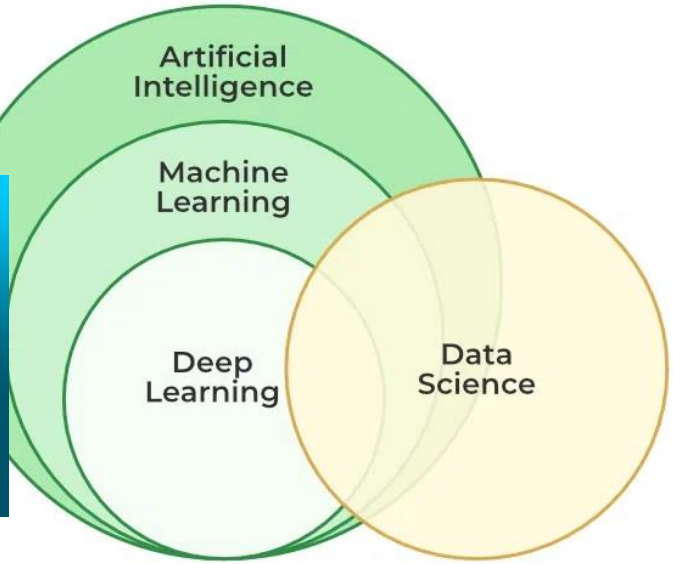
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

UNIT - 3

UNSUPERVISED LEARNING



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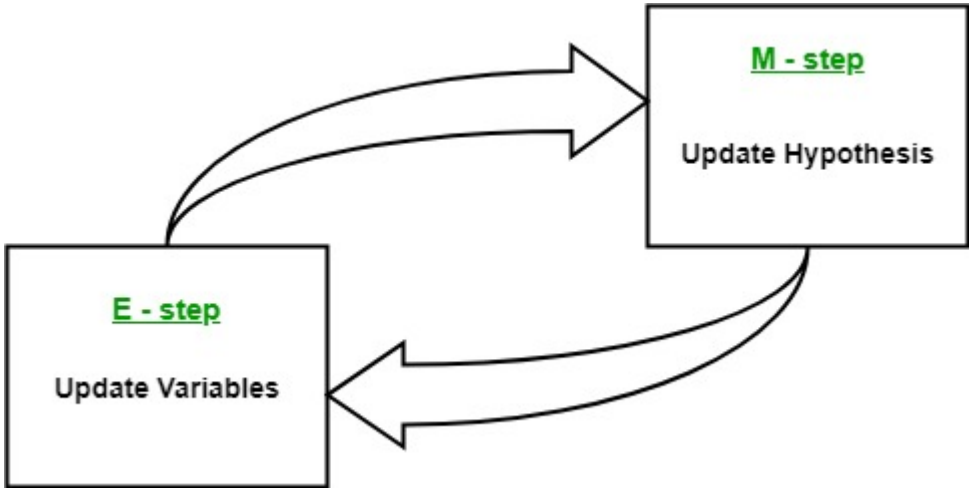
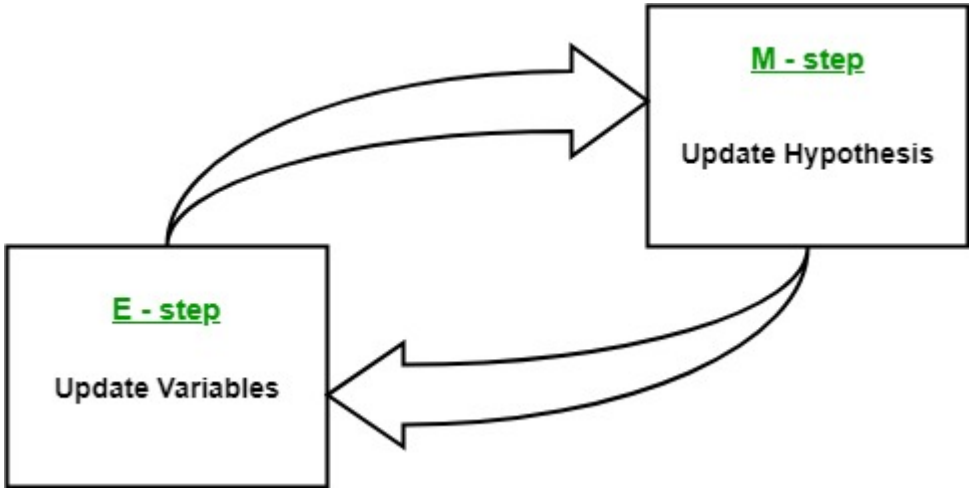
EM Algorithm

- In **the E step,** the algorithm **computes the latent variables** i.e. expectation of the log-likelihood using the current parameter estimates.
- In the **M step**, the algorithm determines the parameters that maximize the **expected log-likelihood** obtained in the E step, and corresponding model parameters are updated based on the estimated latent variables.



