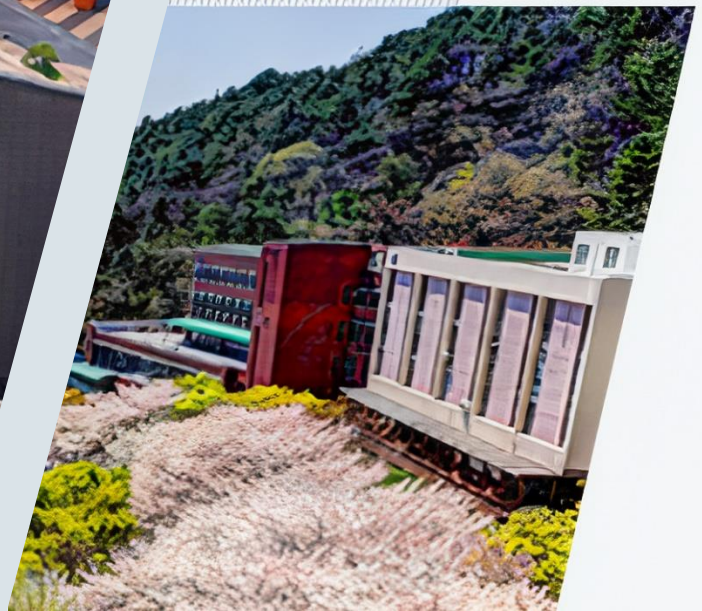
Dong-A Univ. (ISPL)

