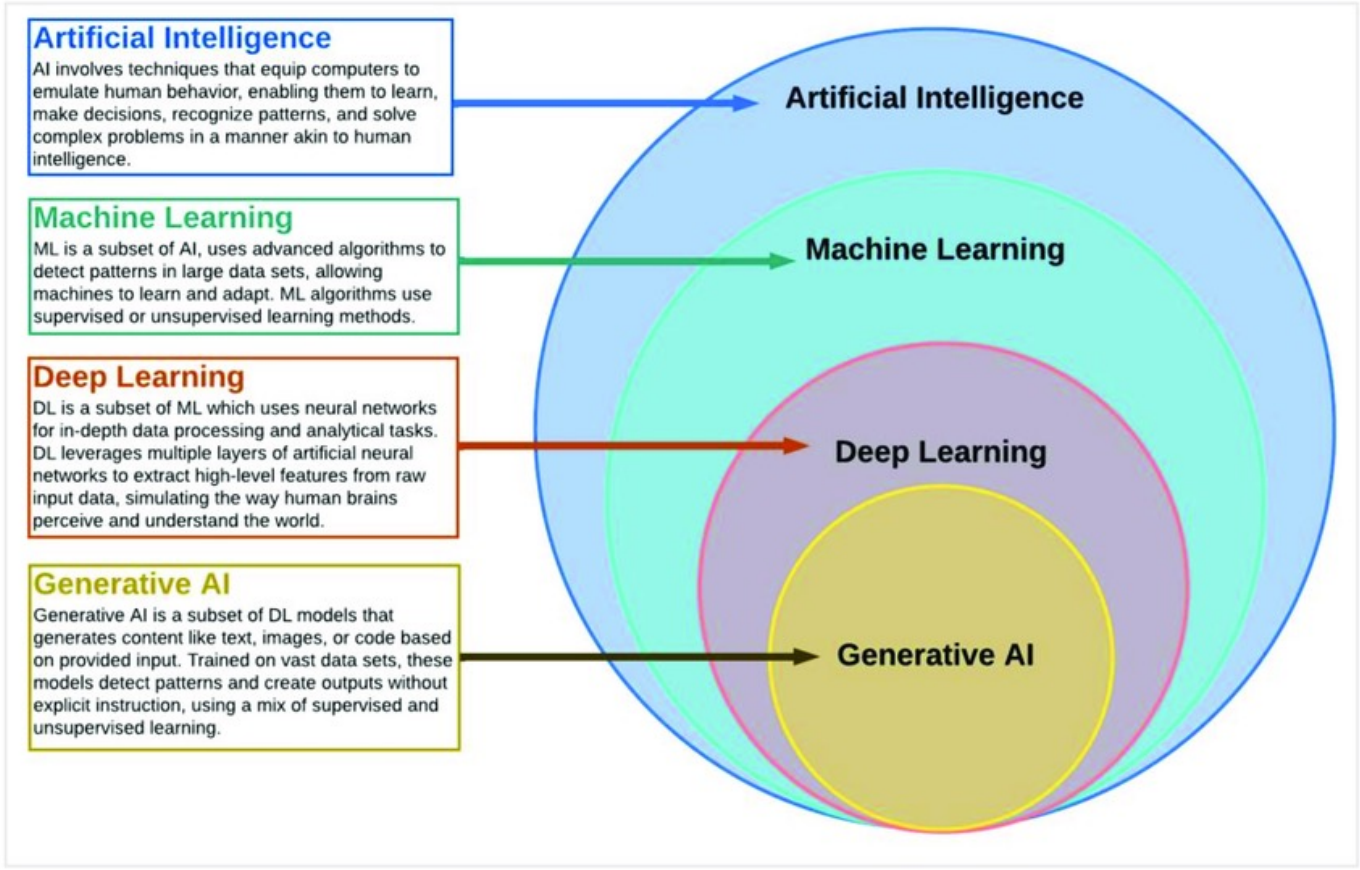
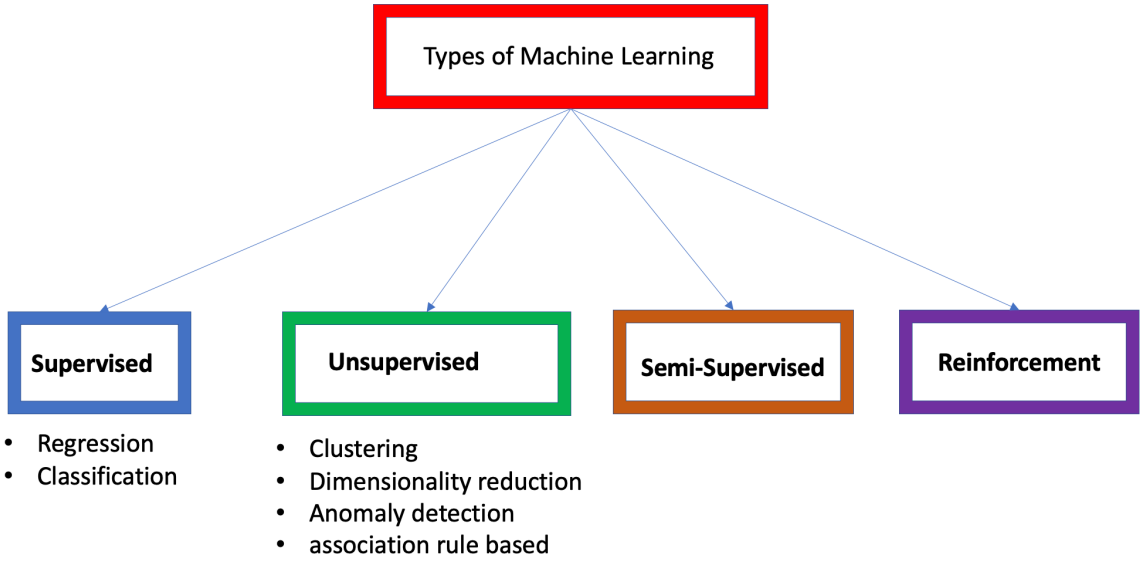