EM Algorithm

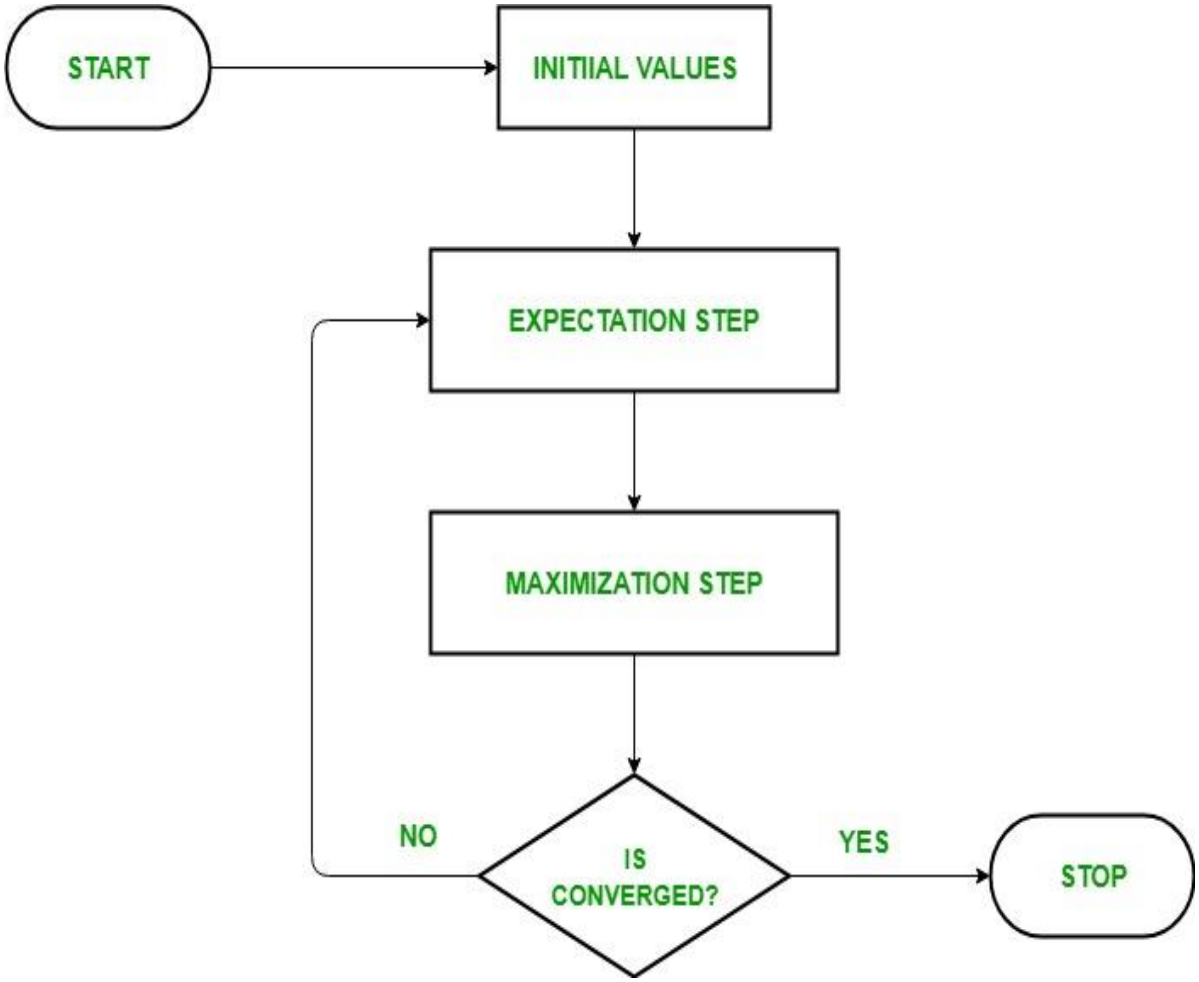


- By **iteratively repeating these steps**, the EM algorithm **seeks to maximize the likelihood of the observed data**.
- It is commonly used for unsupervised learning tasks, such as **clustering,** where **latent variables are inferred** and has applications in various fields, including machine learning, computer vision, and natural language processing.

EM Algorithm

- **Latent Variables:** Latent variables are **unobserved variables in statistical models** and cannot be directly measured but can be detected by their impact on the observable variables.
- **Log-Likelihood:** It is the logarithm of the likelihood function, which measures the **goodness of fit between the observed data and the model**.
- **Convergence:** Convergence refers to the **condition when the EM algorithm has reached a stable solution.**

How EM Algorithm Works



Applications of EM Algorithm

- It can be used to fill in the **missing data in a sample**.
- It can be used as the basis of unsupervised learning of **clusters.**
- It can be used for the purpose of estimating the **parameters of the Hidden Markov Model** (HMM).
- It can be used for discovering the values of **latent variables.**


Thank You