 1112ms	remaining: 327ms
742	learn: 0.310194	total: 1112ms	remaining: 325ms
743	learn: 0.310179	total: 1114ms	remaining: 323ms
744	learn: 0.310043	total: 1118ms	remaining: 321ms
745	learn: 0.309965	total: 1118ms	remaining: 319ms
746	learn: 0.309823	total: 1122ms	remaining: 317ms
747	learn: 0.309790	total: 1122ms	remaining: 315ms
748	learn: 0.309648	total: 1124ms	remaining: 313ms
749	learn: 0.309602	total: 1124ms	remaining: 311ms
750	learn: 0.309395	total: 1128ms	remaining: 309ms
751	learn: 0.309350	total: 1128ms	remaining: 307ms
752	learn: 0.309186	total: 1132ms	remaining: 305ms
753	learn: 0.309130	total: 1132ms	remaining: 303ms
754	learn: 0.308970	total: 1136ms	remaining: 301ms
755	learn: 0.308925	total: 1136ms	remaining: 299ms
756	learn: 0.308745	total: 1140ms	remaining: 297ms
757	learn: 0.308680	total: 1140ms	remaining: 295ms
758	learn: 0.308495	total: 1144ms	remaining: 293ms
759	learn: 0.308405	total: 1144ms	remaining: 291ms
760	learn: 0.308210	total: 1148ms	remaining: 289ms
761	learn: 0.308199	total: 1148ms	remaining: 287ms
762	learn: 0.307918	total: 1152ms	remaining: 285ms
763	learn: 0.307894	total: 1152ms	remaining: 283ms
764	learn: 0.307621	total: 1156ms	remaining: 281ms
765	learn: 0.307562	total: 1156ms	remaining: 279ms
766	learn: 0.307482	total: 1160ms	remaining: 277ms
767	learn: 0.307393	total: 1160ms	remaining: 275ms
768	learn: 0.307329	total: 1164ms	remaining: 273ms
769	learn: 0.307291	total: 1164ms	remaining: 271ms
770	learn: 0.307175	total: 1168ms	remaining: 269ms
771	learn: 0.307132	total: 1168ms	remaining: 267ms
772	learn: 0.306945	total: 1172ms	remaining: 265ms
773	learn: 0.306861	total: 1172ms	remaining: 263ms
774	learn: 0.306702	total: 1176ms	remaining: 261ms
775	learn: 0.306643	total: 1176ms	remaining: 259ms
776	learn: 0.306486	total: 1180ms	remaining: 257ms
777	learn: 0.306428	total: 1180ms	remaining: 255ms
778	learn: 0.306238	total: 1184ms	remaining: 253ms
779	learn: 0.306193	total: 1184ms	remaining: 251ms
780	learn: 0.306040	total: 1188ms	remaining: 249ms
781	learn: 0.305985	total: 1188ms	remaining: 247ms
782	learn: 0.305822	total: 1192ms	remaining: 245ms
783	learn: 0.305768	total: 1192ms	remaining: 243ms
784	learn: 0.305603	total: 1196ms	remaining: 241ms
785	learn: 0.305538	total: 1196ms	remaining: 239ms
786	learn: 0.305375	total: 1200ms	remaining: 237ms
787	learn: 0.305320	total: 1200ms	remaining: 235ms
788	learn: 0.305155	total: 1204ms	remaining: 233ms
789	learn: 0.305092	total: 1204ms	remaining: 231ms
790	learn: 0.304938	total: 1208ms	remaining: 229ms
791	learn: 0.304874	total: 1208ms	remaining: 227ms
792	learn: 0.304716	total: 1212ms	remaining: 225ms
793	learn: 0.304658	total: 1212ms	remaining: 223ms
794	learn: 0.304494	total: 1216ms	remaining: 221ms
795	learn: 0.304432	total: 1216ms	remaining: 219ms
796	learn: 0.304273	total: 1220ms	remaining: 217ms
797	learn: 0.304215	total: 1220ms	remaining: 215ms
798	learn: 0.304053	total: 1224ms	remaining: 213ms
799	learn: 0.303993	total: 1224ms	remaining: 211ms
800	learn: 0.303830	total: 1228ms	remaining: 209ms
801	learn: 0.303776	total: 1228ms	remaining: 207ms
802	learn: 0.303617	total: 1232ms	remaining: 205ms
803	learn: 0.303558	total: 1232ms	remaining: 203ms
804	learn: 0.303398	total: 1236ms	remaining: 201ms
805	learn: 0.303337	total: 1236ms	remaining: 199ms
806	learn: 0.303178	total: 1240ms	remaining: 197ms
807	learn: 0.303115	total: 1240ms	remaining: 195ms
808	learn: 0.302954	total: 1244ms	remaining: 193ms
809	learn: 0.302893	total: 1244ms	remaining: 191ms
810	learn: 0.302730	total: 1248ms	remaining: 189ms
811	learn: 0.302676	total: 1248ms	remaining: 187ms
812	learn: 0.302512	total: 1252ms	remaining: 185ms
813	learn: 0.302454	total: 1252ms	remaining: 183ms
814	learn: 0.302291	total: 1256ms	remaining: 181ms
815	learn: 0.302233	total: 1256ms	remaining: 179ms
816	learn: 0.302068	total: 1260ms	remaining: 177ms
817	learn: 0.302002	total: 1260ms	remaining: 175ms
818	learn: 0.301837	total: 1264ms	remaining: 173ms
819	learn: 0.301773	total: 1264ms	remaining: 171ms
820	learn: 0.301606	total: 1268ms	remaining: 169ms
821	learn: 0.301542	total: 1268ms	remaining: 167ms
822	learn: 0.301375	total: 1272ms	remaining: 165ms
823	learn: 0.301316	total: 1272ms	remaining: 163ms
824	learn: 0.301149	total: 1276ms	remaining: 161ms
825	learn: 0.301084	total: 1276ms	remaining: 159ms
826	learn: 0.300917	total: 1280ms	remaining: 157ms
827	learn: 0.300853	total: 1280ms	remaining: 155ms
828	learn: 0.300686	total: 1284ms	remaining: 153ms
829	learn: 0.300621	total: 1284ms	remaining: 151ms
830	learn: 0.300454	total: 1288ms	

[illegible]

[illegible]

