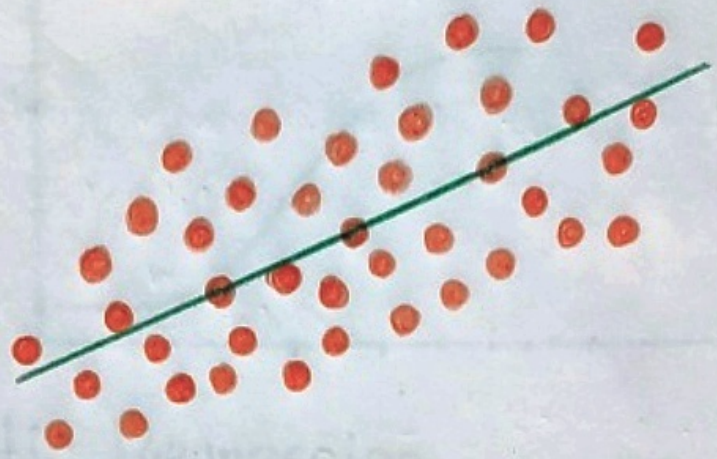
Machine Learnimg Handwritten Notes



Follow
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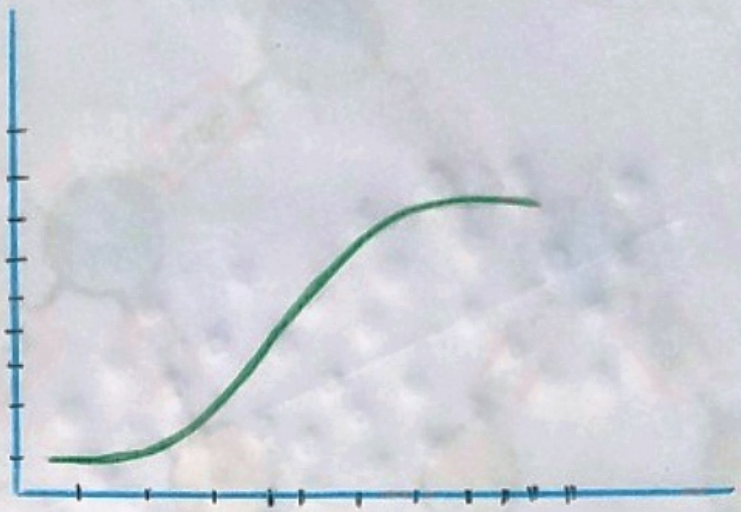
Linear Regression

MERITS :- Simple to implement and efficient to train.
- Overfitting can be reduced by regularization.
- Performs well when the dataset is linearly separable.

DEMERITS :- Assumes that the data is independent which is rare in real life.
- Prone to noise and overfitting.
- Sensitive to outliers.



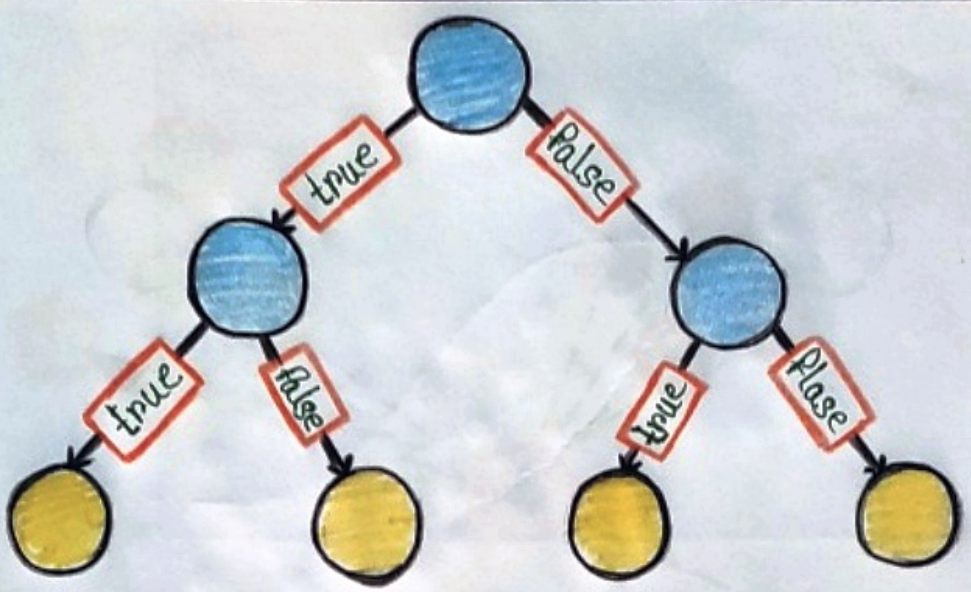
Logistic Regression

MERITS :- Less prone to over-fitting but it can overfit in high dimensional datasets.

