Comparing Supervised Machine Learning Algorithms for Classification of Damaged Structures

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Goal of Project and Dataset

- **Project Goal :** Comparison of different supervised machine learning algorithms in the classification of damaged structures.
- **Dataset**

Satellite images of hurricane damage dataset was used in this project. Link: https://www.kaggle.com/kmader/satellite-images-of-hurricane-damage

Dataset : 10000 train data (damaged and no damage), 2000 validation data, 11000 test data

Damage = categorized by 1

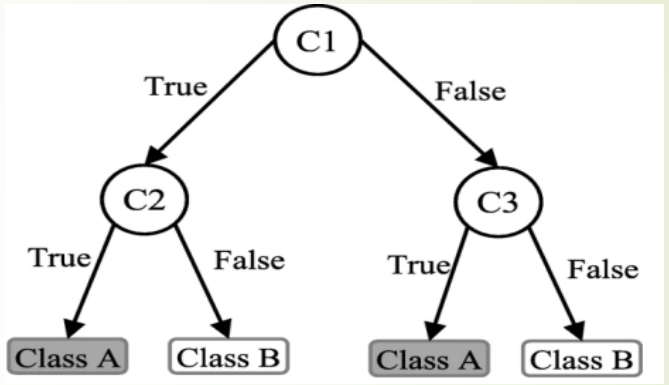
No Damage = categorized by 0

Algorithms

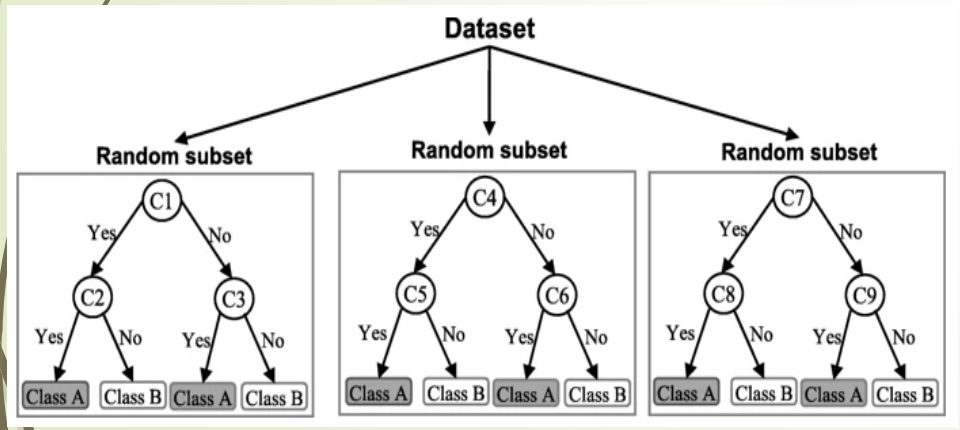
