Quiz Submissions - Quiz 2

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Attempt 1

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Submission View

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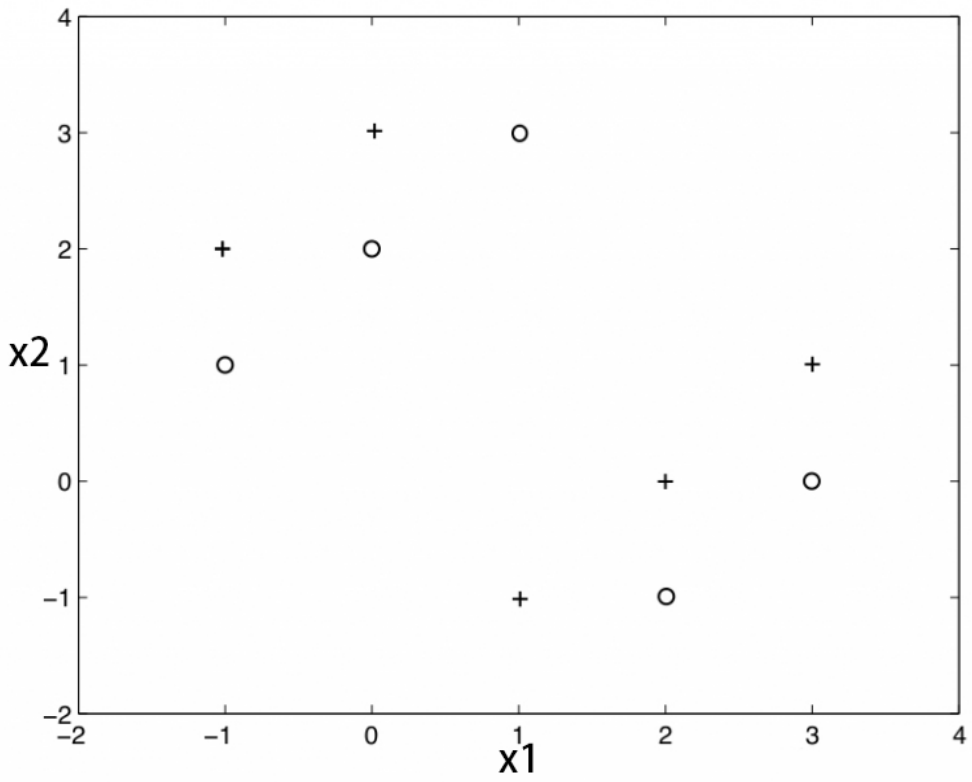
Question 1 **1.5 / 1 point**

For the following classification problem, '+' and 'o' represent 2 classes. Using 1-NN method for classification, what's the accuracy of leave-one-out Cross Validation:



- ✓ 0%
- 100%
- Between 0% - 100%
- None of the above

Question 2 **1.5 / 1 point**

A classifier that attains 100% accuracy on the training set and 70% accuracy on test set is better than a classifier that attains 70% accuracy on the training set and 75% accuracy on test set.

- ○ True
- ✓ ● False

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The first classifier overfits.

Confusion Matrix

Question 3 **0 / 1 point**

Consider the following confusion matrix of results:

–True positive = 105

–False positive = 35

–True negative = 15

–False negative = 5

What is the precision?

Answer:

0.75 ✓

Question 4 **0 / 1 point**

Consider the following confusion matrix of results:

–True positive = 105

–False positive = 35

–True negative = 15

–False negative = 5

What is the recall?

Answer:

0.95 ✔

Question 5 **0 / 1 point**

Consider the following confusion matrix of results:

–True positive = 105

–False positive = 35

–True negative = 15

–False negative = 5

What is the accuracy?

Answer:

0.75 ✔

Question 6 **1.5 / 1 point**

Maximum likelihood estimation gives us not only a point estimate, but a distribution over the parameters that we are estimating.

- ( ) True
- ✔ (•) False

Question 7 **1.5 / 1 point**

Over the past 6 months you defeated your friend 17 out of 22 times in a series of chess games. If we assume a uniform Beta prior on the probability of you winning, what is the probability that you defeat her again next week? Note that we are assuming the outcome of each game is IID from a Bernoulli distribution (**write your answer using two decimal points**)

Answer:

0.75 ✔

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we want to calculate the posterior predictive p(x=1|D), which for Beta-Bernoulli pair is given by (17+1)/(22+2) = .75

Question 8 **1.5 / 1 point**

You flip a biased coin three times: 2 times tails appear and 1 time heads. Let θ be the probability of seeing head. In class, we saw that the maximum likelihood estimate calculates θ which can take any value in [0,1]. Now lets restrict ourselves and say that set of θ can take only possibles values: 0.3 or 0.6. Suppose you have prior over parameter θ.

p(θ=0.3) = 0.3 and p(θ=0.6) = 0.7

Calculate the MAP estimate? Answer question below with format as 0.x (e.g. 0.3 or 0.6).

Answer:

0.6 ✔

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$$\hat{\theta} = \arg\max_{\theta \in \{0.3, 0.6\}} p(D;\theta)p(\theta)$$

$$= \arg\max_{\theta \in \{0.3, 0.6\}} \theta^1(1-\theta)^2 p(\theta)$$

$$\frac{p(D;\theta=0.3)p(\theta=0.3)}{p(D;\theta=0.6)p(\theta=0.6)} = \frac{0.3 * (0.7)^2 * 0.3}{0.6 * (0.4)^2 * 0.7} = \frac{0.21}{0.32} < 1$$

$$\text{implies, } \hat{\theta} = 0.6$$

Question 9 **1.5 / 1 point**

Select all the true statements below.

- ✔ ☑ **Beta distribution is conjugate prior to Bernoulli likelihood.**
- ✔ ☐ **Laplace smoothing is motivated by MAP inference.**
- ✔ ☑ **The only difference between MAP estimate and MLE is in the use of prior.**
- ✔ ☐ **Beta distribution is unimodal.**

Attempt Score: 9 / 9 - 100 %

Overall Grade (highest attempt): 9 / 9 - 100 %

Done