Data Mining: Assignment Week 5: Support Vector Machine

1. Margin of a hyperplane is defined as:

A. The angle it makes with the axes

B. The intercept it makes on the axes

C. Perpendicular distance from its closest point

D. Perpendicular distance from origin

Ans: C

2. In a hard margin support vector machine:

A. No training instances lie inside the margin

B. All the training instances lie inside the margin

C. Only few training instances lie inside the margin

D. None of the above

Ans: A

3. The primal optimization problem solved to obtain the hard margin optimal separating hyperplane is:

A. Minimize ½ W^TW, such that $y_i(W^TX_i+b) \geq 1$ for all i

B. Maximize ½ W^TW, such that $y_i(W^TX_i+b) \geq 1$ for all i

C. Minimize ½ W^TW, such that $y_i(W^TX_i+b) \leq 1$ for all i

D. Maximize ½ W^TW, such that $y_i(W^TX_i+b) \leq 1$ for all i

Ans: A

4. The dual optimization problem solved to obtain the hard margin optimal separating hyperplane is:

A. Maximize ½ W^TW, such that $y_i(W^TX_i+b) \geq 1- \alpha_i$ for all i

B. Minimize ½ $W^TW - \Sigma \alpha_i(y_i(W^TX_i+b) -1)$, such that $\alpha_i \geq 0$, for all i

C. Minimize ½ $W^TW - \Sigma \alpha_i$, such that $y_i(W^TX_i+b) \leq 1$ for all i

D. Maximize ½ $W^TW + \Sigma \alpha_i$, such that $y_i(W^TX_i+b) \leq 1$ for all i

Ans: B

5. The Lagrange multipliers corresponding to the support vectors have a value:

A. equal to zero

B. less than zero

C. greater than zero

D. can take on any value

Ans: C

6. The SVM’s are less effective when:

A. The data is linearly separable
B. The data is clean and ready to use
C. The data is noisy and contains overlapping points
D. None of the above

Ans: C

7. The dual optimization problem in SVM design is solved using:

A. Linear programming

B. Quadratic programming

C. Dynamic programming

D. Integer programming

Ans: B

8. The relative performance of a SVM on training set and unknown samples is controlled by:

A. Lagrange multipliers

B. Margin

C. Slack

D. Generalization constant C

Ans: D

9. The primal optimization problem that is solved to obtain the optimal separating hyperplane in soft margin SVM is:

A. Minimize ½ W^TW, such that $y_i(W^TX_i+b) \geq 1-\xi_i$ for all i

B. Minimize ½ $W^TW + C\Sigma\xi_i^2$, such that $y_i(W^TX_i+b) \geq 1-\xi_i$ for all i

C. Minimize ½ W^TW, such that $y_i(W^TX_i+b) \geq 1-\xi_i^2$ for all i

D. Minimize ½ $W^TW + C\Sigma\xi_i^2$, such that $y_i(W^TX_i+b) \geq 1$ for all i

Ans: B

10. We are designing a SVM $W^TX+b=0$, suppose X_j's are the support vectors and α_j's the corresponding Lagrange multipliers, then which of the following statements are correct:

A. $W = \Sigma\, \alpha_j y_j X_j$

B. $\Sigma\, \alpha_j y_j = 0$

C. Either A or B

D. Both A and B

Ans: D