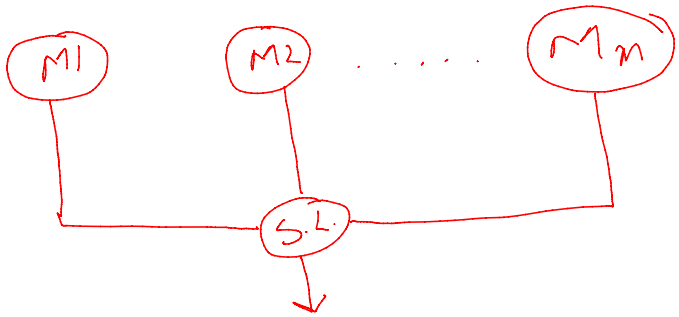
Ensemble Methods

2 January 2024 08:11 PM

- Ensemble learning is a technique where we combine multiple models to get better results.

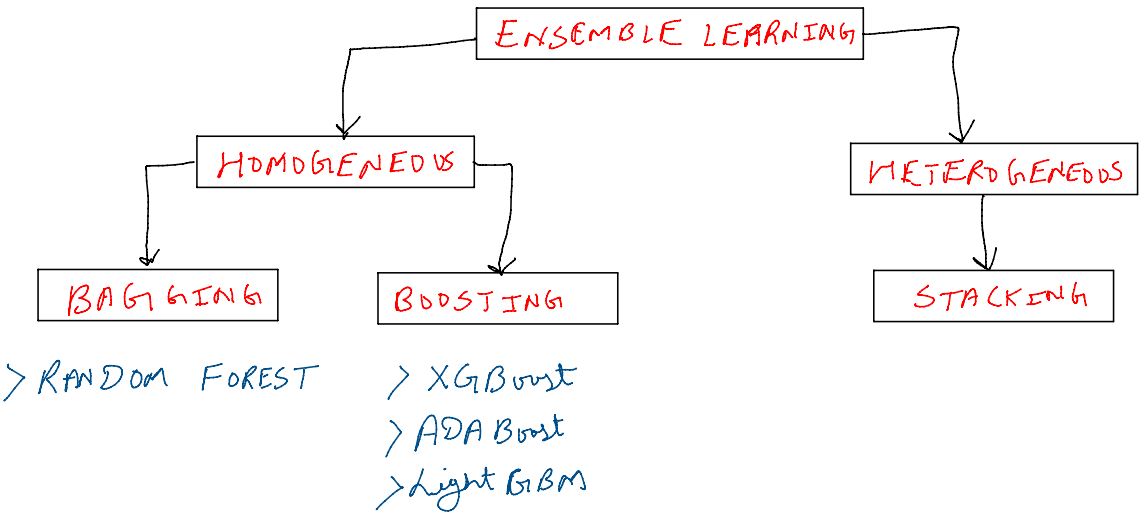
- Individual models can have problems such as:
  - Overfitting
  - Underfitting
  - Noise and errors

- A combination of multiple models nullifies the problems faced by individual models.



- The individual models are known as weak learners.
- The final combination , the ensemble, is known as a strong learner.

Types of ensembles:



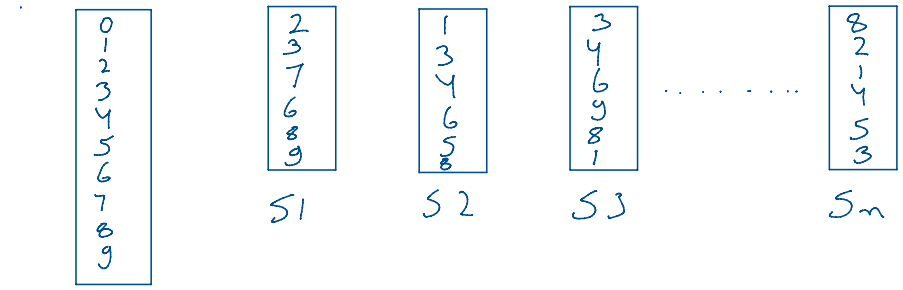
- **Bagging**
- It is a homogeneous ensemble.
- Short for Bootstrapping + Aggregating
- Involves two steps :
  - Bootstrapping:
    - Creating subsets from the dataset by random sampling with replacement.

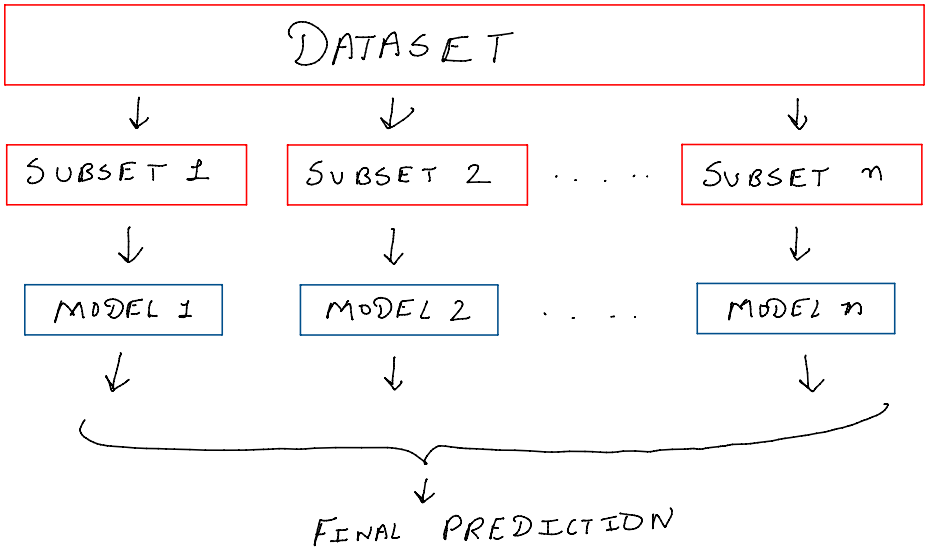
- Each Sample is used to train a decision tree.