Naive Bayes Classification

$$p(class \mid data) = p(data \mid class) * p(class) / p(data)$$

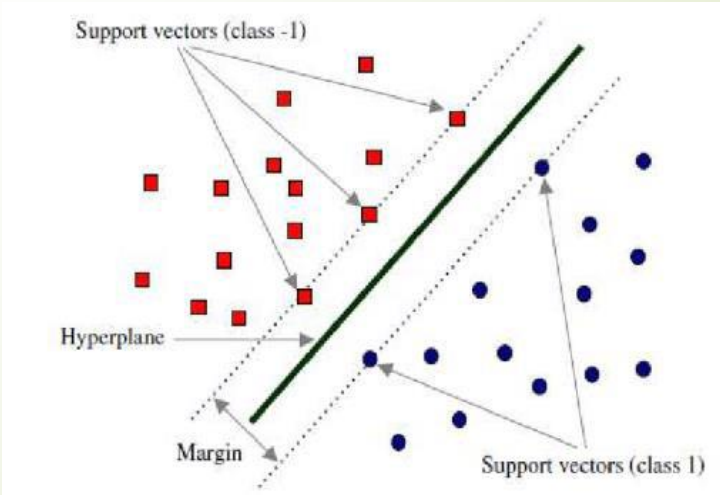
Decision Tree Classification



Random Forest Classification

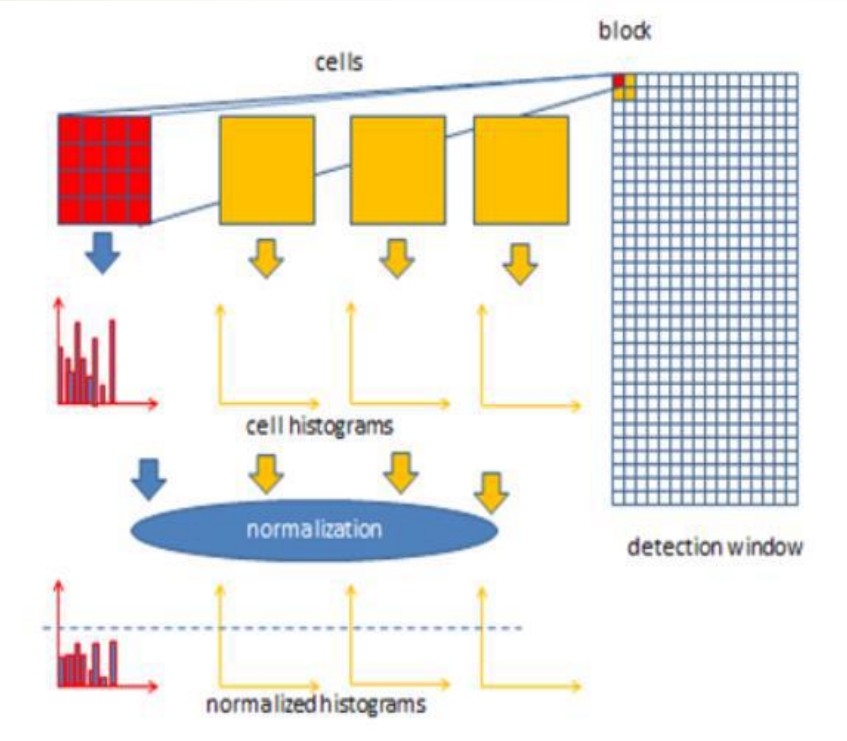


Support Vector Machine (SVM) Classification



Feature Extraction

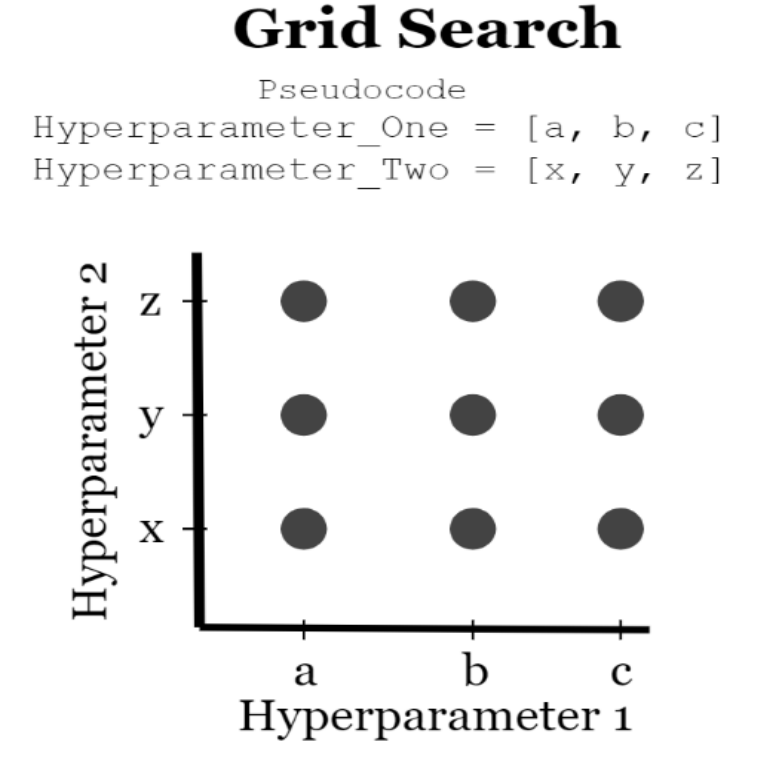
- **Histogram of Oriented Gradients(HOG) :** It deals with the magnitude and oriantations of the pixels.




```
orientations=8,
pixels_per_cell=(16,16),
cells_per_block=(4, 4),
```

Hyperparameters Tuning Technique

- **Grid Search Method** : Grid Search Method determines the best values with hyperparameter combinations.