1962	learn= 0.3796658	total= 322ms	remaining= 134s
1963	learn= 0.3796658	total= 322ms	remaining= 133s
1964	learn= 0.3796838	total= 322ms	remaining= 133s
1965	learn= 0.3797893	total= 322ms	remaining= 133s
1966	learn= 0.3797893	total= 327ms	remaining= 132s
1967	learn= 0.3797632	total= 328ms	remaining= 132s
1968	learn= 0.3797632	total= 328ms	remaining= 132s
1969	learn= 0.3797287	total= 331ms	remaining= 132s
201	learn= 0.3769826	total= 338ms	remaining= 132s
202	learn= 0.3769826	total= 337ms	remaining= 132s
203	learn= 0.3765032	total= 337ms	remaining= 132s
204	learn= 0.3764252	total= 339ms	remaining= 131s
205	learn= 0.3764252	total= 343ms	remaining= 131s
206	learn= 0.3767032	total= 343ms	remaining= 131s
207	learn= 0.3765780	total= 345ms	remaining= 131s
208	learn= 0.3765780	total= 345ms	remaining= 131s
209	learn= 0.3750247	total= 350ms	remaining= 131s
210	learn= 0.3746823	total= 352ms	remaining= 131s
211	learn= 0.3746823	total= 352ms	remaining= 131s
212	learn= 0.3743963	total= 355ms	remaining= 131s
213	learn= 0.3741937	total= 360ms	remaining= 131s
214	learn= 0.3741937	total= 360ms	remaining= 131s
215	learn= 0.3736638	total= 360ms	remaining= 131s
216	learn= 0.3734035	total= 362ms	remaining= 131s
217	learn= 0.3734035	total= 362ms	remaining= 131s
218	learn= 0.3728263	total= 365ms	remaining= 131s
219	learn= 0.3725136	total= 368ms	remaining= 131s
220	learn= 0.3725136	total= 368ms	remaining= 131s
221	learn= 0.3720103	total= 371ms	remaining= 131s
222	learn= 0.3716204	total= 373ms	remaining= 131s
223	learn= 0.3716204	total= 373ms	remaining= 131s
224	learn= 0.3712128	total= 378ms	remaining= 131s
225	learn= 0.3708933	total= 378ms	remaining= 131s
226	learn= 0.3708933	total= 378ms	remaining= 131s
227	learn= 0.3705345	total= 381ms	remaining= 131s
228	learn= 0.3702051	total= 385ms	remaining= 131s
229	learn= 0.3702051	total= 385ms	remaining= 131s
230	learn= 0.3698624	total= 388ms	remaining= 129s
231	learn= 0.3695976	total= 390ms	remaining= 129s
232	learn= 0.3695976	total= 390ms	remaining= 129s
233	learn= 0.3692428	total= 397ms	remaining= 129s
234	learn= 0.3692428	total= 397ms	remaining= 129s
235	learn= 0.3684812	total= 400ms	remaining= 129s
236	learn= 0.3680848	total= 402ms	remaining= 129s
237	learn= 0.3680848	total= 402ms	remaining= 129s
238	learn= 0.3676776	total= 405ms	remaining= 129s
239	learn= 0.3676776	total= 405ms	remaining= 129s
240	learn= 0.3673507	total= 408ms	remaining= 128s
241	learn= 0.3673507	total= 408ms	remaining= 128s
242	learn= 0.3668897	total= 412ms	remaining= 128s
243	learn= 0.3666872	total= 414ms	remaining= 128s
244	learn= 0.3666872	total= 414ms	remaining= 128s
245	learn= 0.3663223	total= 417ms	remaining= 128s
246	learn= 0.3663223	total= 417ms	remaining= 128s
247	learn= 0.3661938	total= 421ms	remaining= 128s
248	learn= 0.3657533	total= 422ms	remaining= 127s
249	learn= 0.3656366	total= 423ms	remaining= 127s
250	learn= 0.3656366	total= 423ms	remaining= 127s
251	learn= 0.3653552	total= 425ms	remaining= 126s
252	learn= 0.3653552	total= 425ms	remaining= 126s
253	learn= 0.3650983	total= 428ms	remaining= 126s
254	learn= 0.3650983	total= 428ms	remaining= 126s
255	learn= 0.3647348	total= 431ms	remaining= 126s
256	learn= 0.3647348	total= 431ms	remaining= 126s
257	learn= 0.3644382	total= 434ms	remaining= 126s
258	learn= 0.3642551	total= 440ms	remaining= 126s
259	learn= 0.3642551	total= 440ms	remaining= 126s
260	learn= 0.3639318	total= 445ms	remaining= 126s
261	learn= 0.3637373	total= 446ms	remaining= 126s
262	learn= 0.3637373	total= 446ms	remaining= 126s
263	learn= 0.3633702	total= 448ms	remaining= 125s
264	learn= 0.3633152	total= 451ms	remaining= 125s
265	learn= 0.3633152	total= 451ms	remaining= 125s
266	learn= 0.3628987	total= 455ms	remaining= 124s
267	learn= 0.3626366	total= 458ms	remaining= 124s
268	learn= 0.3626366	total= 458ms	remaining= 124s
269	learn= 0.3621494	total= 460ms	remaining= 124s
270	learn= 0.3620393	total= 462ms	remaining= 124s
271	learn= 0.3620393	total= 462ms	remaining= 124s
272	learn= 0.3617343	total= 466ms	remaining= 124s
273	learn= 0.3614875	total= 469ms	remaining= 124s
274	learn= 0.3614875	total= 469ms	remaining= 124s
275	learn= 0.3610612	total= 473ms	remaining= 124s
276	learn= 0.3609111	total= 474ms	remaining= 124s
277	learn= 0.3609111	total= 474ms	remaining= 124s
278	learn= 0.3605421	total= 478ms	remaining= 124s
279	learn= 0.3603597	total= 481ms	remaining= 124s
280	learn= 0.3603597	total= 481ms	remaining= 124s
281	learn= 0.3599002	total= 484ms	remaining= 123s
282	learn= 0.3596763	total= 488ms	remaining= 123s
283	learn= 0.3596763	total= 488ms	remaining= 123s
284	learn= 0.3592982	total= 490ms	remaining= 122s
285	learn= 0.3590203	total= 494ms	remaining= 122s
286	learn= 0.3590203	total= 494ms	remaining= 122s
287	learn= 0.3588639	total= 494ms	remaining= 122s
288	learn= 0.3586800	total= 496ms	remaining= 122s
289	learn= 0.3586800	total= 496ms	remaining= 122s
290	learn= 0.3582878	total= 500ms	remaining= 122s
291	learn= 0.3580187	total= 502ms	remaining= 122s
292	learn= 0.3580187	total= 502ms	remaining= 122s
293	learn= 0.3576842	total= 505ms	remaining= 122s
294	learn= 0.3575589	total= 509ms	remaining= 122s
295	learn= 0.3575589	total= 509ms	remaining= 122s
296	learn= 0.3570516	total= 511ms	remaining= 122s
297	learn= 0.3568959	total= 513ms	remaining= 122s
298	learn= 0.3568959	total= 513ms	remaining= 122s
299	learn= 0.3565640	total= 521ms	remaining= 121s
300	learn= 0.3563983	total= 523ms	remaining= 121s
301	learn= 0.3563983	total= 523ms	remaining= 121s
302	learn= 0.3559859	total= 526ms	remaining= 121s
303	learn= 0.3557289	total= 528ms	remaining= 121s
304	learn= 0.3557289	total= 528ms	remaining= 121s
305	learn= 0.3552847	total= 531ms	remaining= 121s
306	learn= 0.3552400	total= 532ms	remaining= 121s
307	learn= 0.3552400	total= 532ms	remaining= 121s
308	learn= 0.3550316	total= 533ms	remaining= 121s