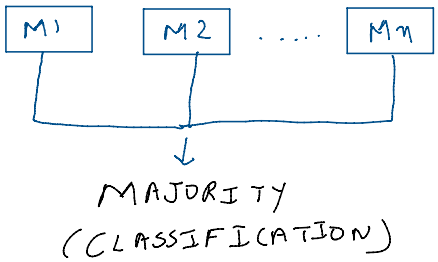
- Aggregating :
  - The results of individual models are combined to make a final decision.

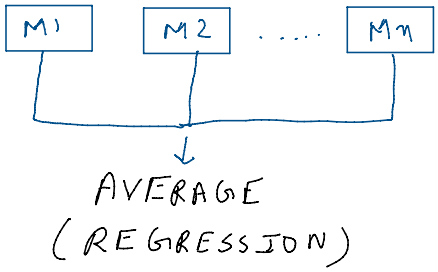
- All weak learners are trained parallelly.
- All weak learners are trained independent of each other.

* BOOTSTRAPPING :-

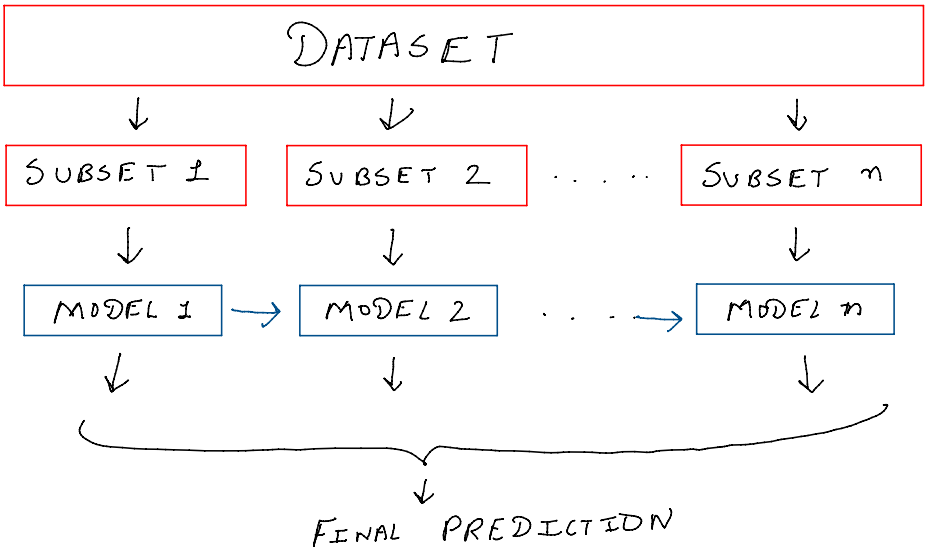


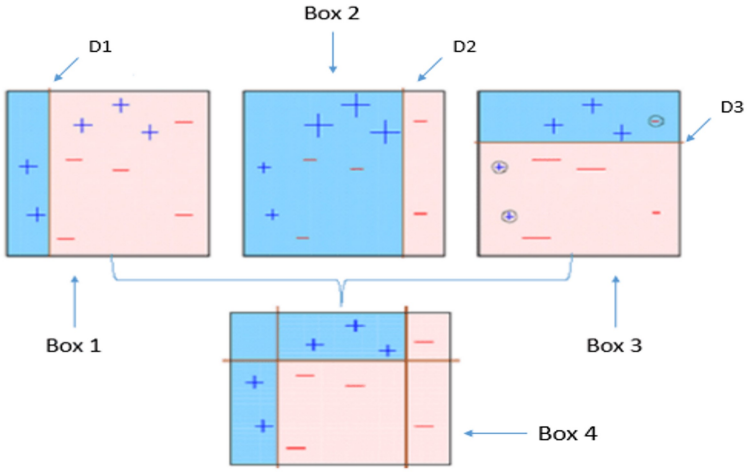






- Boosting
- It is a homogeneous ensemble.
- Each weak learner is trained in such a way that it corrects the mistakes of previous one.
- The weak learners are trained sequentially.
- The training of weak learners is not independent.





	D1	D2	D3	E	A
0	0	1	1	1	1
1	0	1	1	1	1
2	0	1	1	1	1
3	0	0	1	0	0
4	1	1	0	1	1
5	0	1	0	0	0
6	0	1	0	0	0
7	1	1	0	1	1
8	0	0	0	0	0
9	0	1	0	0	0

- Stacking
- Multiple models belonging to different algorithms are trained on the dataset and their results are combined to make the final prediction.