

Task 9: Advanced Supervised Learning Algorithms

Objective

Understand and implement **advanced supervised learning algorithms** such as **Random Forest, Gradient Boosting, and Support Vector Machines (SVM)**.

Learn about **ensemble learning** techniques that combine multiple models to improve prediction accuracy and robustness.

Implementation

- Train and test a **Random Forest** or **XGBoost classifier** on labeled data.
 - Compare accuracy and performance against simpler models.
 - Use metrics like **Accuracy, Precision, Recall, and F1-score** for evaluation.
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Python Code

```
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import classification_report, accuracy_score
from sklearn.model_selection import train_test_split
from sklearn.datasets import load_wine

# Load dataset
data = load_wine()
X, y = data.data, data.target

# Split dataset
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Train Random Forest Classifier
rf = RandomForestClassifier(n_estimators=100, random_state=42)
rf.fit(X_train, y_train)

# Predictions
y_pred = rf.predict(X_test)
```

```
# Evaluation
```

```
print("Accuracy:", accuracy_score(y_test, y_pred))
```

```
print("\nClassification Report:\n", classification_report(y_test, y_pred))
```

Client Project

Develop a **customer churn prediction model** using ensemble classifiers such as Random Forest or Gradient Boosting to enhance prediction reliability.