309	learn= 0.3548771	total= 536ms	remaining= 121s
310	learn= 0.3548771	total= 536ms	remaining= 121s
311	learn= 0.3545701	total= 541ms	remaining= 119s
312	learn= 0.3545003	total= 543ms	remaining= 119s
313	learn= 0.3545003	total= 543ms	remaining= 119s
314	learn= 0.3540783	total= 545ms	remaining= 119s
315	learn= 0.3538422	total= 548ms	remaining= 119s
316	learn= 0.3538422	total= 548ms	remaining= 119s
317	learn= 0.3537221	total= 552ms	remaining= 118s
318	learn= 0.3536014	total= 553ms	remaining= 118s
319	learn= 0.3536014	total= 553ms	remaining= 118s
320	learn= 0.3533913	total= 557ms	remaining= 118s
321	learn= 0.3533126	total= 559ms	remaining= 118s
322	learn= 0.3533126	total= 559ms	remaining= 118s
323	learn= 0.3529384	total= 561ms	remaining= 117s
324	learn= 0.3529384	total= 561ms	remaining= 117s
325	learn= 0.3529143	total= 564ms	remaining= 117s
326	learn= 0.3529484	total= 568ms	remaining= 117s
327	learn= 0.3529484	total= 568ms	remaining= 117s
328	learn= 0.3525401	total= 571ms	remaining= 117s
329	learn= 0.3525087	total= 574ms	remaining= 117s
330	learn= 0.3525087	total= 574ms	remaining= 117s
331	learn= 0.3521498	total= 577ms	remaining= 117s
332	learn= 0.3521498	total= 577ms	remaining= 117s
333	learn= 0.3519092	total= 578ms	remaining= 116s
334	learn= 0.3518060	total= 581ms	remaining= 116s
335	learn= 0.3518060	total= 581ms	remaining= 116s
336	learn= 0.3515923	total= 583ms	remaining= 116s
337	learn= 0.3515923	total= 583ms	remaining= 116s
338	learn= 0.3510884	total= 589ms	remaining= 116s
339	learn= 0.3510579	total= 591ms	remaining= 115s
340	learn= 0.3510579	total= 591ms	remaining= 115s
341	learn= 0.3506203	total= 598ms	remaining= 115s
342	learn= 0.3505119	total= 601ms	remaining= 115s
343	learn= 0.3505119	total= 601ms	remaining= 115s
344	learn= 0.3498312	total= 604ms	remaining= 115s
345	learn= 0.3496967	total= 606ms	remaining= 115s
346	learn= 0.3496967	total= 606ms	remaining= 115s
347	learn= 0.3492200	total= 609ms	remaining= 114s
348	learn= 0.3489254	total= 611ms	remaining= 114s
349	learn= 0.3489254	total= 611ms	remaining= 114s
350	learn= 0.3486508	total= 616ms	remaining= 114s
351	learn= 0.3483720	total= 618ms	remaining= 114s
352	learn= 0.3483720	total= 618ms	remaining= 114s
353	learn= 0.3480795	total= 621ms	remaining= 113s
354	learn= 0.3478639	total= 624ms	remaining= 113s
355	learn= 0.3478639	total= 624ms	remaining= 113s
356	learn= 0.3476931	total= 627ms	remaining= 113s
357	learn= 0.3474846	total= 629ms	remaining= 113s
358	learn= 0.3474846	total= 629ms	remaining= 113s
359	learn= 0.3470423	total= 633ms	remaining= 113s
360	learn= 0.3474233	total= 634ms	remaining= 112s
361	learn= 0.3474233	total= 634ms	remaining= 112s
362	learn= 0.3470103	total= 638ms	remaining= 112s
363	learn= 0.3469032	total= 640ms	remaining= 112s
364	learn= 0.3469032	total= 640ms	remaining= 112s
365	learn= 0.3467357	total= 641ms	remaining= 111s
366	learn= 0.3466006	total= 644ms	remaining= 111s
367	learn= 0.3466006	total= 644ms	remaining= 111s
368	learn= 0.3464078	total= 648ms	remaining= 111s
369	learn= 0.3462126	total= 650ms	remaining= 111s
370	learn= 0.3462126	total= 650ms	remaining= 111s
371	learn= 0.3460244	total= 653ms	remaining= 111s
372	learn= 0.3459525	total= 654ms	remaining= 111s
373	learn= 0.3459525	total= 654ms	remaining= 111s
374	learn= 0.3456661	total= 657ms	remaining= 109s
375	learn= 0.3454596	total= 659ms	remaining= 109s
376	learn= 0.3454596	total= 659ms	remaining= 109s
377	learn= 0.3452260	total= 661ms	remaining= 109s
378	learn= 0.3451884	total= 662ms	remaining= 109s
379	learn= 0.3451884	total= 662ms	remaining= 109s
380	learn= 0.3449744	total= 666ms	remaining= 108s
381	learn= 0.3447701	total= 668ms	remaining= 108s
382	learn= 0.3447701	total= 668ms	remaining= 108s
383	learn= 0.3445325	total= 671ms	remaining= 108s
384	learn= 0.3444680	total= 674ms	remaining= 108s
385	learn= 0.3444680	total= 674ms	remaining= 108s
386	learn= 0.3442817	total= 678ms	remaining= 107s
387	learn= 0.3442817	total= 678ms	remaining= 107s
388	learn= 0.3440328	total= 681ms	remaining= 107s
389	learn= 0.3438073	total= 684ms	remaining= 107s
390	learn= 0.3438073	total= 684ms	remaining= 107s
391	learn= 0.3435713	total= 688ms	remaining= 106s
392	learn= 0.3435713	total= 688ms	remaining= 106s
393	learn= 0.3432822	total= 691ms	remaining= 106s
394	learn= 0.3432822	total= 691ms	remaining= 106s
395	learn= 0.3429317	total= 695ms	remaining= 106s
396	learn= 0.3429317	total= 695ms	remaining= 106s
397	learn= 0.3426426	total= 698ms	remaining= 106s
398	learn= 0.3426426	total= 698ms	remaining= 106s
399	learn= 0.3423494	total= 701ms	remaining= 106s
400	learn= 0.3423494	total= 701ms	remaining= 106s
401	learn= 0.3419898	total= 705ms	remaining= 106s
402	learn= 0.3418092	total= 708ms	remaining= 105s
403	learn= 0.3418092	total= 708ms	remaining= 105s
404	learn= 0.3414100	total= 713ms	remaining= 105s
405	learn= 0.3413624	total= 716ms	remaining= 105s
406	learn= 0.3413624	total= 716ms	remaining= 105s
407	learn= 0.3411036	total= 721ms	remaining= 104s
408	learn= 0.3410735	total= 723ms	remaining= 104s
409	learn= 0.3410735	total= 723ms	remaining= 104s
410	learn= 0.3408205	total= 727ms	remaining= 104s
411	learn= 0.3407930	total= 729ms	remaining= 104s
412	learn= 0.3407930	total= 729ms	remaining= 104s
413	learn= 0.3405404	total= 732ms	remaining= 104s
414	learn= 0.3403980	total= 734ms	remaining= 103s
415	learn= 0.3403980	total= 734ms	remaining= 103s
416	learn= 0.3401374	total= 737ms	remaining= 103s
417	learn= 0.3399516	total= 739ms	remaining= 103s
418	learn= 0.3399516	total= 739ms	remaining= 103s
419	learn= 0.3396561	total= 744ms	remaining= 102s
420	learn= 0.3395297	total= 746ms	remaining= 102s
421	learn= 0.3395297	total= 746ms	remaining= 102s
422	learn= 0.3394476	total= 748ms	remaining= 102s
423	learn= 0.3393982	total= 750ms	remaining= 102s
424	learn= 0.3393982	total= 750ms	remaining= 102s
425	learn= 0.3389720	total= 754ms	remaining= 101s