동아대학교
DONG-A UNIVERSITY

K Nearest Neighbors – 실습

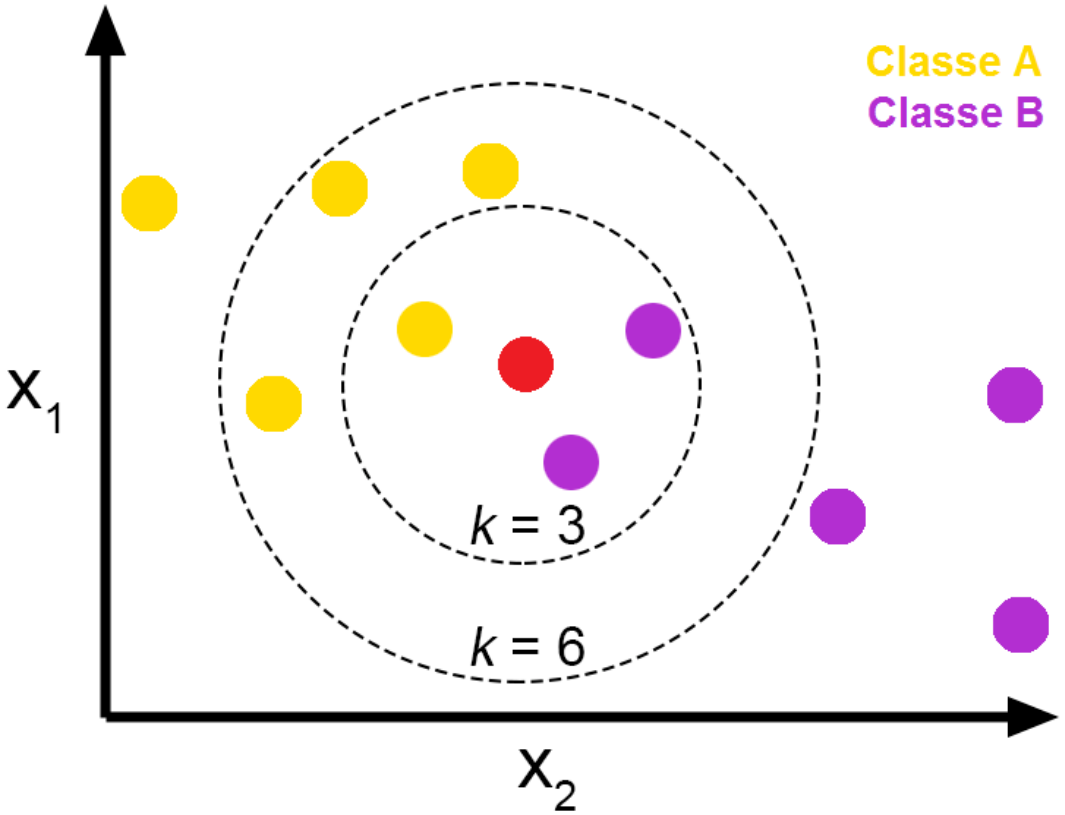
컴퓨터AI공학부

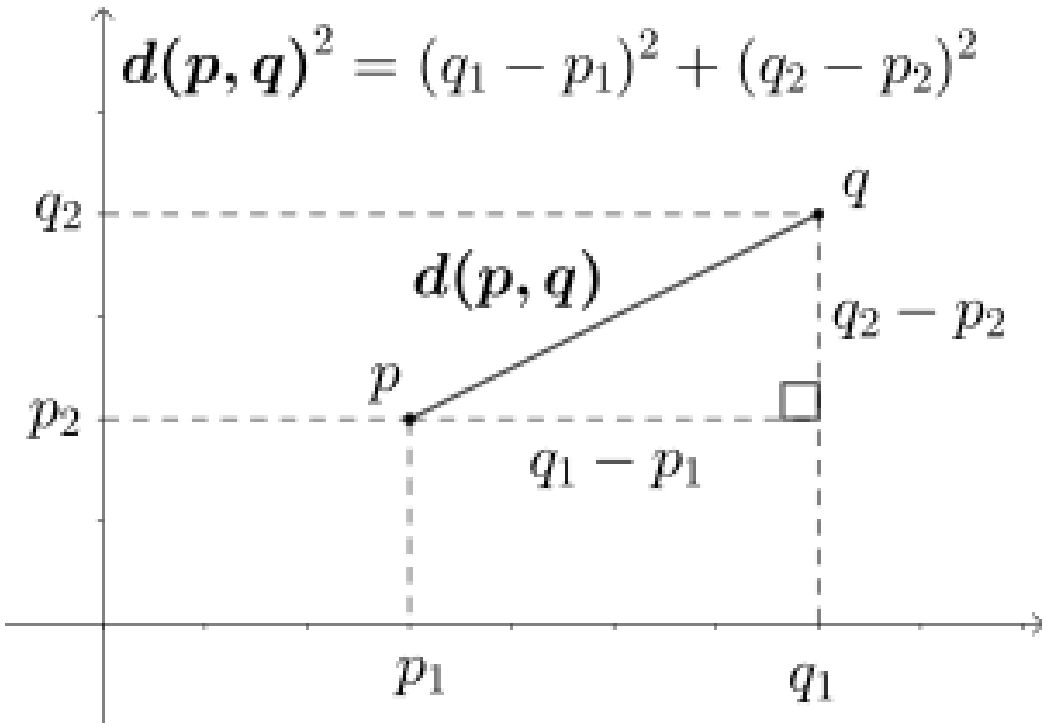
2024년 2학기 머신러닝



Review – K Nearest Neighbors

- 목적: 새로운 샘플에서 가장 인접한 k개 샘플의 class에 따라 현재 class 분류



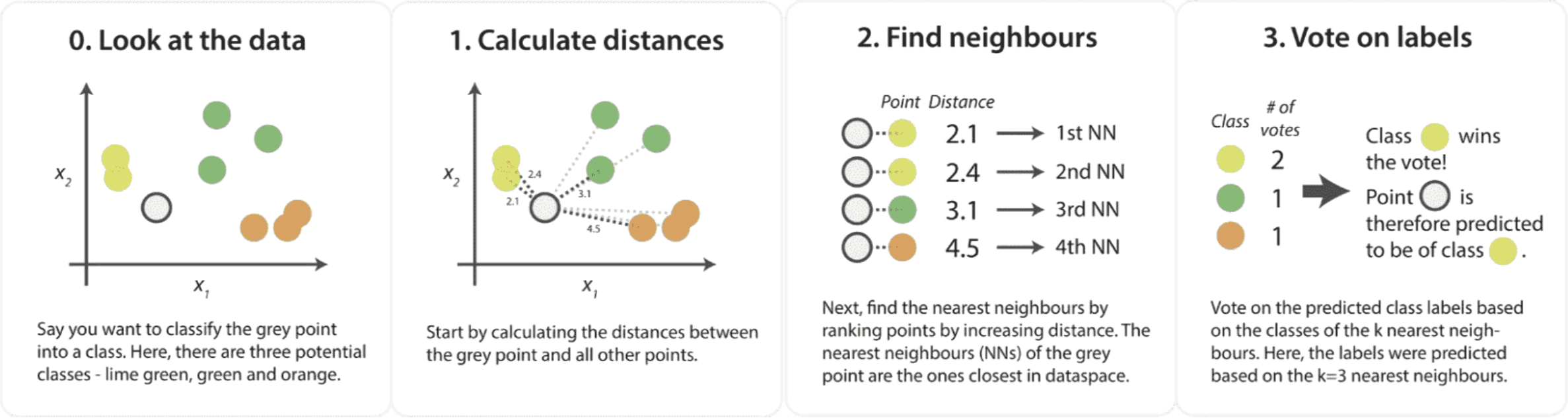


Euclidean distance (L2 distance)

