of loses Exp: 3 3. Study of the classifier with despect to statistical parameters. To study and compare the performance of vortices classifiers using Statistical parameters such as accuracy, Percuision, recall, fi-sure and confusion matrix. * To understand how different machine Learning classifiers Rosforms on a given dataget * To Evaluate the Classifiers using Koy Statistical matrics.

* To compare and interpret the performance of each classifier for model Selection 10 Import required Libraries (pandas, Sklearn, etc...) 2- load the date set. 3. Preprocess the date Chandling missing values, Encoding, Scaling?
4. Shirt the dateset into training and testing Sets. 5. Define a List of classifiers - KNN, SVM, Decision free 6. top each classifier. a. Train the model on the training set. b. paedict using the test sets. C. C. quelate Statistical Parameters: Accuracy - Confusion Matrix. I Compare desults in a Labular format. 8. Inalyze and determine the best-performing classifier based on Constent.

Sicher Maria The propordion of correctly posedicted Samples out of the total Samples Accuracy = True Possitives + True Negatives Total Samples. . sort + million Co 2. Precision of all samples possibled as possible, how many were occurally positive Possession & Tree Positives. True positives + False positive. 3. Real :. Shows how well the model detects actual positives. Recill = True Positives of False Nagative Jul ON CAM 4. Fi-Score Precision & Record Proposition 1 Fiscore = 2 x Polecision * Recall 0.03 06.9 95.0 Tederion tree charaftedien Report: accuracy Those ourself 0 1 4)40 2100

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The boumber of winetances correctly possedicted as belonging to Positive class.

Inforence:

- (i) Here Sim performance Best model with accuracy 96%. along with bulanced poteniseon, see all send fl score.

 It shows similar forformance for both training and testing Let is called generalization.
- (ii) KNN -> Is minimal exceptiting.

 Training Slightly higher than testing but Still close.
- distratission tree: training 2 100%. Tosting 2 94%. -> clear overfitting Chammon in decision trees without pruning).

The Bocast cancer detaset has be used to train know, Som and decision tree and the Statistical paremotors has been Compared and importance.

```
# Import libraries
import pandas as pd
from sklearn.datasets import load breast cancer
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.metrics import classification_report, accuracy_score
from sklearn.neighbors import KNeighborsClassifier
from sklearn.svm import SVC
from sklearn.tree import DecisionTreeClassifier
# Load dataset
data = load_breast_cancer()
X = data.data
y = data.target
# Preprocessing - Scaling
scaler = StandardScaler()
X = scaler.fit_transform(X)
# Train-test split
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
# Initialize models
models = {
    "K-Nearest Neighbors": KNeighborsClassifier(n_neighbors=5),
    "SVM": SVC(kernel='linear'),
"Decision Tree": DecisionTreeClassifier(random_state=42)
# Train, predict, and evaluate
results = {}
for name, model in models.items():
    model.fit(X_train, y_train)
    y_pred = model.predict(X_test)
    accuracy = accuracy_score(y_test, y_pred)
    report = classification_report(y_test, y_pred, target_names=data.target_names, output_dict=True)
    results[name] = {
         "Accuracy": accuracy,
"Precision": report['weighted avg']['precision'],
"Recall": report['weighted avg']['recall'],
         "F1-score": report['weighted avg']['f1-score']
    }
# Display results
df_results = pd.DataFrame(results).T
print("\nPerformance Comparison:")
print(df_results)
# Detailed classification reports
for name, model in models.items():
    y_pred = model.predict(X_test)
    print(f"\n{name} Classification Report:\n")
print(classification_report(y_test, y_pred, target_names=data.target_names))
     Performance Comparison:
     Accuracy Precision Recall F1-score
K-Nearest Neighbors 0.947368 0.947368 0.947368
SVM 0.956140 0.956488 0.956140 0.956237
     Decision Tree
                            0.947368 0.947368 0.947368 0.947368
     K-Nearest Neighbors Classification Report:
                   precision recall f1-score support
        malignant
                          0.93
                                     0.93
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                                   0.96
                          0.96
                                                 0.96
           benign
          accuracy
                                                 0.95
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                                   0.94
                          0.94
                                                 0.94
0.95
         macro avg
                                                             114
     weighted avg
                          0.95
     SVM Classification Report:
                     precision recall f1-score support
                                   0.95
         malignant
                          0.93
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                                                              43
                                    0.96
            benign
                          0.97
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```

https://colab.research.google.com/drive/1XjmezaADMILiPFIEc-Ef6mh1hpWkfuQn#printMode=true

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accuracy			0.96	114	
macro avg	0.95	0.96	0.95	114	
weighted avg	0.96	0.96	0.96	114	
Decision Tree	Classificat	ion Repor	t:		
	precision	recall	f1-score	support	
malignant	0.93	0.93	0.93	43	
benign	0.96	0.96	0.96	71	
accuracy			0.95	114	
macro avg	0.94	0.94	0.94	114	
weighted avg	0.95	0.95	0.95	114	