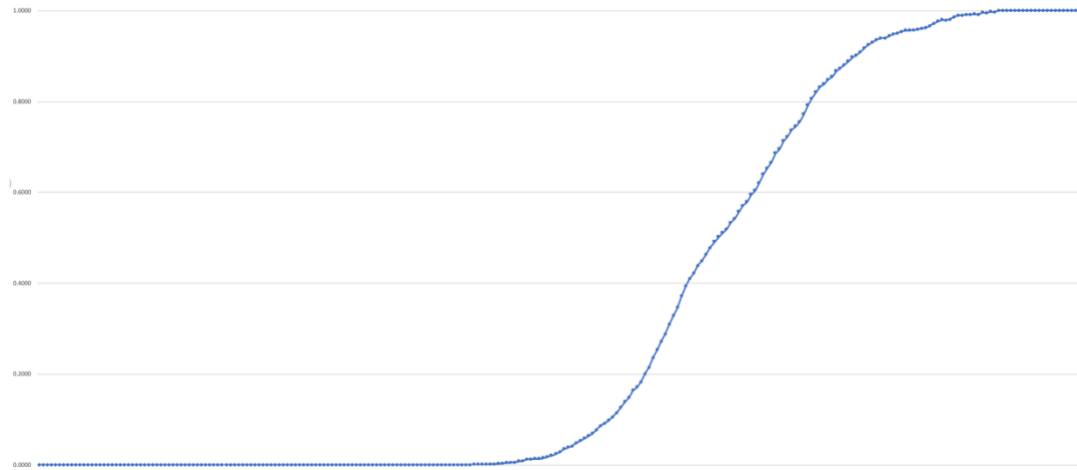


Below is the ROC curve for the code:



I chose to go with the threshold value of 206 which is on the knee of the ROC curve. The TP and FP values at that threshold are shown below. As can be seen the TP rate is fairly high and the FP rate is acceptably low enough for this sort of application.

Threshold = 204	TP = 148	FP = 82	FN = 3	TN = 1029	TPR = 0.980	FPR = 0.074
Threshold = 205	TP = 147	FP = 75	FN = 4	TN = 1036	TPR = 0.974	FPR = 0.068
Threshold = 206	TP = 146	FP = 69	FN = 5	TN = 1042	TPR = 0.967	FPR = 0.062
Threshold = 207	TP = 145	FP = 65	FN = 6	TN = 1046	TPR = 0.960	FPR = 0.059
Threshold = 208	TP = 144	FP = 64	FN = 7	TN = 1047	TPR = 0.954	FPR = 0.058

Below is the normalized MSF image:



Here is the output of the program with all the necessary values to create the ROC curve:

Threshold = 0	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 1	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 2	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 3	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 4	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 5	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 6	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 7	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 8	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 9	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 10	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 11	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 12	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 13	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 14	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 15	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 16	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 17	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 18	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 19	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 20	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 21	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			

[illegible]

[illegible]

[illegible]

Threshold = 94	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 95	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 96	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 97	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 98	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 99	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 100	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 101	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 102	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 103	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 104	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 105	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 106	TP = 151	FP = 1111	FN = 0	TN = 0
TPR = 1.000	FPR = 1.000			
Threshold = 107	TP = 151	FP = 1110	FN = 0	TN = 1
TPR = 1.000	FPR = 0.999			
Threshold = 108	TP = 151	FP = 1110	FN = 0	TN = 1
TPR = 1.000	FPR = 0.999			
Threshold = 109	TP = 151	FP = 1110	FN = 0	TN = 1
TPR = 1.000	FPR = 0.999			
Threshold = 110	TP = 151	FP = 1110	FN = 0	TN = 1
TPR = 1.000	FPR = 0.999			
Threshold = 111	TP = 151	FP = 1109	FN = 0	TN = 2
TPR = 1.000	FPR = 0.998			
Threshold = 112	TP = 151	FP = 1109	FN = 0	TN = 2
TPR = 1.000	FPR = 0.998			
Threshold = 113	TP = 151	FP = 1108	FN = 0	TN = 3
TPR = 1.000	FPR = 0.997			
Threshold = 114	TP = 151	FP = 1107	FN = 0	TN = 4
TPR = 1.000	FPR = 0.996			
Threshold = 115	TP = 151	FP = 1106	FN = 0	TN = 5
TPR = 1.000	FPR = 0.995			
Threshold = 116	TP = 151	FP = 1105	FN = 0	TN = 6
TPR = 1.000	FPR = 0.995			
Threshold = 117	TP = 151	FP = 1105	FN = 0	TN = 6
TPR = 1.000	FPR = 0.995			