Ref.: https://towardsdatascience.com/

Review – K Nearest Neighbors

- 목적: 새로운 샘플에서 가장 인접한 k개 샘플의 class에 따라 현재 class 분류



Ref.: https://medium.com/swlh/k-nearest-neighbor-ca2593d7a3c4

[실습] K Nearest Neighbors (KNN)

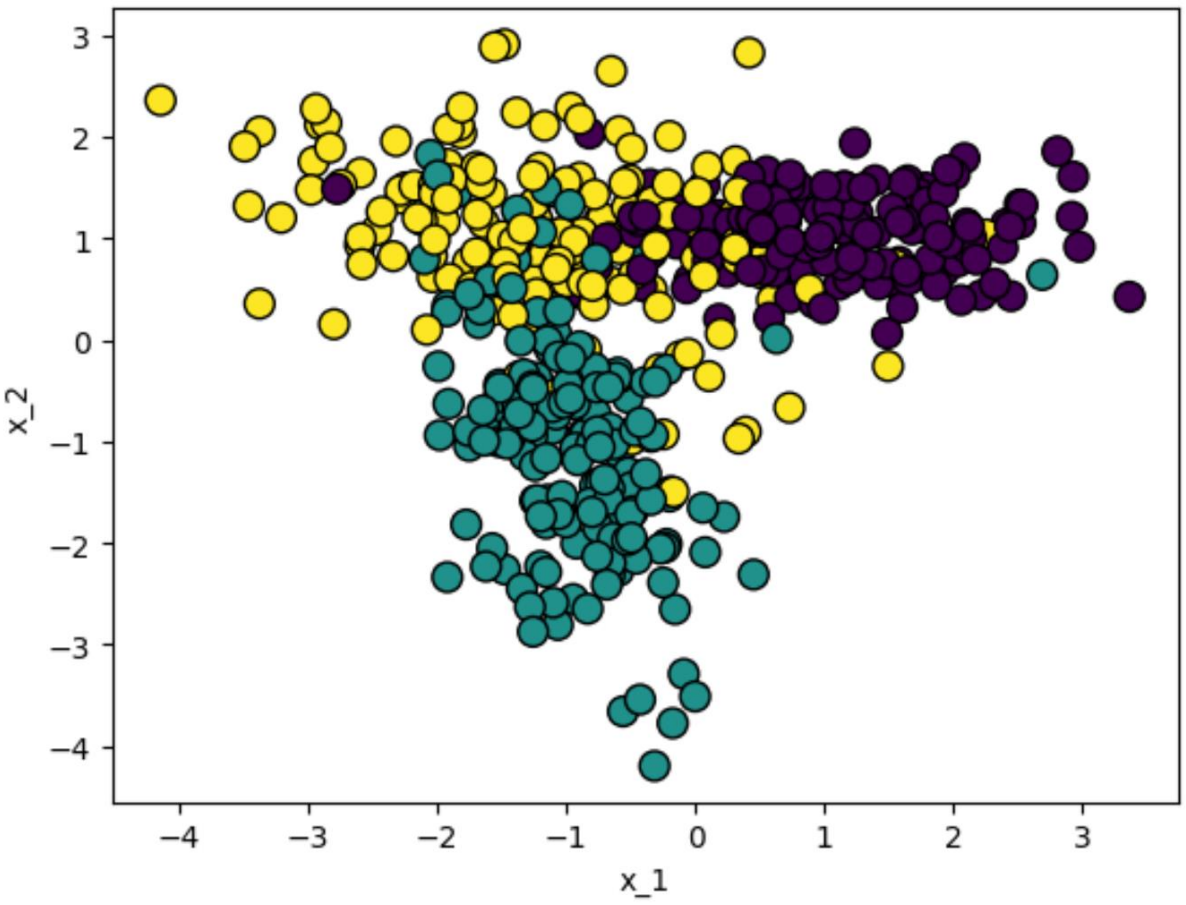
- **Basecode 다운로드: LMS 강의게시판 → 14주차**

K Nearest Neighbors (KNN)

```
[14] import pandas as pd
     import numpy as np
     import matplotlib.pyplot as plt

     from sklearn.datasets import make_classification
     from sklearn.model_selection import train_test_split
```