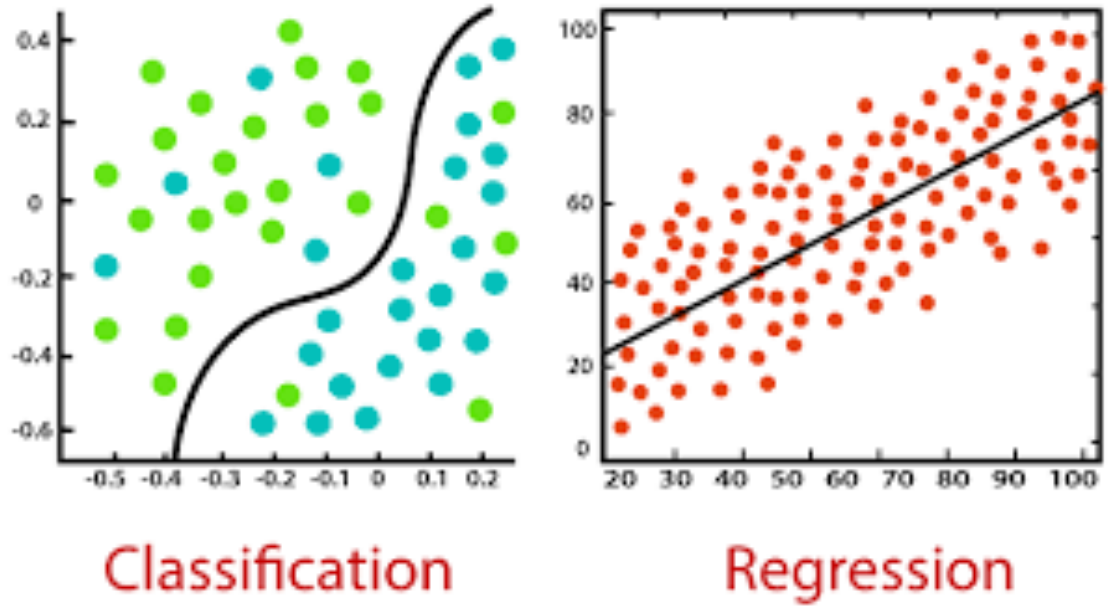
PLANT PATHOLOGY
UF/IFAS