Threshold = 118	TP = 151	FP = 1102	FN = 0	TN = 9
TPR = 1.000	FPR = 0.992			
Threshold = 119	TP = 151	FP = 1101	FN = 0	TN =
10 TPR = 1.000	FPR = 0.991			
Threshold = 120	TP = 151	FP = 1097	FN = 0	TN =
14 TPR = 1.000	FPR = 0.987			
Threshold = 121	TP = 151	FP = 1097	FN = 0	TN =
14 TPR = 1.000	FPR = 0.987			
Threshold = 122	TP = 151	FP = 1096	FN = 0	TN =
15 TPR = 1.000	FPR = 0.986			
Threshold = 123	TP = 151	FP = 1096	FN = 0	TN =
15 TPR = 1.000	FPR = 0.986			
Threshold = 124	TP = 151	FP = 1094	FN = 0	TN =
17 TPR = 1.000	FPR = 0.985			
Threshold = 125	TP = 151	FP = 1091	FN = 0	TN =
20 TPR = 1.000	FPR = 0.982			
Threshold = 126	TP = 151	FP = 1088	FN = 0	TN =
23 TPR = 1.000	FPR = 0.979			
Threshold = 127	TP = 151	FP = 1084	FN = 0	TN =
27 TPR = 1.000	FPR = 0.976			
Threshold = 128	TP = 151	FP = 1079	FN = 0	TN =
32 TPR = 1.000	FPR = 0.971			
Threshold = 129	TP = 151	FP = 1073	FN = 0	TN =
38 TPR = 1.000	FPR = 0.966			
Threshold = 130	TP = 151	FP = 1068	FN = 0	TN =
43 TPR = 1.000	FPR = 0.961			
Threshold = 131	TP = 151	FP = 1066	FN = 0	TN =
45 TPR = 1.000	FPR = 0.959			
Threshold = 132	TP = 151	FP = 1058	FN = 0	TN =
53 TPR = 1.000	FPR = 0.952			
Threshold = 133	TP = 151	FP = 1053	FN = 0	TN =
58 TPR = 1.000	FPR = 0.948			
Threshold = 134	TP = 151	FP = 1047	FN = 0	TN =
64 TPR = 1.000	FPR = 0.942			
Threshold = 135	TP = 151	FP = 1041	FN = 0	TN =
70 TPR = 1.000	FPR = 0.937			
Threshold = 136	TP = 151	FP = 1035	FN = 0	TN =
76 TPR = 1.000	FPR = 0.932			
Threshold = 137	TP = 151	FP = 1026	FN = 0	TN =
85 TPR = 1.000	FPR = 0.923			
Threshold = 138	TP = 151	FP = 1016	FN = 0	TN =
95 TPR = 1.000	FPR = 0.914			
Threshold = 139	TP = 151	FP = 1010	FN = 0	TN =
101 TPR = 1.000	FPR = 0.909			
Threshold = 140	TP = 151	FP = 1003	FN = 0	TN =
108 TPR = 1.000	FPR = 0.903			
Threshold = 141	TP = 151	FP = 994	FN = 0	TN =
117 TPR = 1.000	FPR = 0.895			