Dataset

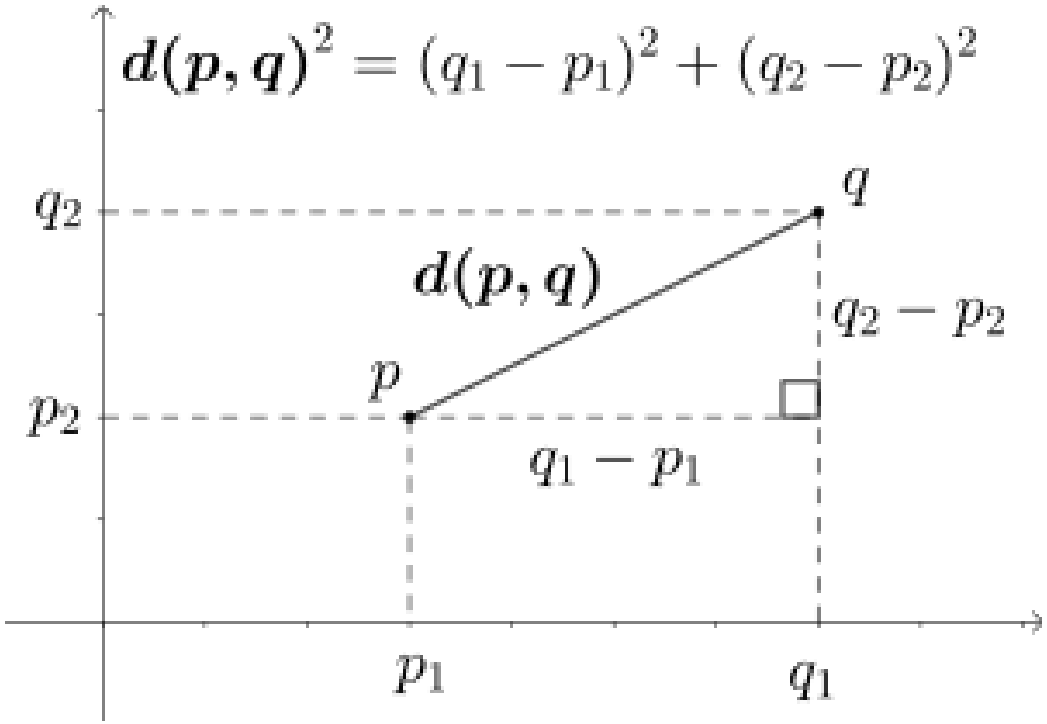
```
[54] X, y = make_classification(n_samples=500,
                                n_features=2,
                                n_classes=3,
                                n_clusters_per_class=1,
                                n_informative=2,
                                n_redundant=0,
                                random_state=40)

     plt.scatter(X[:, 0], X[:, 1], marker='o', c=y, s=100, edgecolor="k", linewidth=1)
     plt.xlabel("x_1")
     plt.ylabel("x_2")
     plt.show()
```



[실습] K Nearest Neighbors (KNN)

- **Euclidian Distance 함수, KNN 모델 작성**

```python
def L2_distance(x1, x2):
  return np.sqrt(np.sum((x1 - x2) ** 2))

class KNN:
  def __init__(self, k=3):
    # initialization

  def fit(self, X, y):
    # Storage training datas

  def predict(self, X):
    # Prediction
```



Euclidean distance (L2 distance)

[실습] K Nearest Neighbors (KNN)