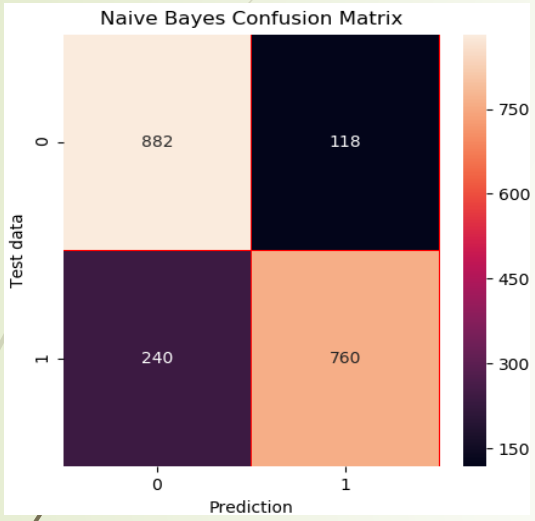


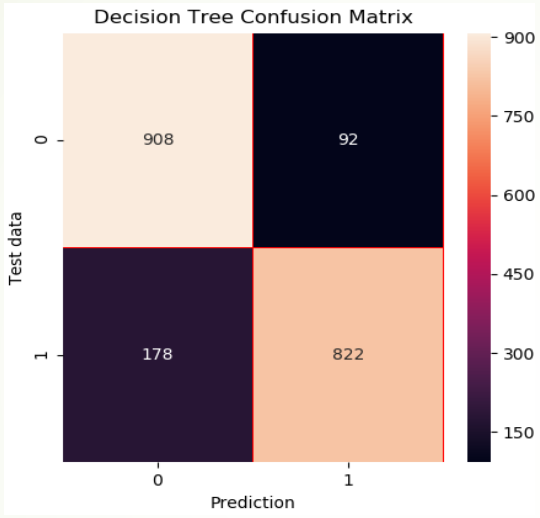
Key	Type	Size	Value
criterion	str	1	entropy
max_features	int	1	10
min_samples_leaf	int	1	1
min_samples_split	int	1	3
n_estimators	int	1	150

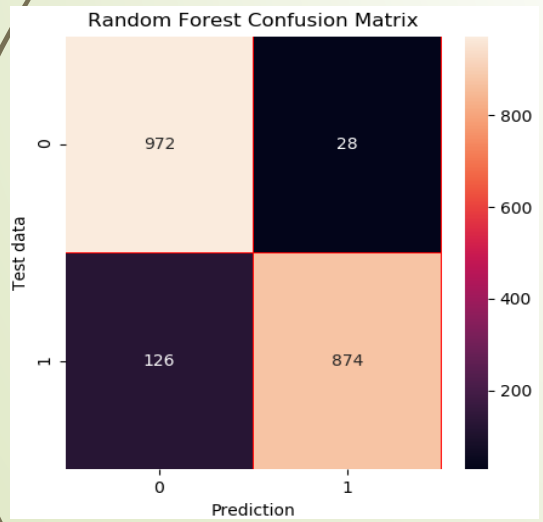
Random Forest Model Hyperparameters value after Grid Search

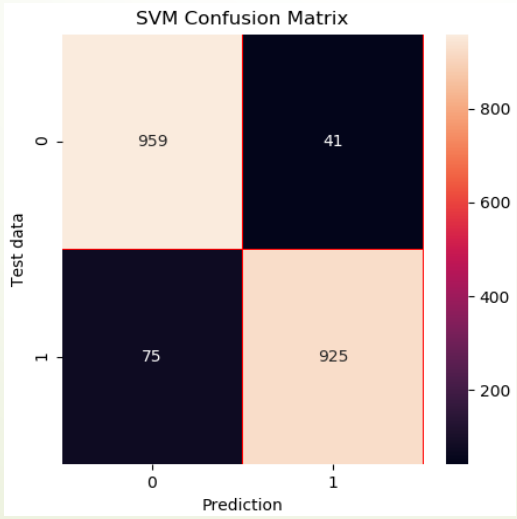
Experimental Results

- Confusion Matrices









- ROC Curve