Threshold = 142	TP = 151	FP = 984	FN = 0	TN =
127 TPR = 1.000	FPR = 0.886			
Threshold = 143	TP = 151	FP = 971	FN = 0	TN =
140 TPR = 1.000	FPR = 0.874			
Threshold = 144	TP = 151	FP = 957	FN = 0	TN =
154 TPR = 1.000	FPR = 0.861			
Threshold = 145	TP = 151	FP = 947	FN = 0	TN =
164 TPR = 1.000	FPR = 0.852			
Threshold = 146	TP = 151	FP = 929	FN = 0	TN =
182 TPR = 1.000	FPR = 0.836			
Threshold = 147	TP = 151	FP = 921	FN = 0	TN =
190 TPR = 1.000	FPR = 0.829			
Threshold = 148	TP = 151	FP = 908	FN = 0	TN =
203 TPR = 1.000	FPR = 0.817			
Threshold = 149	TP = 151	FP = 889	FN = 0	TN =
222 TPR = 1.000	FPR = 0.800			
Threshold = 150	TP = 151	FP = 873	FN = 0	TN =
238 TPR = 1.000	FPR = 0.786			
Threshold = 151	TP = 151	FP = 849	FN = 0	TN =
262 TPR = 1.000	FPR = 0.764			
Threshold = 152	TP = 151	FP = 830	FN = 0	TN =
281 TPR = 1.000	FPR = 0.747			
Threshold = 153	TP = 151	FP = 809	FN = 0	TN =
302 TPR = 1.000	FPR = 0.728			
Threshold = 154	TP = 151	FP = 791	FN = 0	TN =
320 TPR = 1.000	FPR = 0.712			
Threshold = 155	TP = 151	FP = 767	FN = 0	TN =
344 TPR = 1.000	FPR = 0.690			
Threshold = 156	TP = 151	FP = 746	FN = 0	TN =
365 TPR = 1.000	FPR = 0.671			
Threshold = 157	TP = 151	FP = 726	FN = 0	TN =
385 TPR = 1.000	FPR = 0.653			
Threshold = 158	TP = 151	FP = 699	FN = 0	TN =
412 TPR = 1.000	FPR = 0.629			
Threshold = 159	TP = 151	FP = 675	FN = 0	TN =
436 TPR = 1.000	FPR = 0.608			
Threshold = 160	TP = 151	FP = 656	FN = 0	TN =
455 TPR = 1.000	FPR = 0.590			
Threshold = 161	TP = 151	FP = 643	FN = 0	TN =
468 TPR = 1.000	FPR = 0.579			
Threshold = 162	TP = 151	FP = 624	FN = 0	TN =
487 TPR = 1.000	FPR = 0.562			
Threshold = 163	TP = 151	FP = 612	FN = 0	TN =
499 TPR = 1.000	FPR = 0.551			
Threshold = 164	TP = 151	FP = 597	FN = 0	TN =
514 TPR = 1.000	FPR = 0.537			
Threshold = 165	TP = 151	FP = 580	FN = 0	TN =
531 TPR = 1.000	FPR = 0.522			

Threshold = 166	TP = 151	FP = 565	FN = 0	TN =
546 TPR = 1.000	FPR = 0.509			
Threshold = 167	TP = 151	FP = 554	FN = 0	TN =
557 TPR = 1.000	FPR = 0.499			
Threshold = 168	TP = 151	FP = 544	FN = 0	TN =
567 TPR = 1.000	FPR = 0.490			
Threshold = 169	TP = 151	FP = 535	FN = 0	TN =
576 TPR = 1.000	FPR = 0.482			
Threshold = 170	TP = 151	FP = 519	FN = 0	TN =
592 TPR = 1.000	FPR = 0.467			
Threshold = 171	TP = 151	FP = 509	FN = 0	TN =
602 TPR = 1.000	FPR = 0.458			
Threshold = 172	TP = 151	FP = 492	FN = 0	TN =
619 TPR = 1.000	FPR = 0.443			
Threshold = 173	TP = 151	FP = 477	FN = 0	TN =
634 TPR = 1.000	FPR = 0.429			
Threshold = 174	TP = 151	FP = 468	FN = 0	TN =
643 TPR = 1.000	FPR = 0.421			
Threshold = 175	TP = 151	FP = 450	FN = 0	TN =
661 TPR = 1.000	FPR = 0.405			
Threshold = 176	TP = 151	FP = 440	FN = 0	TN =
671 TPR = 1.000	FPR = 0.396			
Threshold = 177	TP = 151	FP = 421	FN = 0	TN =
690 TPR = 1.000	FPR = 0.379			
Threshold = 178	TP = 151	FP = 400	FN = 0	TN =
711 TPR = 1.000	FPR = 0.360			
Threshold = 179	TP = 151	FP = 386	FN = 0	TN =
725 TPR = 1.000	FPR = 0.347			
Threshold = 180	TP = 151	FP = 372	FN = 0	TN =
739 TPR = 1.000	FPR = 0.335			
Threshold = 181	TP = 151	FP = 349	FN = 0	TN =
762 TPR = 1.000	FPR = 0.314			
Threshold = 182	TP = 151	FP = 339	FN = 0	TN =
772 TPR = 1.000	FPR = 0.305			
Threshold = 183	TP = 151	FP = 319	FN = 0	TN =
792 TPR = 1.000	FPR = 0.287			
Threshold = 184	TP = 151	FP = 308	FN = 0	TN =
803 TPR = 1.000	FPR = 0.277			
Threshold = 185	TP = 151	FP = 292	FN = 0	TN =
819 TPR = 1.000	FPR = 0.263			
Threshold = 186	TP = 151	FP = 283	FN = 0	TN =
828 TPR = 1.000	FPR = 0.255			
Threshold = 187	TP = 151	FP = 272	FN = 0	TN =
839 TPR = 1.000	FPR = 0.245			
Threshold = 188	TP = 151	FP = 253	FN = 0	TN =
858 TPR = 1.000	FPR = 0.228			
Threshold = 189	TP = 151	FP = 231	FN = 0	TN =
880 TPR = 1.000	FPR = 0.208			

