Lab 05- Classifying Hurricane Damage Imagery with Machine Learning

-Sachin Mohan Sujir

OBJECTID	ClassValue	C_11	C_21	C_22	C_23	C_31	C_100	Total	U_Accuracy	Kappa
1	C_11	22	0	0	1	0	5	28	0.785714	0
2	C_21	1	9	0	0	0	0	10	0.9	0
3	C_22	0	0	6	1	1	2	10	0.6	0
4	C_23	2	0	0	7	1	0	10	0.7	0
5	C_31	0	0	0	1	8	1	10	0.8	0
6	C_100	0	0	0	1	0	13	14	0.928571	0
7	Total	25	9	6	11	10	21	82	0	0
8	P_Accuracy	0.88	1	1	0.636364	0.8	0.619048	0	0.792683	0
9	Kappa	0	0	0	0	0	0	0	0	0.74041

Confusion Matrix

Each of the classification classes are shown by their class values: C_11 Damaged_Trees, C_21 Blue_Tarp_Cover, C_22 Intact_Roof C_23, Destroyed_Building, C_31 Open_Roads and C_100 Grass. Looking at the row C_11, note how the human classified several pixels as C_11 (Damaged Trees) but the machine classified those same pixels differently as C_23 (Destroyed Building, 1 values), C-100 (Grass , 5 values), The U_Accuracy is 0.78 which is 78% agreement.. The total row represents the number of points that should have been identified by the user/human per class. Looking at the row starting with C_23, machine classified those same pixels differently as C_11 (Damaged_Trees, 2 values), C_31 (Open_Roads, 1 value) thus decreasing the U_Accuracy down to 0.7. This is because of the fact that damaged trees and destroyed buildings look similar. This is false positive. When the machine fails to detect a pixel correctly, this is known as a false negative or type 2. Column C_11 is misclassified as C_21(1 value) C_23(2 values) and the P_accuracy is 0.88. Also, Column C_31 has C_22 (1 value), C_23(1 value) and C_11 (5 values) and the P_accuracy is 0.61. This might be because the overall sample size of the

The kappa value of 0.7404 would be considered “substantial agreement” according to Viera and Garrett (2005) (with values > 0.81 being “Almost perfect agreement”). Thus, the overall results indicate that the SVM algorithm performed moderately well in classifying the Dorian image.

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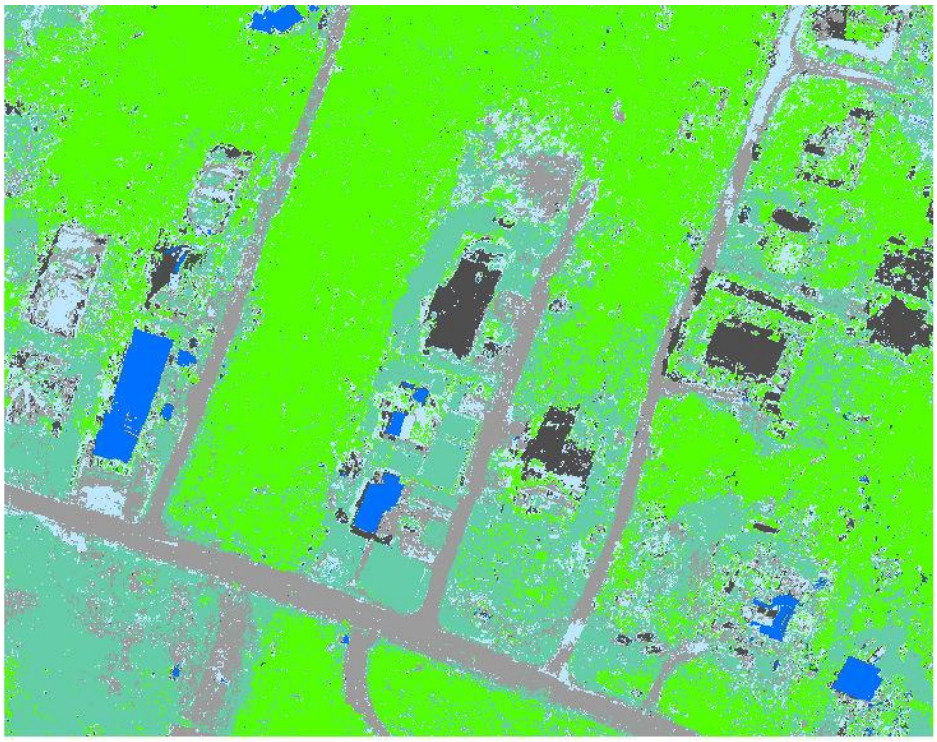

Classification of Hurricane Damage Imagery

Map View of Classification

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Discussion Answers:

1) Yes, open grass must have bee included as one of the classes as there is are places in the map that are unclassified and are grassy regions. I have created a class for grass and have included it in the classification. There are also places like open land, airports that were damaged in the bigger picture. If we include this, we will have more information about the disaster and we might get a bigger picture about it.
2) There are misclassifications in the assessment points. Few points are misclassified into a different class when compared to the ground truth. For example, destroyed buildings were classified as damaged tress and it gives inconsistent results due to this. Inconsistent results cannot be used for analysis of disasters. This will not give us successful results and can cause major problems and can misguide the user working on the project. Hence consistent results are important.