Faculty of Computing

Artificial Intelligence

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LAB # 12

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Lab Tasks

Question 01:

SVM Algorithm:

ID	Feature 1 (X1)	Feature 2 (X2)	Label (Y)
1	2.5	2.4	0
2	1.0	1.2	0
3	2.2	2.9	0
4	1.3	1.1	0
5	3.0	3.0	0
6	7.6	8.0	1
7	6.8	7.1	1
8	8.2	8.5	1
9	7.1	6.5	1
10	6.5	7.0	1
11	3.2	2.9	0
12	2.8	2.7	0
13	7.5	6.9	1
14	8.0	8.3	1
15	1.5	1.0	0
16	2.0	2.2	0
17	6.9	7.4	1
18	7.2	6.8	1
19	3.0	2.6	0
20	8.3	8.7	1

- Load the dataset into Python from a .csv file.
- Split it into training and testing sets (70% train, 30% test).
- Train an SVM model using kernel='linear'.
- Print the accuracy on the test set.
- Plot the data and the decision boundary.

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```
[1] import pandas as pd
    import numpy as np
    import matplotlib.pyplot as plt
    from sklearn.model_selection import train_test_split
    from sklearn.svm import SVC
    from sklearn.metrics import accuracy_score
```

```
[2] data = {
        'X1': [2.5, 1.0, 2.2, 1.3, 3.0, 7.6, 6.8, 8.2, 7.1, 6.5,
               3.2, 2.8, 7.5, 8.0, 1.5, 2.0, 6.9, 7.2, 3.0, 8.3],
        'X2': [2.4, 1.2, 2.9, 1.1, 3.0, 8.0, 7.1, 8.5, 6.5, 7.0,
               2.9, 2.7, 6.9, 8.3, 1.0, 2.2, 7.4, 6.8, 2.6, 8.7],
        'Y':  [0, 0, 0, 0, 0, 1, 1, 1, 1, 1,
               0, 0, 1, 1, 0, 0, 1, 1, 0, 1]
    }

    df = pd.DataFrame(data)
    df.to_csv('svm_dataset.csv', index=False)
```

```
[3] df = pd.read_csv('svm_dataset.csv')
    X = df[['X1', 'X2']].values
    y = df['Y'].values
```

```
[4] X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3, random_state=42)
```

```
    model = SVC(kernel='linear')
    model.fit(X_train, y_train)
```

```
▾     SVC
SVC(kernel='linear')
```

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```
    y_pred = model.predict(X_test)
[6] accuracy = accuracy_score(y_test, y_pred)
    print("Accuracy:", accuracy)
```

```
Accuracy: 1.0
```

```
    plt.figure(figsize=(8, 6))
    plt.scatter(X[:, 0], X[:, 1], c=y, cmap='coolwarm', edgecolors='k')
```

```
<matplotlib.collections.PathCollection at 0x794e4ab94350>
```


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