- **예측 및 성능 평가**

Prediction

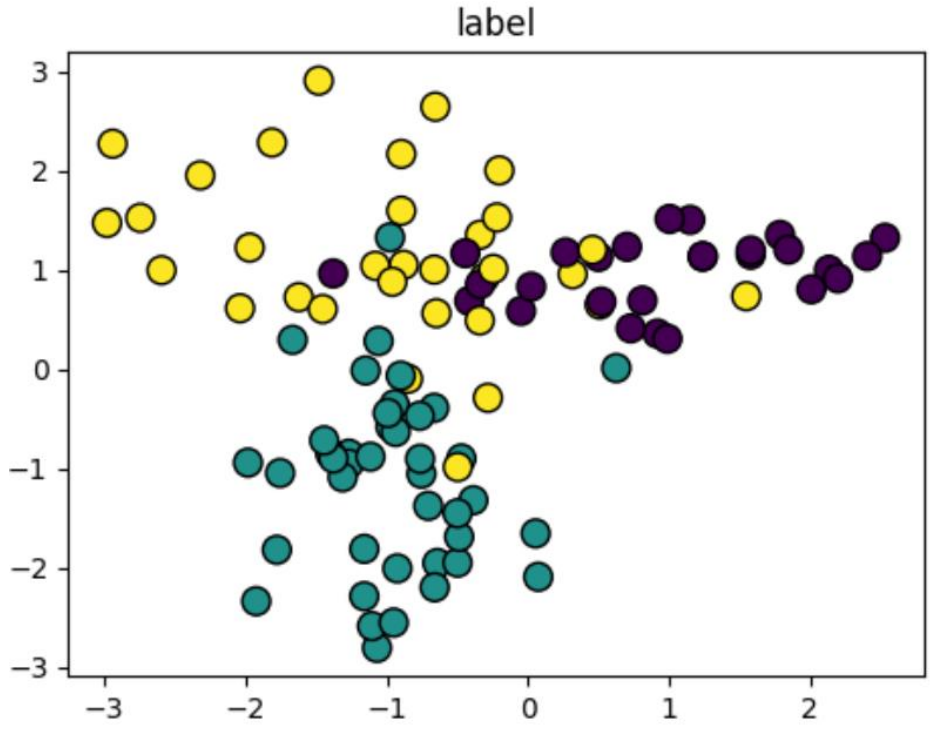
```
[56] model = KNN()
     model.fit(X_train, y_train)
     y_pred = model.predict(X_test)

     accuracy = np.sum(y_pred == y_test) / len(y_test)
     print(accuracy)
```

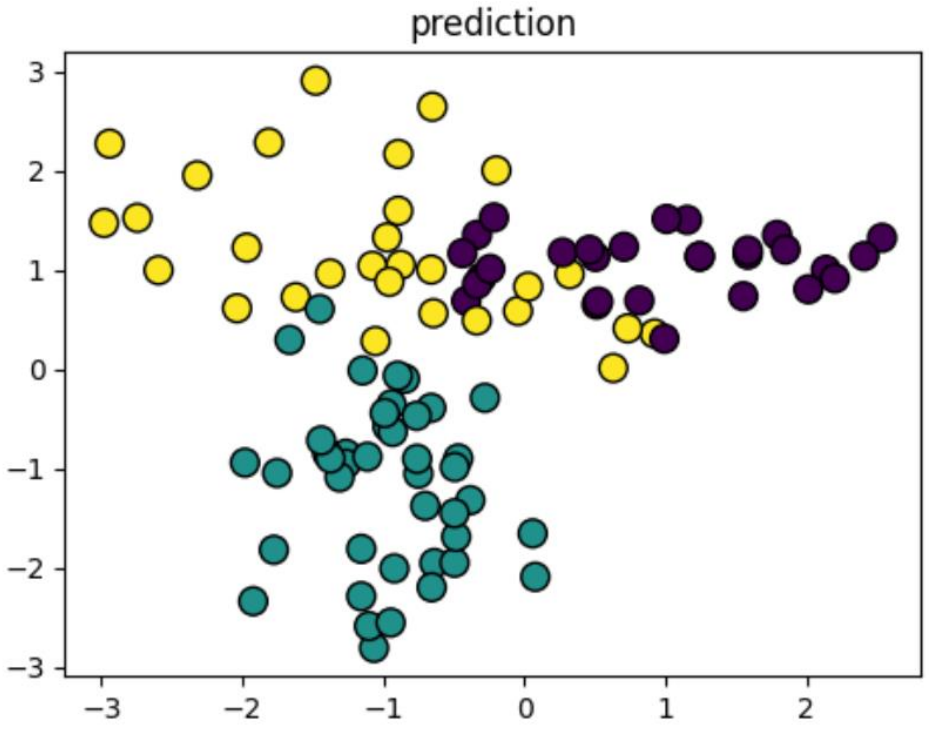
```
0.81
```

[실습] K Nearest Neighbors (KNN)

- **예측 결과 시각화**
  - Label: 정답 데이터
  - Prediction: 예측 값

```
[20] plt.figure(figsize=(12,6))

     plt.subplot(1, 2, 1)
     plt.title("label")
     plt.scatter(X_test[:, 0], X_test[:, 1], marker='o', c=y_test, s=100, edgecolor="k", linewidth=1)

     plt.subplot(1, 2, 2)
     plt.title("prediction")
     plt.scatter(X_test[:, 0], X_test[:, 1], marker='o', c=y_pred, s=100, edgecolor="k", linewidth=1)
     plt.show()
```