AI and Machine Learning, and Deep Learninig



Machine Learning





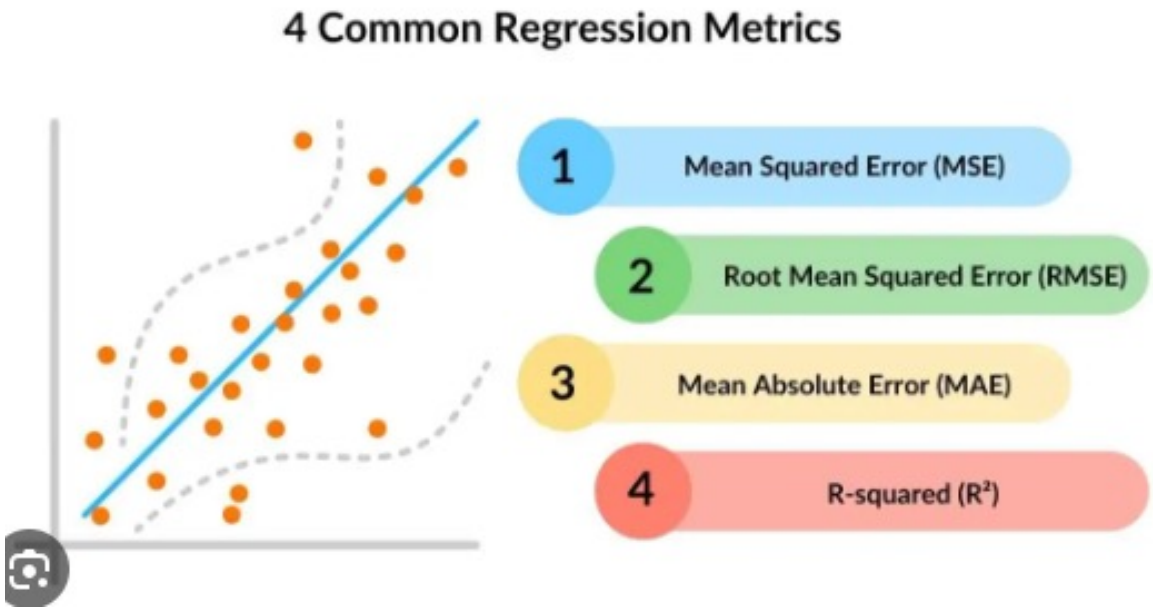
Training Data and Testing Data

- **Training Data:**The dataset used to train the ML model
- The model learns patterns and relationships from this data
- **Testing Data:**The dataset used to evaluate the performance of the trained model
- It helps assess how well the model generalizes to new, unseen data

Overfitting

- **Overfitting:**When a model learns the training data too well, including its noise and outliers
- The model performs well on training data but poorly on new, unseen data
- **Prevention:**Use techniques like cross-validation, regularization, and pruning to prevent overfitting

Evaluating ML Models Metrics for regression



MSE

- It measures the average squared difference bet the actual values and the predicted values.

RMSE

- It is the square root of MSE.
- It provides an error metric in the same units as the original data, making it more interpretable.

MAE

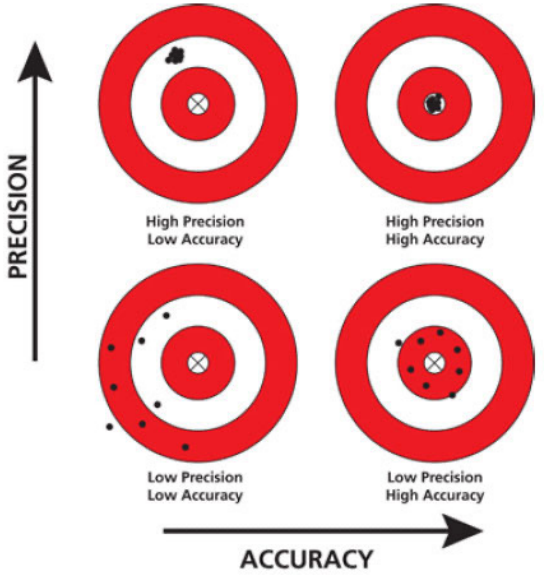
- Measures the average absolute difference between the actual values and the predicted values.
- Lower MAE values indicate a better fit.

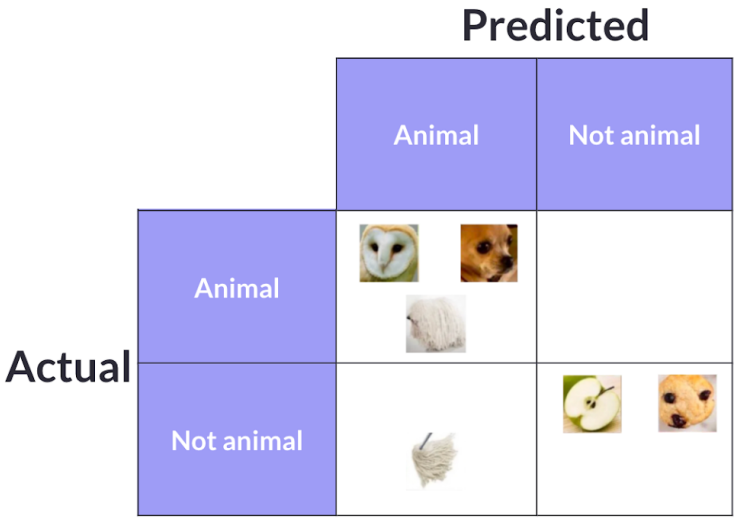
R^2

- Measures the proportion of variance in the dependent variable that is predictable from the independent variables.
- $R^2 = 1$ indicates that the model perfectly explains the variance.
- An R^2 value close to 1 indicates a good fit, while a value close to 0 indicates a poor fit.

Evaluating ML Models
Metrics for classification

- **Accuracy:**
  - The proportion of correctly predicted instances out of the total instances
- **Precision:**
  - The proportion of true positive predictions out of all positive predictions
- **Recall (Sensitivity):**
  - The proportion of true positive predictions out of all actual positives
- **F1 Score:**
  - The harmonic mean of precision and recall





True Positives	2
True Negatives	3
False Positives	0
False Negatives	1

Accuracy	83%	$\frac{3+2}{3+2+0+1}$
Precision	75%	$\frac{3}{3+1}$
Recall	100%	$\frac{3}{3+0}$
F1 score	86%	$2 \cdot \frac{0.75 \cdot 1}{0.75+1}$