Threshold = 190	TP = 151	FP = 215	FN = 0	TN =
896 TPR = 1.000	FPR = 0.194			
Threshold = 191	TP = 151	FP = 200	FN = 0	TN =
911 TPR = 1.000	FPR = 0.180			
Threshold = 192	TP = 151	FP = 187	FN = 0	TN =
924 TPR = 1.000	FPR = 0.168			
Threshold = 193	TP = 151	FP = 180	FN = 0	TN =
931 TPR = 1.000	FPR = 0.162			
Threshold = 194	TP = 151	FP = 169	FN = 0	TN =
942 TPR = 1.000	FPR = 0.152			
Threshold = 195	TP = 151	FP = 162	FN = 0	TN =
949 TPR = 1.000	FPR = 0.146			
Threshold = 196	TP = 151	FP = 148	FN = 0	TN =
963 TPR = 1.000	FPR = 0.133			
Threshold = 197	TP = 151	FP = 141	FN = 0	TN =
970 TPR = 1.000	FPR = 0.127			
Threshold = 198	TP = 151	FP = 133	FN = 0	TN =
978 TPR = 1.000	FPR = 0.120			
Threshold = 199	TP = 151	FP = 124	FN = 0	TN =
987 TPR = 1.000	FPR = 0.112			
Threshold = 200	TP = 150	FP = 113	FN = 1	TN =
998 TPR = 0.993	FPR = 0.102			
Threshold = 201	TP = 150	FP = 108	FN = 1	TN =
1003 TPR = 0.993	FPR = 0.097			
Threshold = 202	TP = 150	FP = 101	FN = 1	TN =
1010 TPR = 0.993	FPR = 0.091			
Threshold = 203	TP = 149	FP = 90	FN = 2	TN =
1021 TPR = 0.987	FPR = 0.081			
Threshold = 204	TP = 148	FP = 82	FN = 3	TN =
1029 TPR = 0.980	FPR = 0.074			
Threshold = 205	TP = 147	FP = 75	FN = 4	TN =
1036 TPR = 0.974	FPR = 0.068			
Threshold = 206	TP = 146	FP = 69	FN = 5	TN =
1042 TPR = 0.967	FPR = 0.062			
Threshold = 207	TP = 145	FP = 65	FN = 6	TN =
1046 TPR = 0.960	FPR = 0.059			
Threshold = 208	TP = 144	FP = 64	FN = 7	TN =
1047 TPR = 0.954	FPR = 0.058			
Threshold = 209	TP = 143	FP = 59	FN = 8	TN =
1052 TPR = 0.947	FPR = 0.053			
Threshold = 210	TP = 142	FP = 54	FN = 9	TN =
1057 TPR = 0.940	FPR = 0.049			
Threshold = 211	TP = 142	FP = 52	FN = 9	TN =
1059 TPR = 0.940	FPR = 0.047			
Threshold = 212	TP = 140	FP = 48	FN = 11	
TN = 1063	TPR = 0.927	FPR = 0.043		
Threshold = 213	TP = 139	FP = 45	FN = 12	
TN = 1066	TPR = 0.921	FPR = 0.041		

