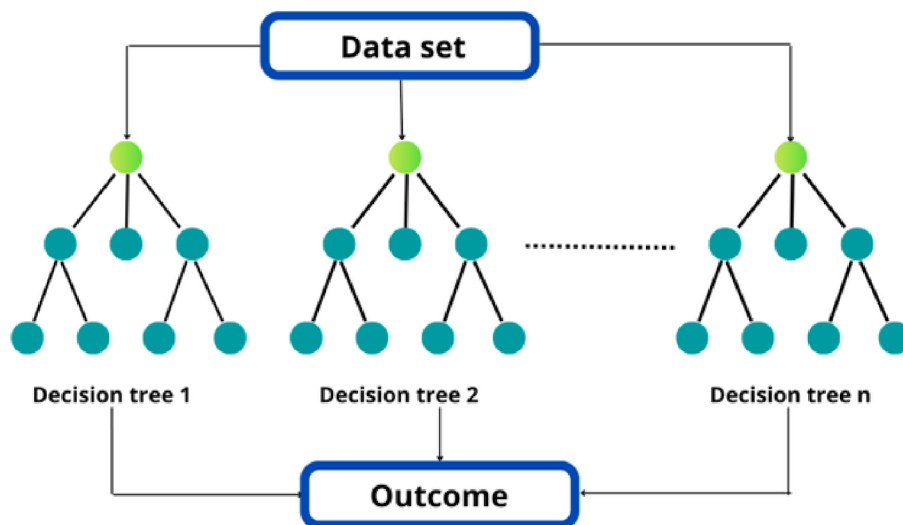# Day 16: Ensemble Learning

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Ensemble Learning

- Ensemble learning is a technique that combines prediction of multiple models to improve accuracy.
- The main goal is to use weak models as a base model, combine their predictions and generate strong model.
- It utilises the strengths of different models to make precise predictions.
- By effectively merging the predictions from different models it generates the output.
- When we combine multiple weak outputs, the final output comes out to be more accurate.
- There are number of ways to combine predictions of different models and based on that there are different types of ensemble learning methods.
- The simple ensemble learning methods are Max Voting, Averaging, Weighted Averaging. Let's see them in detail.
- There are advance ensemble methods as well which we will see in next post.

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Max Voting

- The max voting method is used for classification.
- Multiple classification models are used to make predictions.
- The prediction by each model is termed as vote.
- The class which has the maximum votes that is the maximum predictions from base models.
- For example, two base models predicted class A and one base model predicted class B then according to max voting, the final output will be class A.

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Averaging

- The averaging method is used for regression problems mainly.
- Multiple models are used to make predictions.
- In this, the final prediction is the average of all predictions from base models.
- It can also be used for classification problem if the output is probability of the class.

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Weighted Averaging

- Weighted averaging is an extension of averaging method.
- It can be used for both classification and regression problems.
- Multiple models are used to make predictions.
- The final prediction is the weighted average of all predictions from base models.
- The weights are assigned to models based on the importance of each model and predictions are calculated according to those weights.

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Advantages

- Reduces error and bias.
- Improves the accuracy and performance.
- Helps to combine the strengths of multiple models.
- Reduces the risk of overfitting and underfitting.

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