# 9318 Assignment

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Question 1:

1.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | location | time | item | quantity |
| 1 | Sydney | 2005 | PS2 | 1400 |
| 2 | Sydney | 2006 | PS2 | 1500 |
| 3 | Sydney | 2006 | Wii | 500 |
| 4 | Sydney | 2005 | ALL | 1400 |
| 5 | Sydney | 2006 | ALL | 2000 |
| 6 | Sydney | ALL | PS2 | 2900 |
| 7 | Sydney | ALL | Wii | 500 |
| 8 | Sydney | ALL | ALL | 3400 |
| 9 | Melbourne | 2005 | XBox 360 | 1700 |
| 10 | Melbourne | 2005 | ALL | 1700 |
| 11 | Melbourne | ALL | XBox 360 | 1700 |
| 12 | Melbourne | ALL | ALL | 1700 |
| 13 | ALL | 2005 | PS2 | 1400 |
| 14 | ALL | 2006 | PS2 | 1500 |
| 15 | ALL | 2006 | Wii | 500 |
| 16 | ALL | 2005 | XBox 360 | 1700 |
| 17 | ALL | ALL | PS2 | 2900 |
| 18 | ALL | ALL | Wii | 500 |
| 19 | ALL | ALL | XBox 360 | 1700 |
| 20 | ALL | 2005 | ALL | 3100 |
| 21 | ALL | 2006 | ALL | 2000 |
| 22 | ALL | ALL | ALL | 5100 |

2.

SELECT Location, Time, Item, SUM(Quantity)

From sales  
Group By Location, Time, Item with rollup

Union  
SELECT Location, Time, Item, SUM(Quantity)

From sales  
Group By Item, Location, Time with rollup

Union  
SELECT Location, Time, Item, SUM(Quantity)

From sales  
Group By Time, Item, Location with rollup

3.

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Time | Item | Quantity |
| Sydney | 2006 | ALL | 2000 |
| Sydney | ALL | PS2 | 2900 |
| ALL | ALL | PS2 | 2900 |
| ALL | 2005 | ALL | 3100 |
| ALL | 2006 | ALL | 2000 |
| Sydney | ALL | ALL | 3400 |
| ALL | ALL | ALL | 5100 |

4.

f(Location, Time, Item) = (3 \* Location + Time) \* 4 + Item

Step 1:

|  |  |  |  |
| --- | --- | --- | --- |
| Location | Time | Item | Quantity |
| 1 | 1 | 1 | 1400 |
| 1 | 2 | 1 | 1500 |
| 1 | 2 | 3 | 500 |
| 2 | 1 | 2 | 1700 |
| 1 | 1 | 0 | 1400 |
| 1 | 2 | 0 | 2000 |
| 2 | 1 | 0 | 1700 |
| 1 | 0 | 1 | 2900 |
| 1 | 0 | 3 | 500 |
| 2 | 0 | 2 | 1700 |
| 0 | 1 | 1 | 1400 |
| 0 | 2 | 1 | 1500 |
| 0 | 2 | 3 | 500 |
| 0 | 1 | 2 | 1700 |
| 0 | 0 | 1 | 2900 |
| 0 | 0 | 3 | 500 |
| 0 | 0 | 2 | 1700 |
| 0 | 1 | 0 | 3100 |
| 0 | 2 | 0 | 2000 |
| 1 | 0 | 0 | 3400 |
| 2 | 0 | 0 | 1700 |
| 0 | 0 | 0 | 5100 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Offset | Quantity |  | Offset | Quantity |  | MD Array |
| 17 | 1400 | 0 | 5100 | 5100 |
| 21 | 1500 | 1 | 2900 | 2900 |
| 23 | 500 | 2 | 1700 | 1700 |
| 30 | 1700 | 3 | 500 | 500 |
| 16 | 1400 | 4 | 3100 | 3100 |
| 20 | 2000 | 5 | 1400 | 1400 |
| 28 | 1700 | 6 | 1700 | 1700 |
| 13 | 2900 | 8 | 2000 | 2000 |
| 15 | 500 | 9 | 1500 | 1500 |
| 26 | 1700 | 11 | 500 | 500 |
| 5 | 1400 | 12 | 3400 | 3400 |
| 9 | 1500 | 13 | 2900 | 2900 |
| 11 | 500 | 15 | 500 | 500 |
| 6 | 1700 | 16 | 1400 | 1400 |
| 1 | 2900 | 17 | 1400 | 1400 |
| 3 | 500 | 20 | 2000 | 2000 |
| 2 | 1700 | 21 | 1500 | 1500 |
| 4 | 3100 | 23 | 500 | 500 |
| 8 | 2000 | 24 | 1700 | 1700 |
| 12 | 3400 | 26 | 1700 | 1700 |
| 24 | 1700 | 28 | 1700 | 1700 |
| 0 | 5100 | 30 | 1700 | 1700 |

Step 2:

Question 2:

1.

The naive bayes classiﬁer is :

Each feature only have two value(0 and 1). when the feature value is 0:

Each feature only have two value(0 and 1). when the feature value is 1:

so

if > 1, f (x) will be classified to 1.

if < 1, f (x) will be classified to 0.

because ∈ {0, 1}, = . the function could be:

Let

It will equal the vector in binary classification. so they are the same. Because it has (actually it should be ) , the total dimension will be n + 1. Input should always equals 1 or 0.

2.

For Naïve Bayes classifier, can be learned by calculating the values of and , which can be estimated from frequency counts of training data and this is not that difficult, while for Logistic Regression classifier, it is less restrictive and is chosen arbitrarily and thus requires a full search over the linear space of possible models. The data requirement for learning is , while it is for learning . Therefor Logistic Regression converges slower to its asymptotic accuracy than Naïve Bayes, and learning is much easier than learning .

Question 3:

1.

The loss function of Logistic Regression , the probability P(y=0|x)

The loss function of Logistic Regression , the probability P(y=1|x)

the loss function is

this can drives(prove process):

because of minimized the loss function equals maximized log-likelihood (loss function=-log likelihood)

is the loss function for logistic regression that we want to prove.

2.

The loss function of Logistic Regression:

the loss function of the total dataset is: