



Problem :

To experiment with various supervised learning algorithms on CIFAR - 100 dataset which consists of 50000 training images and which has been divided into 100 classes. And to analyze the behavior of neural network , decision tree and Naive Bayes algorithms on the 10000 test images.

Data Set 1 – CIFAR 100 :

The dataset has 100 classes containing 600 images each. There are 500 training images and 100 testing images per class. The 100 classes in the CIFAR-100 are grouped into 20 superclasses. Each image comes with a "fine" label (the class to which it belongs) and a "coarse" label (the superclass to which it belongs).



RANDOM FOREST:

- A random forest is simply a collection of decision trees whose results are aggregated into one final result.
- random forests are a strong modeling technique and much more robust than a single decision tree.
 - Advantage : They don not over fit.

ARTIFICIAL NEURAL NETWORK :

- Computations are structured in terms of an interconnected group of artificial neurons.
- They are usually used to model complex relationships between inputs and outputs or to find patterns in data.

NAIVE BAYES:

- Naive Bayes classifiers are a family of simple probabilistic classifiers based on applying Bayes' theorem with strong (naive) independence assumptions between the features.



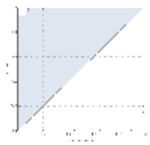
RESULTS:

I am presenting the precision, recall and accuracy for 3 classes for each algorithm discussed in previous section :

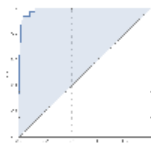
| Algorithm Chosen | Classes | Precision | Recall | Accuracy |
|----------------------------------|--------------|-----------|--------|----------|
| Decision tree with random forest | Apple | 59.09% | 0.86 | 0.46 |
| | Maple tree | 51.72% | 0.5 | 0.46 |
| | Pickup truck | 41.17% | 0.7 | 0.46 |
| Artificial Neural Network | Apple | 86.2% | 0.8333 | 0.55 |
| | Maple tree | 73.33% | 0.366 | 0.55 |
| | Pickup truck | 100% | 0.233 | 0.55 |
| Naïve Bayes | Apple | 92.3% | 0.8 | 0.557 |
| | Maple tree | 60% | 0.3 | 0.557 |
| | Pickup truck | 80% | 0.533 | 0.557 |

ROC CURVE :

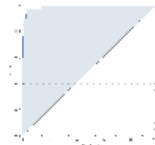
Random Forest :



Apple

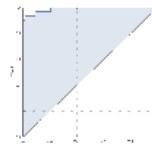


Maple tree

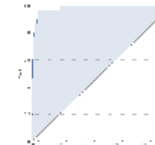


Pickup truck

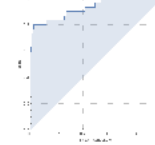
Neural network :



Apple

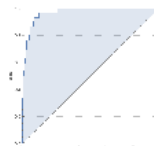


Maple tree

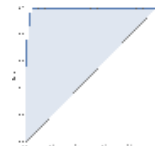


pickup truck

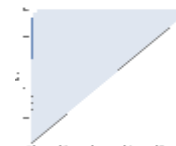
Naïve Bayes:



Apple



Maple tree



pickup truck