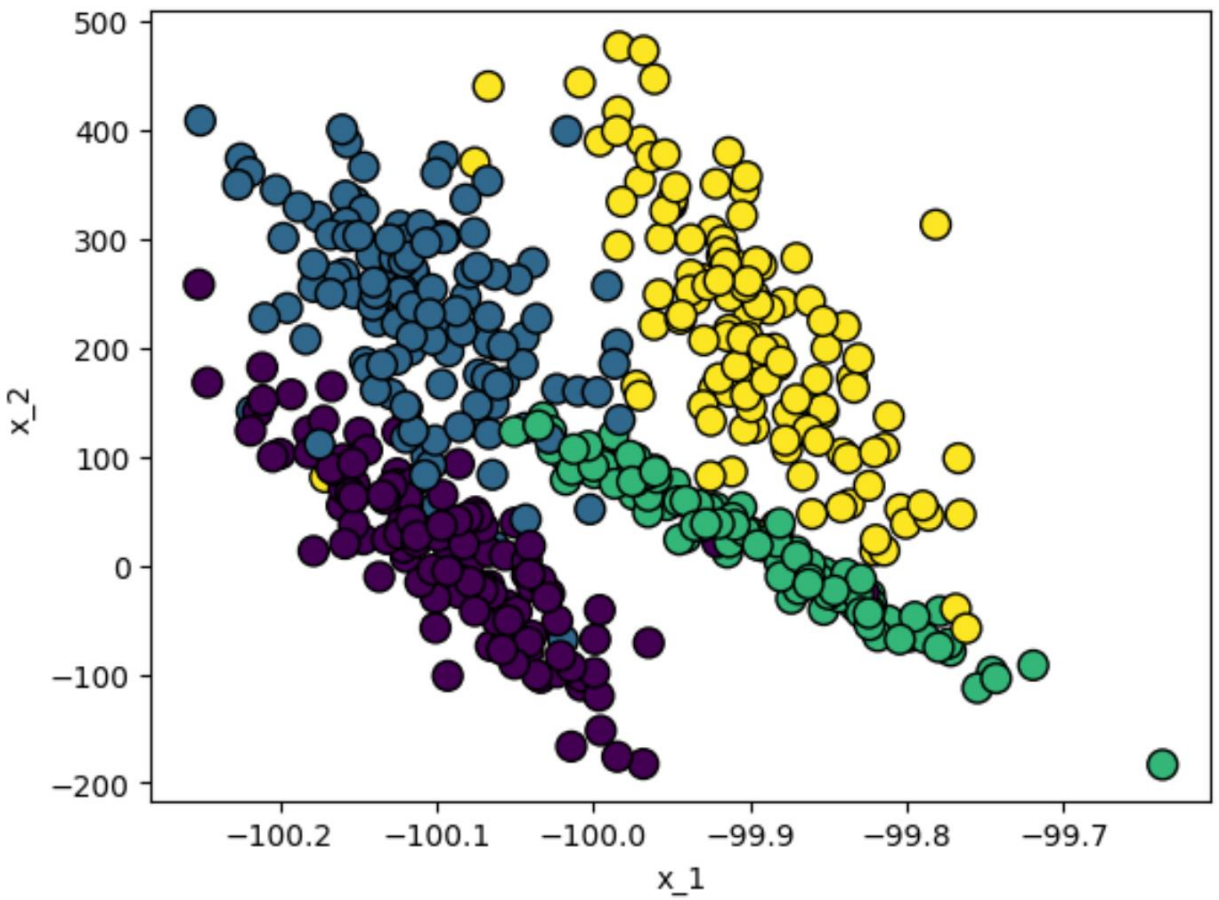




기말고사 연습 문제[1/3]

- **K Nearest Neighbors (KNN)**
  - x1, x2 데이터에 대해 각각 Gaussian 정규화 수행 후 KNN 학습 및 예측 수행

