MLE-1

Assume we performed n coin flips and used the outcome to learn the probability of heads, defined as q. In the questions below assume that 0 < q < 1 unless stated otherwise.

We have performed an additional coin flip and learned a new probability for heads, q1, based on the n+1 observations. The following holds:

□ q1 = q

□ q1 ≠ q

□ it depends on q and the value of the new observation

MLE-2

We have performed two additional coin flips and learned a new probability for heads, q1, based on the n+2 observations. The following holds:

□ q1 = q

□ q1 ≠ q

□ it depends on q and the values of the new observations

MLE-3

Now assume that 0 .6 < q < 1. Similar to (2) we have performed two additional coin flips and learned a new probability for heads, q1, based on the n+2 observations. The following holds:

□ q1 = q

□ q1 ≠ q

□ it depends on q and the values of the new observations

KNN-1

We are performing a 2 class classification with KNN (classes are 0 and 1). For a specific input point X we know that 1KNN and 5KNN return 0. What would 3KNN return?

□ 0

□ 1

□ Impossible to tell

KNN-2

Assume that we also allow even K values for 2 class classification (again, classes are 0 and 1). For such even K, if the number of K closest samples in the training data is the same for both classes we output 2. Otherwise we output the majority class as usual. Assume that for k=2 we outputted 2 and for K=4 we outputted 1. What would the output for 5KNN be?

□ 1

□ 2

□ 0

□ Impossible to tell

NB-1

Assume we are using a Naïve Bayes classifier to classify documents with three possible labels (‘Election’, ‘Sports’, ‘Health’). Our input vectors are binary and each contains 10 (binary) values. How many total parameter values do we need to set to fully define the NB classifier for this problem?

□ 3\*(2^10)+2

□ 12

□ 32

□ 62

□ Impossible to tell

NB-2

For a two class classification problem (Y is either 0 or 1) and a binary attribute xi, let v0 = P(xi = 0 | Y =0) and v1 = P(xi = 0 | Y =1)

The following holds:

□ v0+v1 = 1

□ v0+v1 < 1

□ v0+v1 > 1

□ None of the above is guaranteed to hold

NB-KNN

Assume we are using an input vector X with m values (features) and a corresponding vector Y for either KNN (using Euclidian distance) or Naïve Bayes. Further, assume that we have enough training data to obtain the optimal model for NB for this data. If we now use the first entry in X twice (i.e. we increase the vector X to become m+1 dimensions by inserting another copy of x1 in place m+1) what would be the impact on the classifiers we learn?

□ For KNN the classifier can change, for NB it would not

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□ For both the classifier could change

□ For both the classifier would not change