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In [11]: import pandas as pd
import numpy as np
from sklearn.datasets import load_breast_cancer
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score, precision_score, recall_score, f1_score
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
data = load_breast_cancer()
X = pd.DataFrame(data.data, columns=data.feature_names)
y = pd.Series(data.target)
print('Feature matrix shape:', X.shape)
print('Target distribution:\n', y.value_counts())
X.head()
X.describe().T
X.isnull().sum().sum()
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.20, random_state=42, shuffle=True)
print('Train shape:', X_train.shape)
print('Test shape :', X_test.shape)
scaler = MinMaxScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)
model = LogisticRegression(max_iter=700)
model.fit(X_train_scaled, y_train)
y_pred = model.predict(X_test_scaled)
acc = accuracy_score(y_test, y_pred)
prec = precision_score(y_test, y_pred)
rec = recall_score(y_test, y_pred)
f1 = f1_score(y_test, y_pred)
print('Accuracy :', acc)
print('Precision:', prec)
print('Recall :', rec)
print('F1 score :', f1)
cm = confusion_matrix(y_test, y_pred)
plt.figure(figsize=(6,4))
sns.heatmap(cm, annot=True, fmt='d', cmap='Greens')
plt.title('Confusion Matrix')
plt.xlabel('Predicted label')
plt.ylabel('True label')
plt.show()
from sklearn.metrics import classification_report
print(classification_report(y_test, y_pred, target_names=data.target_names))
coef = pd.Series(model.coef_[0], index=data.feature_names).sort_values(key=abs, ascending=False)
coef.head(10)
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Feature matrix shape: (569, 30)
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Target distribution:
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1    357
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0    212
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Name: count, dtype: int64
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Train shape: (455, 30)
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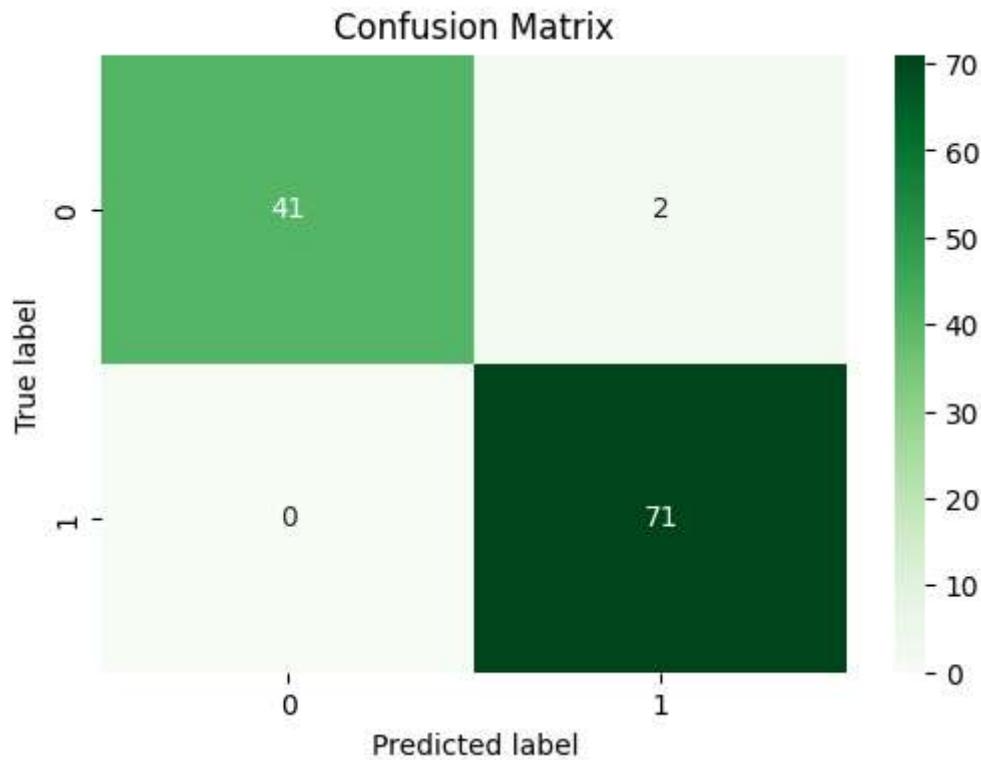
```
Test shape : (114, 30)
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Accuracy : 0.9824561403508771
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Precision: 0.9726027397260274
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Recall : 1.0
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F1 score : 0.9861111111111112
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	precision	recall	f1-score	support
malignant	1.00	0.95	0.98	43
benign	0.97	1.00	0.99	71
accuracy			0.98	114
macro avg	0.99	0.98	0.98	114
weighted avg	0.98	0.98	0.98	114

```
Out[11]: worst concave points    -2.420848
worst texture                  -2.278259
worst radius                   -2.206153
mean concave points           -2.012297
worst perimeter                -1.973923
mean radius                    -1.766832
mean perimeter                 -1.719999
mean texture                   -1.681894
worst area                     -1.561212
mean area                      -1.467152
dtype: float64
```