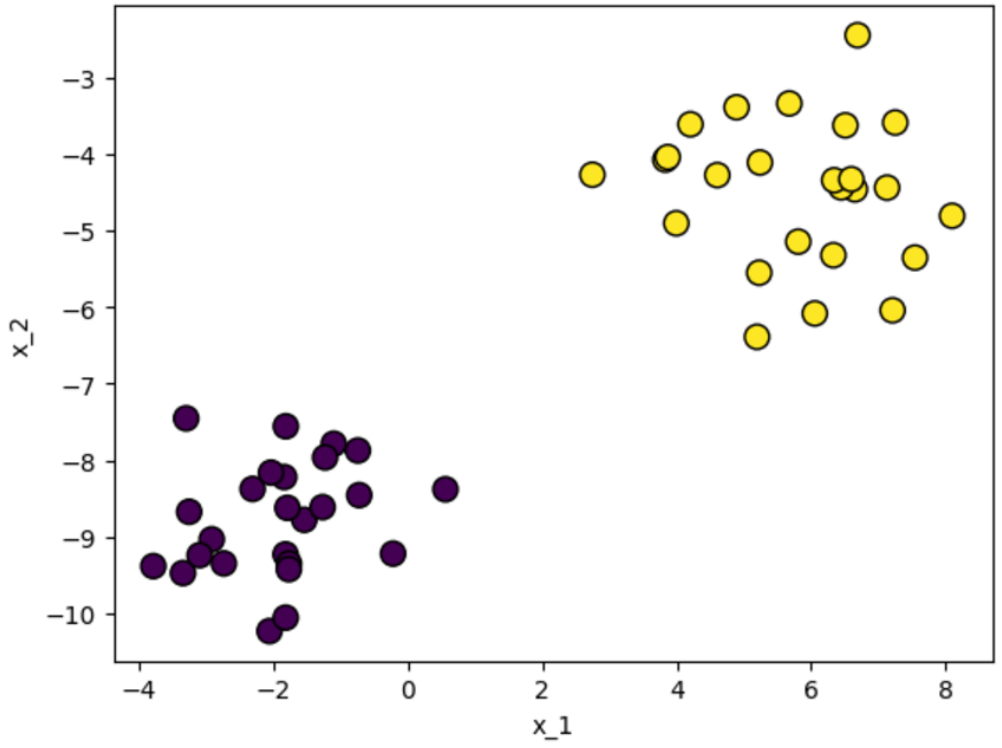
```
X, y = make_classification(n_samples=500,
                           n_features=2,
                           n_classes=4,
                           n_clusters_per_class=1,
                           n_informative=2,
                           n_redundant=0,
                           random_state=40)

X[:, 0] = X[:, 0] * 0.1 - 100
X[:, 1] = X[:, 1] * 100 + 120

plt.scatter(X[:, 0], X[:, 1], marker='o', c=y, s=100, edgecolor="k", linewidth=1)
plt.xlabel("x_1")
plt.ylabel("x_2")
plt.show()
```

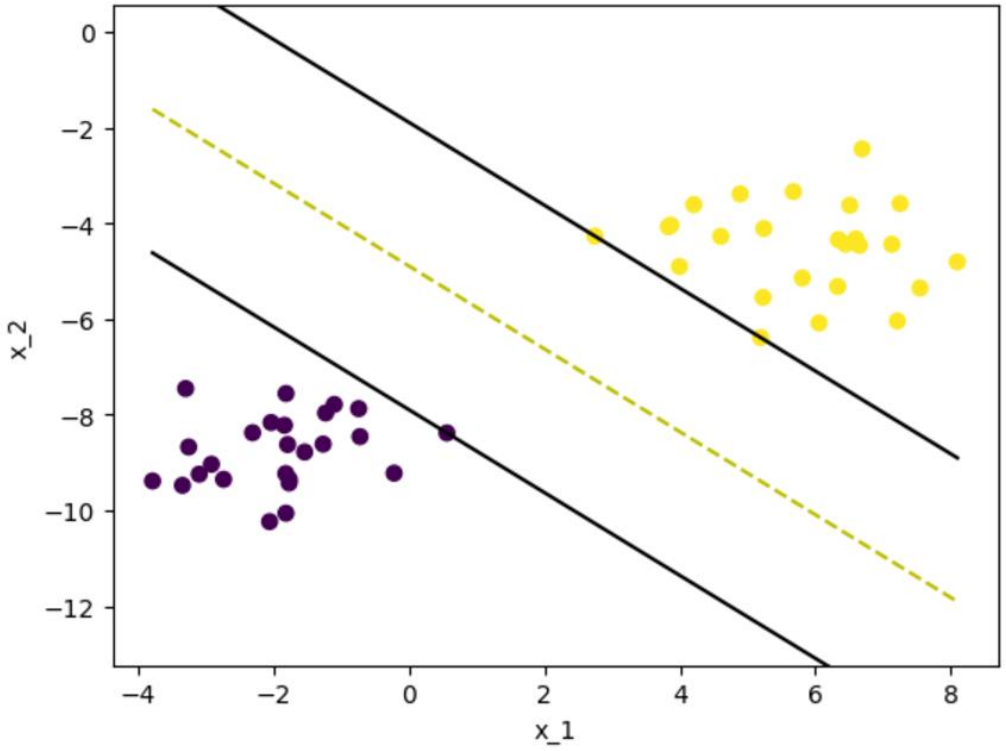


기말고사 연습 문제[2/3]