[illegible]


```
learn rate set to 0.0039376
1: learn: 0.6831212 total: 1.24ms remaining: 132ms
1: learn: 0.6765093 total: 3.99ms remaining: 133s
1: learn: 0.6708977 total: 1.24ms remaining: 132ms
1: learn: 0.6664888 total: 6.72ms remaining: 134s
51: learn: 0.6664384 total: 7.96ms remaining: 132s
51: learn: 0.6634354 total: 10.2ms remaining: 132s
51: learn: 0.6616055 total: 12.2ms remaining: 132s
81: learn: 0.6646521 total: 11.2ms remaining: 132ms
81: learn: 0.6598262 total: 12.1ms remaining: 132ms
101: learn: 0.6354093 total: 13.8ms remaining: 131s
111: learn: 0.6302493 total: 15.3ms remaining: 132ms
141: learn: 0.6281012 total: 15.2ms remaining: 132ms
141: learn: 0.6209222 total: 17.6ms remaining: 132ms
141: learn: 0.6102733 total: 18.4ms remaining: 131s
171: learn: 0.6076892 total: 20.3ms remaining: 131s
171: learn: 0.6037133 total: 21ms remaining: 131s
191: learn: 0.5951683 total: 23.8ms remaining: 131s
201: learn: 0.5912322 total: 23.9ms remaining: 131s
201: learn: 0.5924322 total: 23.9ms remaining: 131s
221: learn: 0.5832128 total: 26.1ms remaining: 131s
231: learn: 0.5792875 total: 27.4ms remaining: 131s
251: learn: 0.5714977 total: 30.2ms remaining: 131s
261: learn: 0.5678686 total: 31.5ms remaining: 131s
261: learn: 0.5634826 total: 31.7ms remaining: 131s
281: learn: 0.5607179 total: 34.3ms remaining: 131s
291: learn: 0.5574011 total: 35.4ms remaining: 131s
311: learn: 0.5512606 total: 37.3ms remaining: 131s
321: learn: 0.5482979 total: 38.4ms remaining: 131s
341: learn: 0.5426233 total: 41.2ms remaining: 131s
351: learn: 0.5401083 total: 42.4ms remaining: 131s
361: learn: 0.5378387 total: 42.2ms remaining: 131s
381: learn: 0.5338931 total: 44.9ms remaining: 131s
391: learn: 0.5319473 total: 45.7ms remaining: 131s
411: learn: 0.5258809 total: 48.8ms remaining: 131s
411: learn: 0.5238273 total: 48.5ms remaining: 131s
441: learn: 0.5186345 total: 53.4ms remaining: 131s
441: learn: 0.5163018 total: 54.2ms remaining: 131s
461: learn: 0.5150739 total: 55.2ms remaining: 131s
471: learn: 0.5131264 total: 56.5ms remaining: 131s
481: learn: 0.5107913 total: 57.9ms remaining: 131s
491: learn: 0.5093934 total: 58.3ms remaining: 131s
501: learn: 0.5074181 total: 59.4ms remaining: 131s
511: learn: 0.5057092 total: 60.9ms remaining: 131s
531: learn: 0.5031665 total: 62.3ms remaining: 131s
531: learn: 0.5013822 total: 63.9ms remaining: 131s
551: learn: 0.4986366 total: 64.6ms remaining: 131s
561: learn: 0.4958589 total: 65.7ms remaining: 131s
571: learn: 0.4930715 total: 67.1ms remaining: 131s
591: learn: 0.4907972 total: 69ms remaining: 131s
591: learn: 0.4879807 total: 69.1ms remaining: 131s
611: learn: 0.4874633 total: 74.8ms remaining: 131s
621: learn: 0.4857828 total: 74.8ms remaining: 131s
631: learn: 0.4836286 total: 77.9ms remaining: 131s
641: learn: 0.4822887 total: 79.7ms remaining: 131s
651: learn: 0.4802393 total: 82.7ms remaining: 131s
671: learn: 0.4772451 total: 84.1ms remaining: 131s
681: learn: 0.4754822 total: 86.3ms remaining: 131s
691: learn: 0.4738206 total: 87.6ms remaining: 131s
711: learn: 0.4704893 total: 89.9ms remaining: 131s
721: learn: 0.4672227 total: 91.3ms remaining: 131s
741: learn: 0.4672842 total: 91.3ms remaining: 131s
741: learn: 0.4607389 total: 95ms remaining: 131s
751: learn: 0.4582167 total: 97.6ms remaining: 131s
801: learn: 0.4570493 total: 98.9ms remaining: 131s
811: learn: 0.4549374 total: 101.1ms remaining: 131s
831: learn: 0.4534674 total: 103.6ms remaining: 131s
841: learn: 0.4523819 total: 103.6ms remaining: 131s
851: learn: 0.4509244 total: 107ms remaining: 131s
861: learn: 0.4498366 total: 107.9ms remaining: 131s
881: learn: 0.4477830 total: 109.5ms remaining: 131s
891: learn: 0.4448185 total: 111.3ms remaining: 131s
901: learn: 0.4441613 total: 111.3ms remaining: 131s
911: learn: 0.4432393 total: 111.6ms remaining: 131s
941: learn: 0.4420224 total: 117ms remaining: 131s
951: learn: 0.4409227 total: 117.5ms remaining: 131s
961: learn: 0.4390047 total: 121.2ms remaining: 131s
981: learn: 0.4387806 total: 121.2ms remaining: 131s
1001: learn: 0.4358384 total: 122.8ms remaining: 131s
1011: learn: 0.4343879 total: 125.8ms remaining: 131s
1021: learn: 0.4328062 total: 125.8ms remaining: 131s
1041: learn: 0.4334841 total: 128.5ms remaining: 131s
1051: learn: 0.4320393 total: 130.3ms remaining: 131s
1061: learn: 0.4304888 total: 133ms remaining: 131s
1071: learn: 0.4292266 total: 133.6ms remaining: 131s
1081: learn: 0.4273556 total: 137.9ms remaining: 131s
