Advanced Machine Learning: Homework Problem Set II

Guidelines: You have to submit hardcopy of the solutions (printed or hand-written) by March 7, 2018 begining of lecture class. Write your name and roll number clearly on top of the solution. Be clear and precise in your solution.

Problem 1:

Show that if two hypothesis classes $\mathcal{H}_1$ and $\mathcal{H}_2$, have VC-dimension d each, their union has VC-dimension at most $2d + 1$.

Problem 2:

Consider the hypothesis class $\mathcal{H}_{\text{sine}} = \{\text{sign}((\sin(ax + b)), a, b \in \mathbb{R}\}$ over the domain $x \in \mathbb{R}$.

(a) Draw a typical function of this class. Show that the points x, $2x$, $3x$, $4x$ canot be shattered by $\mathcal{H}_{\text{sine}}$.

(b) Show that VC dimension of the hypothesis class $\mathcal{H}_{\text{sine}}$ is infinite. (Note that, there are only two free parameters in this hypothesis class.)