- Efficient when the dataset has features that are linearly separable.
- Easy to implement and efficient to train.

DEMERITS :- Should not be used when the number of observations are lesser than the number of features.

- Assumption of linearity which is rare in practise.
- Can only be used to predict discrete function.



Decision Tree

MERITS :- Can solve non-linear problems.

- Can work on high-dimensional data with excellent accuracy.
- Easy to visualize and explain.

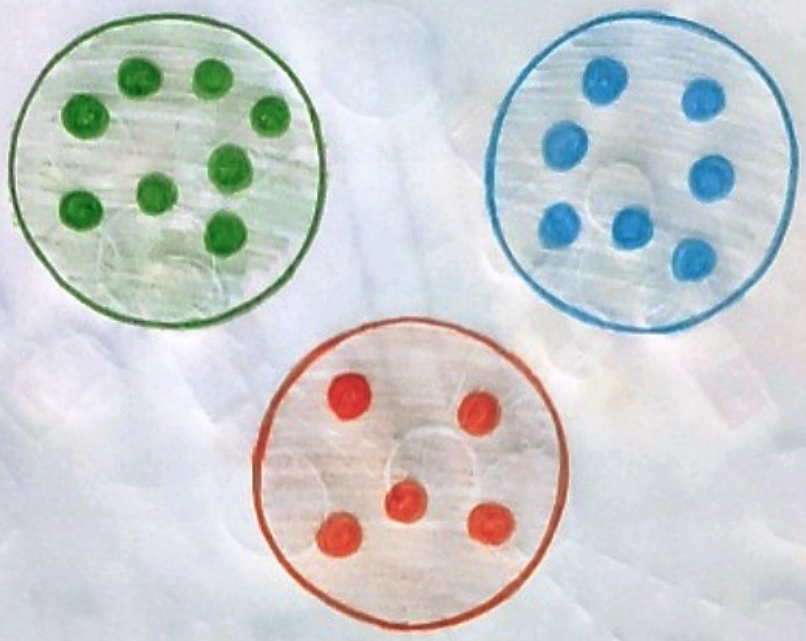
DEMERITS :- Overfitting. Might be resolved by random forest.

- A small change in the data can lead to a large change in the structure of the optimal decision tree.
- Calculations can get very complex.

K Nearest Neighbour

MERITS :- Can make predictions without training.
- Time complexity is O(n).
- Can be used for both classification and regression.

DEMERITS :- Does not work well with large dataset.
- Sensitive to noisy data, missing values and outliers.
- Need feature scaling.
- Choose the correct K value.



K Means

MERITS:- Simple to implement.

- Scales to large data sets.
- Guarantees convergence.
- Easily adapts to new examples.
- Generalizes to clusters of different shapes and sizes.

DEMERITE:- Sensitive to the outliers.

- Choosing the k values manually is tough.
- Dependent on initial values.
- Scalability decreases when dimension increases.

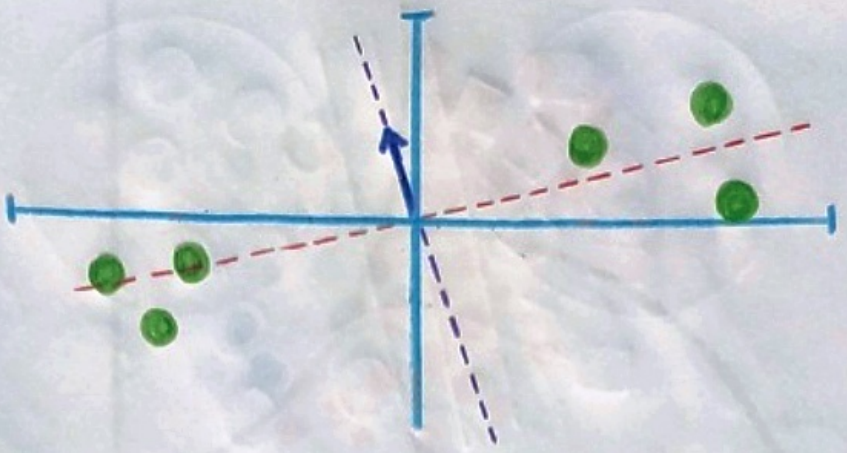
Support Vector Machine

MERITS :- Good at high dimensional data.

- Can work on small dataset.
- Can solve non-linear problems.

DEMERITS :- Inefficient on large data.

