**Breast Cancer Classification using AdaBoost**

***Project Overview***

This project implements the AdaBoost algorithm from scratch and compares it to other ensemble methods like Bagging and Decision Trees to classify breast cancer tumors as Malignant or Benign.

***Dataset:***

-Dataset Used: Breast Cancer Wisconsin Dataset

- Features: 10 selected features

- Target Variable: 0 (Malignant) or 1 (Benign)

***Implementation Steps;***

***1. Data Preprocessing***

- Load the dataset

- Perform feature selection

- Split data into training and testing sets

***2. Model Training & Comparison***

- Train a Decision Tree Classifier

- Train an AdaBoost Classifier using Decision Stumps

- Train a Bagging Classifier

***3. Evaluation & Results w***

- Compare accuracy of different models

- Visualize decision boundaries

***Results.***

- Single Decision Tree Accuracy: 92.98%

- Bagging Classifier Accuracy:93.49%

- AdaBoost Accuracy: 96.49%

***Takeaways***

✅ AdaBoost outperformed Decision Trees and Bagging.

✅ Ensemble methods help improve accuracy and reduce overfitting.

✅ Further tuning or feature engineering could improve performance even more.

***Installation & Running the Code***

To run this project, install dependencies using:

```bash (python adaboost\_breast\_cancer.py)

pip install -r requirements.txt