Threshold = 214	TP = 133	FP = 43	FN = 18	
TN = 1068	TPR = 0.881	FPR = 0.039		
Threshold = 215	TP = 133	FP = 42	FN = 18	
TN = 1069	TPR = 0.881	FPR = 0.038		
Threshold = 216	TP = 130	FP = 40	FN = 21	
TN = 1071	TPR = 0.861	FPR = 0.036		
Threshold = 217	TP = 128	FP = 37	FN = 23	
TN = 1074	TPR = 0.848	FPR = 0.033		
Threshold = 218	TP = 122	FP = 34	FN = 29	
TN = 1077	TPR = 0.808	FPR = 0.031		
Threshold = 219	TP = 121	FP = 30	FN = 30	
TN = 1081	TPR = 0.801	FPR = 0.027		
Threshold = 220	TP = 118	FP = 25	FN = 33	
TN = 1086	TPR = 0.781	FPR = 0.023		
Threshold = 221	TP = 115	FP = 20	FN = 36	
TN = 1091	TPR = 0.762	FPR = 0.018		
Threshold = 222	TP = 111	FP = 17	FN = 40	
TN = 1094	TPR = 0.735	FPR = 0.015		
Threshold = 223	TP = 104	FP = 16	FN = 47	
TN = 1095	TPR = 0.689	FPR = 0.014		
Threshold = 224	TP = 99	FP = 14	FN = 52	
TN = 1097	TPR = 0.656	FPR = 0.013		
Threshold = 225	TP = 98	FP = 10	FN = 53	
TN = 1101	TPR = 0.649	FPR = 0.009		
Threshold = 226	TP = 93	FP = 7	FN = 58	TN =
1104	TPR = 0.616	FPR = 0.006		
Threshold = 227	TP = 89	FP = 7	FN = 62	TN =
1104	TPR = 0.589	FPR = 0.006		
Threshold = 228	TP = 81	FP = 5	FN = 70	TN =
1106	TPR = 0.536	FPR = 0.005		
Threshold = 229	TP = 75	FP = 5	FN = 76	TN =
1106	TPR = 0.497	FPR = 0.005		
Threshold = 230	TP = 68	FP = 4	FN = 83	TN =
1107	TPR = 0.450	FPR = 0.004		
Threshold = 231	TP = 63	FP = 4	FN = 88	TN =
1107	TPR = 0.417	FPR = 0.004		
Threshold = 232	TP = 60	FP = 2	FN = 91	TN =
1109	TPR = 0.397	FPR = 0.002		
Threshold = 233	TP = 53	FP = 2	FN = 98	TN =
1109	TPR = 0.351	FPR = 0.002		
Threshold = 234	TP = 48	FP = 1	FN = 103	TN =
1110	TPR = 0.318	FPR = 0.001		
Threshold = 235	TP = 43	FP = 1	FN = 108	TN =
1110	TPR = 0.285	FPR = 0.001		
Threshold = 236	TP = 41	FP = 0	FN = 110	TN =
1111	TPR = 0.272	FPR = 0.000		
Threshold = 237	TP = 39	FP = 0	FN = 112	TN =
1111	TPR = 0.258	FPR = 0.000		

Threshold = 238	TP = 35	FP = 0	FN = 116	TN =
1111 TPR = 0.232	FPR = 0.000			
Threshold = 239	TP = 31	FP = 0	FN = 120	TN =
1111 TPR = 0.205	FPR = 0.000			
Threshold = 240	TP = 28	FP = 0	FN = 123	TN =
1111 TPR = 0.185	FPR = 0.000			
Threshold = 241	TP = 24	FP = 0	FN = 127	TN =
1111 TPR = 0.159	FPR = 0.000			
Threshold = 242	TP = 23	FP = 0	FN = 128	TN =
1111 TPR = 0.152	FPR = 0.000			
Threshold = 243	TP = 20	FP = 0	FN = 131	TN =
1111 TPR = 0.132	FPR = 0.000			
Threshold = 244	TP = 16	FP = 0	FN = 135	TN =
1111 TPR = 0.106	FPR = 0.000			
Threshold = 245	TP = 13	FP = 0	FN = 138	TN =
1111 TPR = 0.086	FPR = 0.000			
Threshold = 246	TP = 11	FP = 0	FN = 140	TN =
1111 TPR = 0.073	FPR = 0.000			
Threshold = 247	TP = 8	FP = 0	FN = 143	TN = 1111
TPR = 0.053	FPR = 0.000			
Threshold = 248	TP = 6	FP = 0	FN = 145	TN = 1111
TPR = 0.040	FPR = 0.000			
Threshold = 249	TP = 5	FP = 0	FN = 146	TN = 1111
TPR = 0.033	FPR = 0.000			
Threshold = 250	TP = 1	FP = 0	FN = 150	TN = 1111
TPR = 0.007	FPR = 0.000			
Threshold = 251	TP = 1	FP = 0	FN = 150	TN = 1111
TPR = 0.007	FPR = 0.000			
Threshold = 252	TP = 1	FP = 0	FN = 150	TN = 1111
TPR = 0.007	FPR = 0.000			
Threshold = 253	TP = 1	FP = 0	FN = 150	TN = 1111
TPR = 0.007	FPR = 0.000			
Threshold = 254	TP = 1	FP = 0	FN = 150	TN = 1111
TPR = 0.007	FPR = 0.000			
Threshold = 255	TP = 0	FP = 0	FN = 151	TN = 1111
TPR = 0.000	FPR = 0.000			