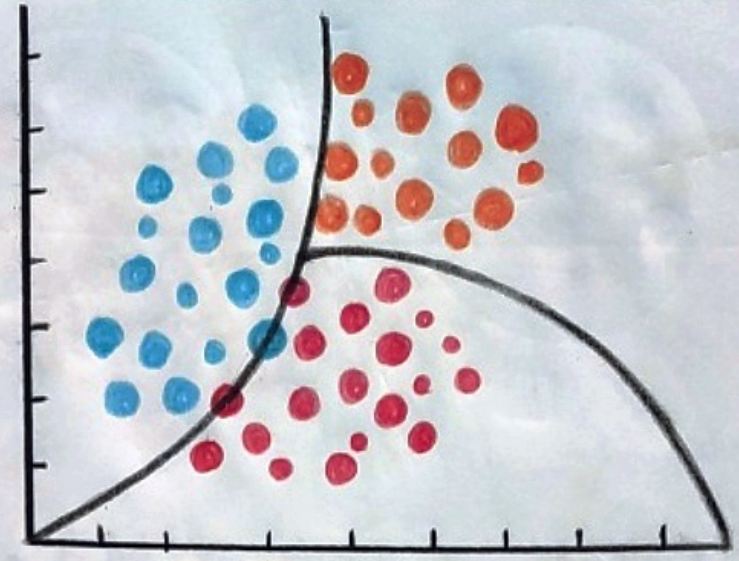
- Requires picking the right kernal.



Principal Component Analysis

MERITS :- Reduce correlated features.
- Improve performance.
- Reduce overfitting.

DEMERITS :- Principal components are less interpretable.
- Information loss.
- Must standardize data before implementing PCA.



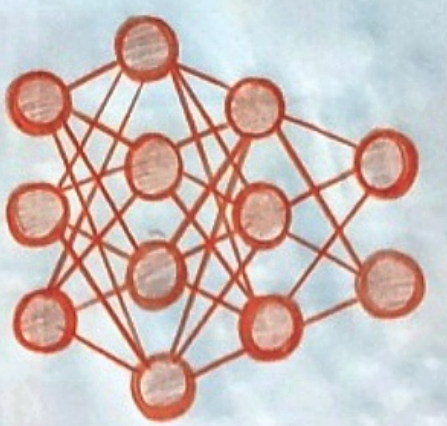
Naive Bayes

MERITS :- Training period is less.

- Better suited for categorical inputs.
- Easy to implement.

DEMERITS :- Assumes that all features are independent which is rarely happening in real life.

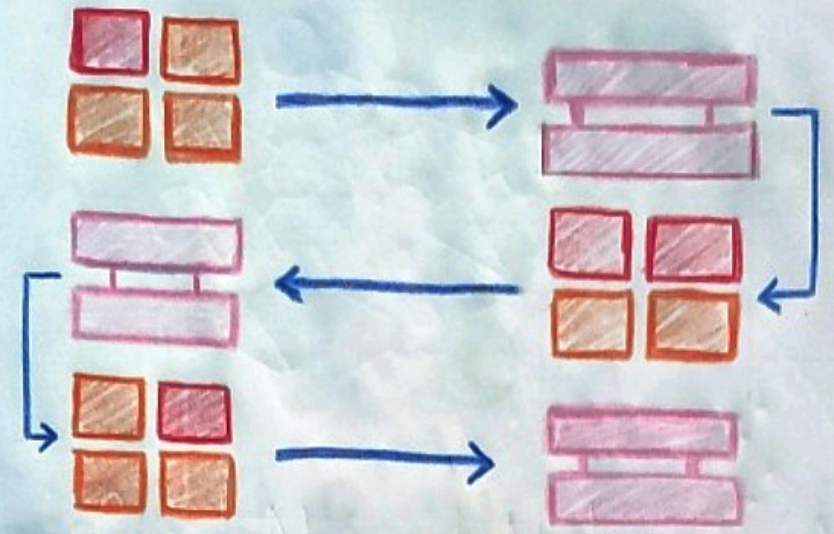
- Zero Frequency.
- Estimations can be wrong in some cases.



Artificial Neural Network (ANN)

MERITS:- Have fault tolerance.
- Have the ability to learn and model non-linear and complex relationships.
- Can generalize on unsean data.

