

Problem Set 3

1. Consider a binary feature X and a binary class Y . For the goal of predicting Y from X assume an equal split between the Train and Test sets. [60]
 - (a) State the “No-Free-Lunch” Theorem. [5]
 - (b) List all possible learning problems. [15]
 - (c) Consider an algorithm that you design to predict Y from X . What is the average accuracy of your algorithm for the absolute loss model? (Justify!) [30]
 - (d) (Independent of (c)) Is it possible to design a prediction algorithm which yields 100% average accuracy? (Justify!) [10]
 2. Alice has lost her perfume; oh, no! :(She can only hope to find it in her 5-drawer cabinet. The probability to be in drawer i is p_i . Conditioned on the perfume being in drawer i , the probability of finding it there is only s_i (the drawers are messy!). Assume that Alice searches in drawer 3 and she doesn't find it. Conditioned on this event, what's the probability that the perfume is in drawer i (i can be any number 1, 2, 3, 4, 5)? [40]
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