1101: learn: 0.4262366 total: 139.3ms remaining: 131s
1111: learn: 0.4247416 total: 142.8ms remaining: 131s
1121: learn: 0.4234636 total: 142.8ms remaining: 131s
1131: learn: 0.4228099 total: 144.2ms remaining: 131s
1141: learn: 0.4220355 total: 145.8ms remaining: 131s
1151: learn: 0.4198831 total: 149.4ms remaining: 131s
1161: learn: 0.4182623 total: 149.4ms remaining: 131s
1171: learn: 0.4183998 total: 150.1ms remaining: 131s
1181: learn: 0.4174390 total: 152.2ms remaining: 131s
1191: learn: 0.4158028 total: 155.8ms remaining: 131s
1201: learn: 0.4158028 total: 155.8ms remaining: 131s
1211: learn: 0.4143822 total: 156.6ms remaining: 131s
1221: learn: 0.4137923 total: 158.8ms remaining: 131s
1231: learn: 0.4125199 total: 160.2ms remaining: 131s
1241: learn: 0.4127841 total: 161.6ms remaining: 131s
1251: learn: 0.4122544 total: 162.8ms remaining: 131s
1261: learn: 0.4107613 total: 165.2ms remaining: 131s
1271: learn: 0.4108284 total: 167.8ms remaining: 131s
1281: learn: 0.4102684 total: 167.8ms remaining: 131s
1291: learn: 0.4096152 total: 170.5ms remaining: 131s
1301: learn: 0.4084368 total: 171.8ms remaining: 131s
1311: learn: 0.4079598 total: 171.8ms remaining: 131s
1321: learn: 0.4068672 total: 177.8ms remaining: 131s
1331: learn: 0.4060265 total: 178.1ms remaining: 131s
1341: learn: 0.4052485 total: 182.8ms remaining: 131s
1351: learn: 0.4050273 total: 182.8ms remaining: 131s
1361: learn: 0.4043682 total: 184.2ms remaining: 131s
1371: learn: 0.4037128 total: 185.8ms remaining: 131s
1381: learn: 0.4030632 total: 185.8ms remaining: 131s
1391: learn: 0.4025756 total: 189.5ms remaining: 131s
1401: learn: 0.4024371 total: 190.1ms remaining: 131s
1411: learn: 0.4023213 total: 192.8ms remaining: 131s
1421: learn: 0.4018285 total: 194.8ms remaining: 131s
1431: learn: 0.4012285 total: 196.8ms remaining: 131s
1441: learn: 0.4008403 total: 197.8ms remaining: 131s
1451: learn: 0.3998010 total: 202.8ms remaining: 131s
1461: learn: 0.3989767 total: 202.8ms remaining: 131s
1471: learn: 0.3981603 total: 206.6ms remaining: 131s
1481: learn: 0.3971544 total: 201.8ms remaining: 131s
1491
```



```
890: learn: 0.295018      total: 1.27s      remaining: 135ms
891: learn: 0.294880      total: 1.27s      remaining: 134ms
892: learn: 0.294609      total: 1.27s      remaining: 133ms
893: learn: 0.294456      total: 1.27s      remaining: 131ms
894: learn: 0.294358      total: 1.28s      remaining: 130ms
895: learn: 0.294287      total: 1.28s      remaining: 148ms
896: learn: 0.294218      total: 1.28s      remaining: 147ms
897: learn: 0.294153      total: 1.28s      remaining: 145ms
898: learn: 0.294016      total: 1.28s      remaining: 144ms
899: learn: 0.293840      total: 1.28s      remaining: 142ms
900: learn: 0.293713      total: 1.29s      remaining: 141ms
901: learn: 0.293673      total: 1.28s      remaining: 140ms
902: learn: 0.293383      total: 1.29s      remaining: 138ms
903: learn: 0.293323      total: 1.29s      remaining: 137ms
904: learn: 0.293133      total: 1.29s      remaining: 135ms
905: learn: 0.293102      total: 1.29s      remaining: 134ms
906: learn: 0.292970      total: 1.29s      remaining: 133ms
907: learn: 0.292950      total: 1.29s      remaining: 131ms
908: learn: 0.292879      total: 1.3s      remaining: 130ms
909: learn: 0.292764      total: 1.3s      remaining: 128ms
910: learn: 0.292735      total: 1.3s      remaining: 127ms
911: learn: 0.292502      total: 1.3s      remaining: 126ms
912: learn: 0.292324      total: 1.3s      remaining: 124ms
913: learn: 0.292389      total: 1.3s      remaining: 123ms
914: learn: 0.292243      total: 1.31s      remaining: 121ms
915: learn: 0.292073      total: 1.31s      remaining: 120ms
916: learn: 0.291992      total: 1.31s      remaining: 119ms
917: learn: 0.291982      total: 1.31s      remaining: 117ms
918: learn: 0.291918      total: 1.32s      remaining: 116ms
919: learn: 0.291796      total: 1.31s      remaining: 114ms
920: learn: 0.291608      total: 1.31s      remaining: 113ms
921: learn: 0.291501      total: 1.31s      remaining: 112ms
922: learn: 0.291525      total: 1.32s      remaining: 110ms
923: learn: 0.291449      total: 1.32s      remaining: 108ms
924: learn: 0.291413      total: 1.32s      remaining: 107ms
925: learn: 0.291123      total: 1.32s      remaining: 105ms
926: learn: 0.291040      total: 1.32s      remaining: 104ms
927: learn: 0.290812      total: 1.32s      remaining: 102ms
928: learn: 0.290767      total: 1.32s      remaining: 101ms