- **Support Vector Machine (SVM)**
  - Cross entropy loss를 이용해 gradient decent 수행 후 결과 시각화

```
X, y = make_blobs(n_samples=50, n_features=2, centers=2, cluster_std=1.05, random_state=40)
plt.scatter(X[:, 0], X[:, 1], marker='o', c=y, s=100, edgecolor="k", linewidth=1)
plt.xlabel("x_1")
plt.ylabel("x_2")
plt.show()
```

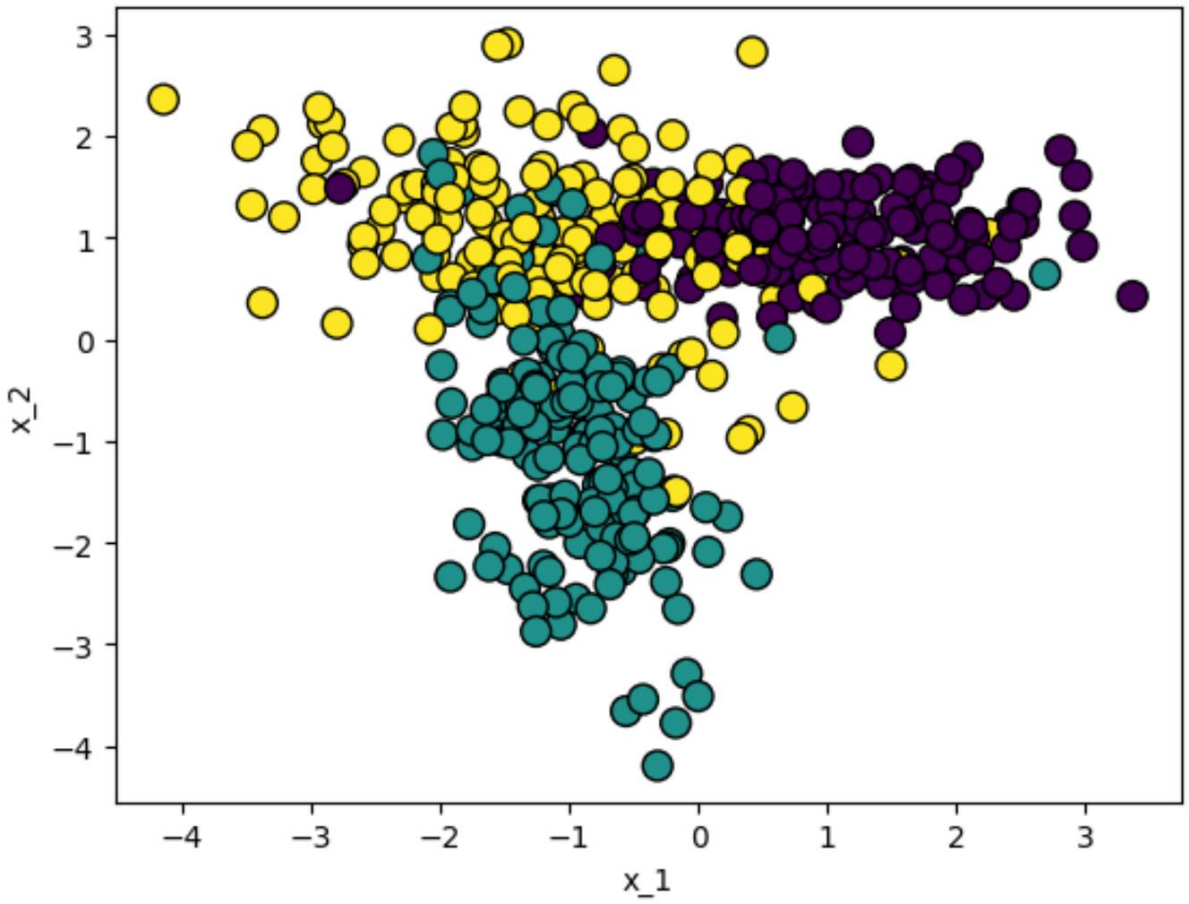




기말고사 연습 문제[3/3]

- **Support Vector Machine (SVM)**
  - 3개 클래스를 가지는 데이터에 대해 분류를 수행하는 SVM 모델 생성

```
[54] X, y = make_classification(n_samples=500,
                                n_features=2,
                                n_classes=3,
                                n_clusters_per_class=1,
                                n_informative=2,
                                n_redundant=0,
                                random_state=40)

     plt.scatter(X[:, 0], X[:, 1], marker='o', c=y, s=100, edgecolor="k", linewidth=1)
     plt.xlabel("x_1")
     plt.ylabel("x_2")
     plt.show()
```



Questions & Answers

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