

BRAC UNIVERSITY
Faculty of Computer Science and Engineering
CSE713– TASK #6
ADVANCED SYNTACTIC PATTERN RECOGNITION

Instructor: Annajiat Alim Rasel

2024/09/28

Name: Shaoun Chandra Shill
Student ID: 23373005

Support Vector Machines (SVMs) are supervised learning methods used for classification, regression, and outlier detection. They are particularly effective in high-dimensional spaces, even when the number of dimensions exceeds the number of samples. SVMs utilize support vectors—critical training points that define the decision boundary—making them memory efficient. The versatility of SVMs lies in the ability to use various kernel functions, such as linear, polynomial, and radial basis function (RBF), allowing customization for different tasks. However, SVMs have limitations, including the risk of overfitting when the number of features greatly exceeds the number of samples and the computational complexity of calculating probability estimates through cross-validation. In classification tasks, SVMs can handle binary and multi-class problems using methods like "one-vs-one" and "one-vs-rest" strategies. For regression, SVMs can be extended to Support Vector Regression (SVR), where the model relies on a subset of training data. Despite their effectiveness, SVMs require careful tuning of hyperparameters like C and gamma to achieve optimal performance, especially when using non-linear kernels. Additionally, the computational and memory demands increase with the size of the dataset, particularly for non-linear SVMs.