929: learn: 0.290581      total: 1.32s      remaining: 99.7ms
930: learn: 0.290585      total: 1.32s      remaining: 99.7ms
931: learn: 0.290360      total: 1.33s      remaining: 96.8ms
932: learn: 0.290129      total: 1.33s      remaining: 95.4ms
933: learn: 0.290104      total: 1.33s      remaining: 94ms
934: learn: 0.289907      total: 1.33s      remaining: 92.5ms
935: learn: 0.289829      total: 1.33s      remaining: 91.5ms
936: learn: 0.289659      total: 1.33s      remaining: 89.7ms
937: learn: 0.289449      total: 1.33s      remaining: 88.2ms
938: learn: 0.2893186      total: 1.33s      remaining: 86.8ms
939: learn: 0.289239      total: 1.34s      remaining: 85ms
940: learn: 0.2891595      total: 1.34s      remaining: 83.9ms
941: learn: 0.2891209      total: 1.34s      remaining: 82.5ms
942: learn: 0.2890267      total: 1.34s      remaining: 80.7ms
943: learn: 0.288967      total: 1.34s      remaining: 79.7ms
944: learn: 0.2889570      total: 1.34s      remaining: 78.2ms
945: learn: 0.288876      total: 1.34s      remaining: 77.4ms
946: learn: 0.2886792      total: 1.35s      remaining: 75.4ms
947: learn: 0.2884946      total: 1.35s      remaining: 74ms
948: learn: 0.2883239      total: 1.35s      remaining: 72.5ms
949: learn: 0.2881913      total: 1.35s      remaining: 71.1ms
950: learn: 0.2880346      total: 1.35s      remaining: 69.7ms
951: learn: 0.2880120      total: 1.35s      remaining: 68.5ms
952: learn: 0.2878553      total: 1.35s      remaining: 66.8ms
953: learn: 0.2877767      total: 1.35s      remaining: 65.4ms
954: learn: 0.2876728      total: 1.36s      remaining: 63.5ms
955: learn: 0.287616      total: 1.36s      remaining: 62.5ms
956: learn: 0.2875138      total: 1.36s      remaining: 61.1ms
957: learn: 0.2874188      total: 1.36s      remaining: 59.6ms
958: learn: 0.2873819      total: 1.36s      remaining: 58.2ms
959: learn: 0.2872645      total: 1.36s      remaining: 56.8ms
960: learn: 0.2872019      total: 1.36s      remaining: 55.4ms
961: learn: 0.2871630      total: 1.36s      remaining: 53.9ms
962: learn: 0.2870670      total: 1.37s      remaining: 52.5ms
963: learn: 0.2869768      total: 1.37s      remaining: 50.9ms
964: learn: 0.2868638      total: 1.37s      remaining: 49.6ms
965: learn: 0.286661      total: 1.37s      remaining: 48.2ms
966: learn: 0.2865736      total: 1.37s      remaining: 46.8ms
967: learn: 0.2863801      total: 1.37s      remaining: 45.4ms
968: learn: 0.2862693      total: 1.37s      remaining: 44ms
969: learn: 0.2862239      total: 1.38s      remaining: 42.5ms
970: learn: 0.2861831      total: 1.38s      remaining: 41.1ms
971: learn: 0.2861505      total: 1.38s      remaining: 39.7ms
972: learn: 0.286133      total: 1.38s      remaining: 38.2ms
973: learn: 0.2859927      total: 1.38s      remaining: 36.8ms
974: learn: 0.2859507      total: 1.38s      remaining: 35.4ms
975: learn: 0.2858759      total: 1.38s      remaining: 34ms
976: learn: 0.2857559      total: 1.38s      remaining: 32.6ms
977: learn: 0.2856414      total: 1.39s      remaining: 31.1ms
978: learn: 0.2855716      total: 1.39s      remaining: 29.7ms
979: learn: 0.2854827      total: 1.39s      remaining: 28.3ms
980: learn: 0.2853861      total: 1.39s      remaining: 26.9ms
981: learn: 0.2853126      total: 1.39s      remaining: 25.5ms
982: learn: 0.2853124      total: 1.39s      remaining: 24.1ms
983: learn: 0.2852616      total: 1.39s      remaining: 22.7ms
984: learn: 0.2852023      total: 1.4s      remaining: 21.2ms
985: learn: 0.2851014      total: 1.4s      remaining: 19.8ms
986: learn: 0.2850422      total: 1.4s      remaining: 18.4ms
987: learn: 0.2849336      total: 1.4s      remaining: 17ms
988: learn: 0.2848950      total: 1.4s      remaining: 15.6ms
989: learn: 0.2848518      total: 1.4s      remaining: 14.2ms
990: learn: 0.2846481      total: 1.4s      remaining: 12.7ms
991: learn: 0.2845500      total: 1.4s      remaining: 11.3ms
992: learn: 0.2844121      total: 1.41s      remaining: 9.91ms
993: learn: 0.284343      total: 1.41s      remaining: 8.5ms
994: learn: 0.2843051      total: 1.41s      remaining: 7.08ms
995: learn: 0.2842434      total: 1.41s      remaining: 5.67ms
996: learn: 0.2841570      total: 1.41s      remaining: 4.25ms
997: learn: 0.2840381      total: 1.41s      remaining: 2.83ms
998: learn: 0.2839733      total: 1.42s      remaining: 1.42ms
999: learn: 0.2839293      total: 1.42s      remaining: 0s
Accuracy: 83.17 %
Standard Deviation: 4.70 %
```

