Support Vector Machines (SVM) – Single-Slide Summary

What is SVM?

- A **supervised learning** algorithm used for **binary classification**.
- Finds the **optimal hyperplane** that maximally separates two classes.

Key Concepts

- **Margin**: Distance between the hyperplane and the nearest data points from each class (support vectors).
- **Maximizing the margin** improves generalization.
- Works well for **linearly and non-linearly separable** data using kernels.

Mathematical Formulation

- Uses **Lagrange multipliers** and **Quadratic Programming** for optimization.

Kernels

- Map input to higher dimensions for non-linear separation:
- Linear
- Polynomial
- Radial Basis Function (RBF)

- Sigmoid

Pros & Cons

✅ High accuracy
✅ Effective in high-dimensional spaces
❌ Slower for large datasets
❌ Less effective with noisy data