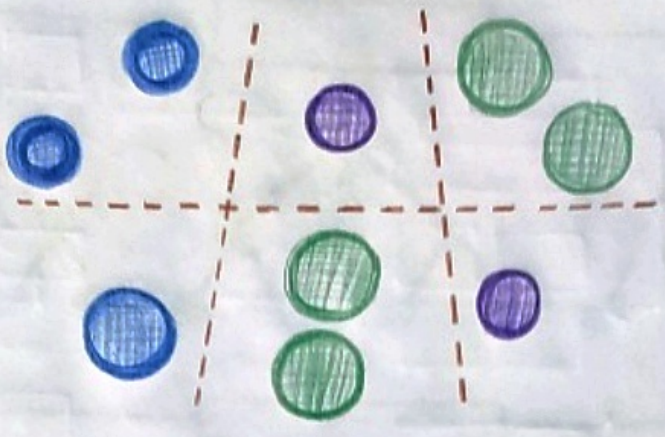
DEMERITS:- Long training time.
- Non-guaranteed convergence.
- Black box. Hard to explain solution.
- Hardware dependence.
- Requires user's ability to translate the problem.



Adaboost

MERITS :- Relatively robust to overfitting.
- High accuracy.
- Easy to understand and to visualize.

DEMERITS :- Sensitive to noise data.
- Affected by outliers.
- Not optimized for speed.



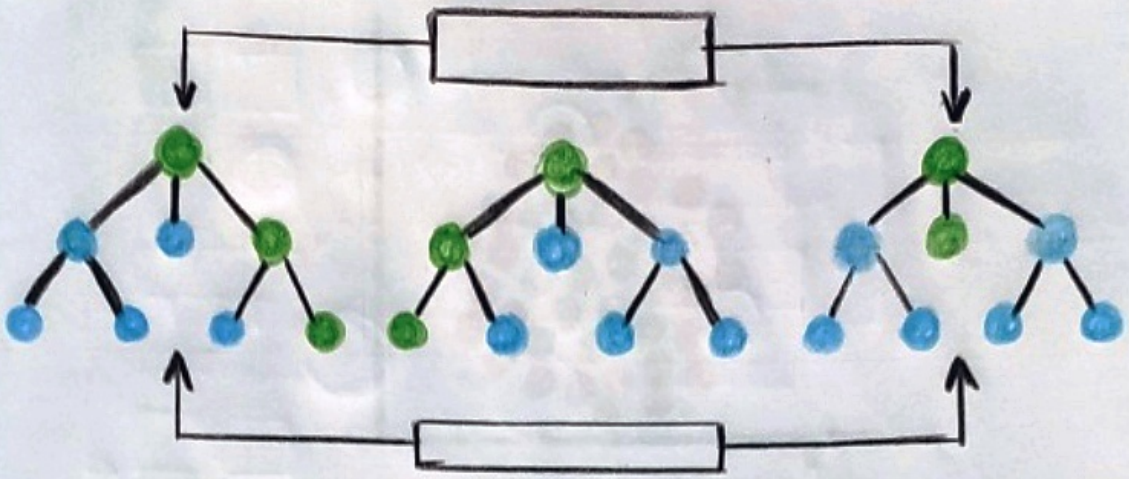
Gradient Boosting

MERITS :- Generally more accurate compare to other modes.

- Train faster especially on larger datasets.
- Most of them provide support handling categorical features.
- Some of them handle missing values natively.

DEMERITS :- Can overemphasize outliers and cause overfitting.

- Requires many trees (>1000) which can be time and memory exhaustive.



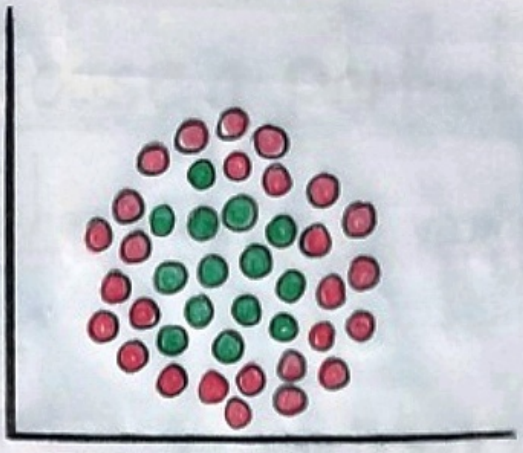
Random Forest

MERITS:- Capable of performing both Classification and Regression tasks.

- Capable of handling large datasets with high dimensionality.
- Enhances the accuracy of the model and prevents the overfitting issue.

DEMERITS:- Requires much computational power for large datasets.

- Requires much time for training.
- Can't describe relationships within data.



DBSCAN

MERITS:- Does not require a-priori specification of number of clusters.

- Able to handle outliers within the dataset.
- Able to find arbitrarily size and arbitrarily shaped clusters.

DEMERITS:- Struggles with clusters of simillar density.

- Struggles with high dimensionality data.