Training various models on the Training set

1. Logistic Regression

```
In [36]: from sklearn.linear_model import LogisticRegression
clf_lr = LogisticRegression(random_state=0)
clf_lr.fit(X_train, y_train)

Out[36]: LogisticRegression(random_state=0)
```

```
In [37]: y_pred_lr = clf_lr.predict(X_test)
```

2. K-Nearest Neighbor (K-NN)

```
In [38]: from sklearn.neighbors import KNeighborsClassifier
clf_knn = KNeighborsClassifier(n_neighbors= 5, metric = 'minkowski', p = 2)
clf_knn.fit(X_train, y_train)

Out[38]: KNeighborsClassifier()
```

```
In [39]: y_pred_knn = clf_knn.predict(X_test)
```

3. Support Vector Machine (SVM)

```
In [40]: from sklearn.svm import SVC
clf_svc = SVC(kernel='linear', random_state=0)
clf_svc.fit(X_train, y_train)

Out[40]: SVC(kernel='linear', random_state=0)
```

```
In [41]: y_pred_svc = clf_svc.predict(X_test)
```

4. Kernel SVM

```
In [42]: from sklearn.svm import SVC
clf_kernelSVC = SVC(kernel='rbf', random_state=0)
clf_kernelSVC.fit(X_train, y_train)

Out[42]: SVC(random_state=0)
```

```
In [43]: y_pred_kernelSVC = clf_kernelSVC.predict(X_test)
```

5. Naïve Bayes

```
In [44]: from sklearn.naive_bayes import GaussianNB
clf_nb = GaussianNB()
clf_nb.fit(X_train, y_train)

Out[44]: GaussianNB()
```

```
In [45]: y_pred_nb = clf_nb.predict(X_test)
```

6. Decision Tree

6.1 with GINI

```
In [46]: from sklearn import DecisionTreeClassifier
clf_dtGINI = DecisionTreeClassifier(criterion='gini', random_state=0)
clf_dtGINI.fit(X_train, y_train)

Out[46]: DecisionTreeClassifier(random_state=0)
```

```
In [47]: y_pred_dtGINI = clf_dtGINI.predict(X_test)
```

6.2 with ENTROPY

```
In [48]: from sklearn import DecisionTreeClassifier
clf_dtENTROPY = DecisionTreeClassifier(criterion='entropy', random_state=0)
clf_dtENTROPY.fit(X_train, y_train)

Out[48]: DecisionTreeClassifier(criterion='entropy', random_state=0)
```

```
In [49]: y_pred_dtENTROPY = clf_dtENTROPY.predict(X_test)
```

7. Random Forest Classifier

7.2 with ENTROPY

```
In [50]: from sklearn.ensemble import RandomForestClassifier
clf_rfcENTROPY = RandomForestClassifier(n_estimators = 10, criterion = 'gini', random_state = 0)
clf_rfcGINI.fit(X_train, y_train)

Out[50]: RandomForestClassifier(n_estimators=10, random_state=0)
```

```
In [51]: y_pred_rfcGINI = clf_rfcGINI.predict(X_test)
```

7.2 with ENTROPY

```
In [52]: from sklearn.ensemble import RandomForestClassifier
clf_rfcENTROPY = RandomForestClassifier(n_estimators = 10, criterion = 'entropy', random_state = 0)
clf_rfcENTROPY.fit(X_train, y_train)

Out[52]: RandomForestClassifier(criterion='entropy', n_estimators=10, random_state=0)
```

```
In [53]: y_pred_rfcENTROPY = clf_rfcENTROPY.predict(X_test)
```

Evaluating the model performance with Confusion Matrix

```
In [54]: pip install -U prettytable

Requirement already satisfied: prettytable in /opt/conda/lib/python3.7/site-packages (2.4.0)
Collecting prettytable<3.0.0-py3-none-any.whl (24 KB)
Requirement already satisfied: wcwidth in /opt/conda/lib/python3.7/site-packages (from prettytable) (0.2.5)
Requirement already satisfied: importlib-metadata in /opt/conda/lib/python3.7/site-packages (from prettytable) (4.10.1)
Requirement already satisfied: pyparsing>=3.6.4 in /opt/conda/lib/python3.7/site-packages (from importlib-metadata->prettytable) (3.10.0.2)
Requirement already satisfied: typing-extensions>=3.6.4 in /opt/conda/lib/python3.7/site-packages (from importlib-metadata->prettytable) (3.10.0.2)
Installing collected packages: prettytable
  Attempting uninstall: prettytable
    Found existing installation: prettytable 2.4.0
    Uninstalling prettytable-2.4.0:
      Successfully uninstalled prettytable-2.4.0
  Successfully installed prettytable-2.4.0

Successfully installed prettytable-3.0.0
Note: you may need to restart the kernel to use updated packages.
```

```
In [55]: from prettytable import PrettyTable
from sklearn.metrics import confusion_matrix, accuracy_score
```

```
In [56]: evaluationTable = PrettyTable()
evaluationTable.field_names = ["Model", "Confusion Matrix", "Accuracy"]
evaluationTable.add_row(["Logistic Regression", confusion_matrix(y_test, y_pred_lr), accuracy_score(y_test, y_pred_lr)])
evaluationTable.add_row(["K Nearest Neighbor", confusion_matrix(y_test, y_pred_knn), accuracy_score(y_test, y_pred_knn)])
evaluationTable.add_row(["Support Vector Machine", confusion_matrix(y_test, y_pred_svc), accuracy_score(y_test, y_pred_svc)])
evaluationTable.add_row(["SVM Kernel", confusion_matrix(y_test, y_pred_kernelSVC), accuracy_score(y_test, y_pred_kernelSVC)])
evaluationTable.add_row(["Naive Bayes", confusion_matrix(y_test, y_pred_nb), accuracy_score(y_test, y_pred_nb)])
evaluationTable.add_row(["Decision Tree (with GINI)", confusion_matrix(y_test, y_pred_dtGINI), accuracy_score(y_test, y_pred_dtGINI)])
evaluationTable.add_row(["Decision Tree (with Entropy)", confusion_matrix(y_test, y_pred_dtENTROPY), accuracy_score(y_test, y_pred_dtENTROPY)])
evaluationTable.add_row(["Random Forest (with GINI)", confusion_matrix(y_test, y_pred_rfcGINI), accuracy_score(y_test, y_pred_rfcGINI)])
evaluationTable.add_row(["Random Forest (with ENTROPY)", confusion_matrix(y_test, y_pred_rfcENTROPY), accuracy_score(y_test, y_pred_rfcENTROPY)])
print(evaluationTable)
```

