


**NAME OF STUDENT: AHMED ALI ANSARI ID No: 1402-2020**

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### Assignment-01

**Spring 2023**

Department / Faculty	Program	offer no	Course	Instructor	Issue Date	Due Date	Faculty Signature	Total Marks
FCIT	BS Computer Science	6th Offer No 66311	Artificial Intelligence	Ms. Komal Chohan	3/4/2023	10/4/2023		5

### Instructions

1. This paper contains **4 Questions**. Attempt all questions.
2. This assignment should be completed within assigned time, after the due date, assignment will not be accepted.
3. Students of particular course will download assignment and submit solution which will only be accepted through CMS portal. Also bring hardcopy with you.
4. Please ensure that no part of your assignment should be copied from any other source without acknowledgment of the source and proper referencing (IEEE).
5. Please note that copy-paste is a serious nature of academic dishonesty, it is called "Plagiarism" and the penalties are attached to being found guilty of committing such offenses.
6. It is allowed using lecture notes, books, and other sources, however needing to refer/cite properly, Reference list must be given at end of the assignment.
7. Assignment can be compressed or break in two parts if file size is larger than uploading limit.
8. The font size should be 12 in Times New Roman, Line Space 1.5, Main Heading font size Bold 14, Subheading font size 12 Bold and text font size 12 should be used. All figures and illustrations should be properly titled or numbered on the left side, below.
9. Also ensure that no part of your assignment has been written by any other person, except to the extent of collaboration and /or group work.
10. You must have to upload the source file of this assignment.
11. Expected outcome of this assignment follows **CLO # 3 (C3, PLO-1) - Cognitive Domain:3(Demonstrate); PLO-1: Academic Education**

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*This table is for official use; do not write anything on it.*

CLOs	CLO_3	CLO_3	CLO_3	CLO_3	TOTAL
Question Number	1	2	3	4	
Student's Score					
Maximum Score	1	1	1	2	5

Assignment # 01

Spring 2023

Artificial Intelligence

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***Expected Outcome:***

**CLO 3:** Demonstrate knowledge about the practical aspects of Artificial Intelligence lab course. (C3, PLO-1)

**Cognitive Domain: 3 (Cognitive); PLO-1: Academic Education**

**Total (5 marks)**

- |  |        |
|--|--------|
| A: What is Support Vector Machine Algorithm?   | 1 MARK |
| B: How does the Support Vector Machine Algorithm works?                                  | 1 MARK |
| C: What are the benefits of Support Vector Machine Algorithm?                            | 1 MARK |
| D: Submit a python code including an implementation of Support Vector Machine Algorithm. | 2 MARK |

**Note:**

- If you submit your assignment after the given deadline **Zero** will be awarded to you.
- Copied assignment will be marked **zero**.
- Viva will be conducted for this assignment and on the basis of that your assignment will be evaluated.

Please submit these answers in hard copies (to be submitted in the lab) as well as in soft copies (To be submitted in the Google classroom) along with source files (Make a folder, add there assignment solution file and source files then convert that folder into zip file and then submit the softcopy) and the deadline for **BCS 6** is:

**10 April, 2023**

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**Solution:**

***A) What is Support Vector Machine :***

In Machine Learning it is based on Supervised Learning Algorithm that uses classification and regression methods. This technique is used to overcome classification Problems (spam check , recognized characters) such as : Binary classification , Multi-class , multi-label classification.

***B) How does Support Vector Machine work :***

The SVM algorithm seeks to identify the optimum hyperplane that classifies the data points into distinct groups.

SVM seeks to identify the hyperplane that optimizes the margin between the two classes in a binary classification task. The gap between the nearest data points from each class and the hyperplane is referred to as the margin. The hyperplane with the biggest margin between the two classes is what the SVM algorithm seeks to identify.

The SVM algorithm analyses the training data to identify support vectors, or the data points that are closest to the hyperplane, in order to locate the hyperplane. The SVM algorithm looks for the hyperplane that maximizes the margin between the two classes while using the support vectors to determine the hyperplane.

The SVM algorithm looks for the hyperplane that maximizes the margin between the two classes while still accurately categorizing all of the training data using the support vectors to create the hyperplane.

By converting the input data into a higher-dimensional feature space using a kernel function, the SVM approach can also be applied to issues involving non-linear classification. A linear hyperplane can be utilized to divide the classes in this feature space.

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### ***C) Benefits :***

When there is a distinct margin of distinction, it works incredibly well.

In high-dimensional spaces, it works well.

In situations where there are more dimensions than samples, it is effective.

It is also memory efficient since it uses support vectors, a subset of the training set, in the decision function.

### ***D) SVM ALGORITHM:***

```
In [6]: from sklearn import svm
        from sklearn.datasets import make_classification
        from sklearn.model_selection import train_test_split
        from sklearn.metrics import accuracy_score

        # Generate some sample data
        X, y = make_classification(n_samples=1000, n_features=10, n_classes=2, random_state=42)

        # Split the data into training and testing sets
        X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

        # Create an SVM classifier with a linear kernel
        clf = svm.SVC(kernel='linear')

        # Train the classifier on the training data
        clf.fit(X_train, y_train)

        # Make predictions on the testing data
        y_pred = clf.predict(X_test)

        # Calculate the accuracy of the classifier
        accuracy = accuracy_score(y_test, y_pred)
        print("Accuracy:", accuracy)
```

Accuracy: 0.83