Boston 집값 선형회귀 예제

라이브러리 및 패키지 Import

In [1]:
```
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
from sklearn.datasets import load_boston
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error, r2_score

# 경고 무시 (FutureWarning)
import warnings
warnings.filterwarnings('ignore', category=FutureWarning)
```

데이터셋 불러오기

In [2]:
```
# Boston 집값 데이터셋 로드
boston = load_boston()
df = pd.DataFrame(boston.data, columns=boston.feature_names)
df['PRICE'] = boston.target
```

In [16]:
```
# 데이터프레임 확인
df.head()
```

Out[16]:

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO	B	LSTAT	PRICE
0	0.00632	18.0	2.31	0.0	0.538	6.575	65.2	4.0900	1.0	296.0	15.3	396.90	4.98	24.0
1	0.02731	0.0	7.07	0.0	0.469	6.421	78.9	4.9671	2.0	242.0	17.8	396.90	9.14	21.6
2	0.02729	0.0	7.07	0.0	0.469	7.185	61.1	4.9671	2.0	242.0	17.8	392.83	4.03	34.7
3	0.03237	0.0	2.18	0.0	0.458	6.998	45.8	6.0622	3.0	222.0	18.7	394.63	2.94	33.4
4	0.06905	0.0	2.18	0.0	0.458	7.147	54.2	6.0622	3.0	222.0	18.7	396.90	5.33	36.2

데이터 전처리

In [4]:
```
# 데이터 전처리
X = df.drop(columns=['PRICE'])
y = df['PRICE']
```

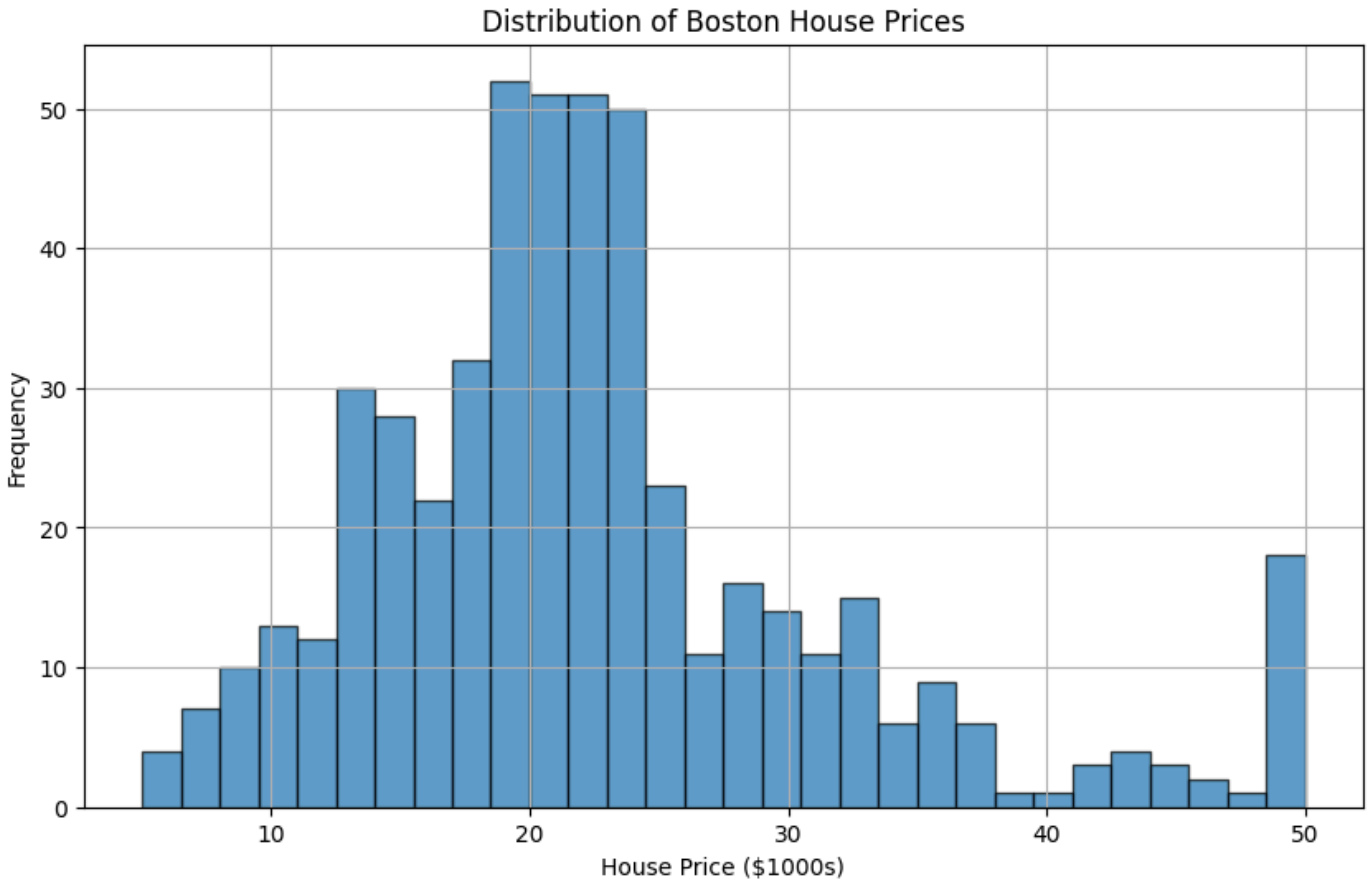
In [5]:
```
# 훈련 세트와 테스트 세트로 분리
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42
```

In [6]:
```
# 피처 스케일링
scaler = StandardScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

데이터 분포 확인

In [7]:
```
# 집값 데이터 분포 확인
gsize=(10, 6))
```

```
plt.hist(df['PRICE'], bins=30, edgecolor='black', alpha=0.7)
plt.title('Distribution of Boston House Prices')
plt.xlabel('House Price ($1000s)')
plt.ylabel('Frequency')
plt.grid(True)
plt.show()
```



데이터 학습

In [8]:
```
# 선형 회귀 모델 학습
model = LinearRegression()
model.fit(X_train, y_train)

# 테스트 세트로 예측 수행
y_pred = model.predict(X_test)
```

성능 및 결과 확인

In [13]:
```
# 모델 평가
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
r2 = r2_score(y_test, y_pred)

print(f'MSE: {mse}')
print(f'RMSE: {rmse}')
print(f'R-squared Score: {r2}')
```

```
MSE: 24.291119474973517
RMSE: 4.928602182665336
R-squared Score: 0.668759493535632
```

In [14]:
```
# 절편(intercept) / 회귀계수(coefficients) 확인
print("절편(intercept):", model.intercept_)
print("회귀계수(coefficients):", np.round(model.coef_, 2))
```

```
절편(intercept): 22.796534653465343
회귀계수(coefficients): [-1.    0.7   0.28  0.72 -2.02  3.15 -0.18 -3.08  2.25 -1.77 -2.0
4  1.13
 -3.61]
```

시각화

In [12]:
```
# 실제 값 vs 예측 값 시각화
plt.figure(figsize=(10, 6))
plt.scatter(y_test, y_pred, alpha=0.5, color='blue')
plt.plot([y_test.min(), y_test.max()], [y_test.min(), y_test.max()], '--r', linewidth=2)
plt.title('Actual vs Predicted House Prices')
plt.xlabel('Actual House Prices')
plt.ylabel('Predicted House Prices')
plt.grid(True)
plt.show()
```