	Model	Confusion Matrix	Accuracy
	Logistic Regression	[[253 13]]	0.9449760765550239
	K Nearest Neighbor	[[10 142]]	0.8588516746411483
	Support Vector Machine	[[266 0]]	1.0
	SVM Kernel	[[0 152]]	0.901913875980861
	Naive Bayes	[[256 10]]	0.901913875980861
	Decision Tree (with GINI)	[[231 35]]	0.868421052631579
	Decision Tree (with Entropy)	[[12 140]]	0.7990430622009569
	Random Forest (with GINI)	[[218 48]]	0.8038277511961722
	Random Forest (with ENTROPY)	[[36 116]]	0.8444976076555024
	Random Forest (with ENTROPY)	[[237 29]]	0.8277511961722488
		[[40 132]]	

Confusion Matrix :

```
In [57]: confusionMatrixTable = PrettyTable()
confusionMatrixTable.field_names = ["Model", "Accuracy"]
confusionMatrixTable.add_row(["Logistic Regression", confusion_matrix(y_test, y_pred_lr)])
confusionMatrixTable.add_row(["K Nearest Neighbor", confusion_matrix(y_test, y_pred_knn)])
confusionMatrixTable.add_row(["Support Vector Machine", confusion_matrix(y_test, y_pred_svc)])
confusionMatrixTable.add_row(["SVM Kernel", confusion_matrix(y_test, y_pred_kernelSVC)])
confusionMatrixTable.add_row(["Naive Bayes", confusion_matrix(y_test, y_pred_nb)])
confusionMatrixTable.add_row(["Decision Tree (with GINI)", confusion_matrix(y_test, y_pred_dtGINI)])
confusionMatrixTable.add_row(["Decision Tree (with Entropy)", confusion_matrix(y_test, y_pred_dtENTROPY)])
confusionMatrixTable.add_row(["Random Forest (with GINI)", confusion_matrix(y_test, y_pred_rfcGINI)])
confusionMatrixTable.add_row(["Random Forest (with ENTROPY)", confusion_matrix(y_test, y_pred_rfcENTROPY)])
print(confusionMatrixTable)
```

	Model	Accuracy
	Logistic Regression	0.9449760765550239
	K Nearest Neighbor	0.8588516746411483
	Support Vector Machine	1.0
	SVM Kernel	0.901913875980861
	Naive Bayes	0.868421052631579
	Decision Tree (with GINI)	0.7990430622009569
	Decision Tree (with Entropy)	0.8038277511961722
	Random Forest (with GINI)	0.8444976076555024
	Random Forest (with ENTROPY)	0.8277511961722488
		0.8277511961722488

Accuracy Table :

```
In [58]: AccuracyTable = PrettyTable()
AccuracyTable.field_names = ["Model", "Accuracy"]
AccuracyTable.add_row(["Logistic Regression", accuracy_score(y_test, y_pred_lr)])
AccuracyTable.add_row(["K Nearest Neighbor", accuracy_score(y_test, y_pred_knn)])
AccuracyTable.add_row(["Support Vector Machine", accuracy_score(y_test, y_pred_svc)])
AccuracyTable.add_row(["SVM Kernel", accuracy_score(y_test, y_pred_kernelSVC)])
AccuracyTable.add_row(["Naive Bayes", accuracy_score(y_test, y_pred_nb)])
AccuracyTable.add_row(["Decision Tree (with GINI)", accuracy_score(y_test, y_pred_dtGINI)])
AccuracyTable.add_row(["Decision Tree (with Entropy)", accuracy_score(y_test, y_pred_dtENTROPY)])
AccuracyTable.add_row(["Random Forest (with GINI)", accuracy_score(y_test, y_pred_rfcGINI)])
AccuracyTable.add_row(["Random Forest (with ENTROPY)", accuracy_score(y_test, y_pred_rfcENTROPY)])
print(AccuracyTable)
```

	Model	Accuracy
	Logistic Regression	0.9449760765550239
	K Nearest Neighbor	0.8588516746411483
	Support Vector Machine	1.0
	SVM Kernel	0.901913875980861
	Naive Bayes	0.868421052631579
	Decision Tree (with GINI)	0.7990430622009569
	Decision Tree (with Entropy)	0.8038277511961722
	Random Forest (with GINI)	0.8444976076555024
	Random Forest (with ENTROPY)	0.8277511961722488
		0.8277511961722488

```
In [59]: output = pd.DataFrame({"PassengerId": test_dataset.PassengerId, "Survived": y_pred_kernelSVC})
print(output)
```

PassengerId	Survived
0	892
1	893
2	894
3	895
4	896
...	...
413	1305
414	1306
415	1307
416	1308
417	1309

[418 rows x 2 columns]

Grid Search with SVM

- taking too much load.

IGNORE THIS SECTION.

```
In [60]: # from sklearn.svm import SVC
# classifier = SVC(kernel = 'rbf', random_state = 0)
# classifier.fit(X_train, y_train)

# from sklearn.metrics import confusion_matrix, accuracy_score
# y_pred = classifier.predict(X_test)
# cm = confusion_matrix(y_test, y_pred)
# print(cm)
# accuracy_score(y_test, y_pred)
```

```
In [61]: # k-fold
# from sklearn.model_selection import cross_val_score
# accuracies = cross_val_score(estimator=classifier, X=X_train, y=y_train, cv=10)
# print(f"Standard Deviation : {accuracies.std()*100:.2f}%")
```

```
In [62]: # Grid search
from sklearn.model_selection import GridSearchCV
# parameters = {
#     'C': np.linspace(0.01, 1, num=10).tolist(), # [0.1, 0.25, 0.5, 0.75, 1]
#     'kernel': ['linear'],
#     'degree': [3, 4, 5],
# }
# 'C': np.linspace(0.01, 1, num=10).tolist(), # [0.1, 0.25, 0.5, 0.75, 1]
# 'kernel': ['rbf', 'poly', 'sigmoid'],
# 'gamma': np.linspace(0.01, 1, num=10).tolist(), # [0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9]
# 'degree': [3, 4, 5],
# }
# grid_search = GridSearchCV(estimator=classifier,
#                             param_grid=parameters,
#                             scoring='accuracy', # As we are doing classification, we are using accuracy for s
#                             cv=10, # number of folds (same like k-fold cross validation)
#                             n_jobs=-1 # all your processors will be used available in hardware
# )
# grid_search.fit(X_train, y_train)
```

```
In [64]: # best_accuracy = grid_search.best_score_
# print(f"Best Accuracy achieved : {best_accuracy*100:.2f}%")
```

```
In [65]: # best_parameters = grid_search.best_params_
# print(f"Best parameters achieved : {best_parameters}")
```