LONDON METROPOLITAN UNIVERSITY

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Module Code & Module Title

CU6051NI - Artificial Intelligence

Assignment

Lab Work 5

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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a mark of zero will be awarded.

Lab work – 5

For this lab work, you will be working with the Naïve Bayes Classifier for spam detection.

Given below are 2 tables containing training data and test data respectively.

Training examples consist of text (sms) labeled as spam or not spam. Use the examples to build the vocabulary for the classifier. Then using the bag of words approach, transform the texts into feature vectors.

Then following the algorithm for the Naïve Bayes Classifier, classify the 2 texts in the test data

Training Data:

Text	Label
Congrats, You have won!! reply to our sms for a free nokia mobile + free camcorder.	spam
Congrats! 1 year special cinema pass for 2 is yours. reply to this sms to claim your prize.	spam
I am pleased to tell you that you are awarded with a 1500 Bonus Prize, reply to this sms to claim your prize.	Spam
Dont worry. I guess he is busy.	Not spam
Going for dinner. msg you later.	Not spam
Ok, I will call you up when I get some cash.	Not Spam

Text Classification of Training Data of Spam and Non-Spam via code:

```
spamDict=dict()
nonSpamDict=dict()

#test_string_spam = "Congrats, You have won!! reply to our sms for a free
nokia mobile free camcorder. Congrats! 1 year special cinema pass for 2 is
 yours. reply to this sms to claim your prize. I am pleased to tell you th
at you are awarded with a 1500 Bonus Prize, reply to this sms to claim you
r prize."


def word_count_spam(str):
    counts = dict()
    spam=dict()
    words = str.split()

    for word in words:
        if word in counts:
            counts[word] += 1
        else:
            counts[word] = 1
        spam[word]=(counts[word]+1)/109
    spamDict=spam

    return spam
spamForOthers= 1/109
```

```
print( word_count_spam('congrats you have won reply to our sms for a free
nokia mobile free camcorder congrats 1 year special cinema pass for 2 is y
ours reply to this sms to claim your prize I am pleased to tell you that y
ou are awarded with a 1500 bonus prize reply to this sms to claim your pri
ze'))
print("Spam classification value for other words not in Spam: " + str(spam
ForOthers))

print("..............................................................NOT SPAM
 BELOW.....................................................................
.....")


def word_count_notspam(str):
    counts = dict()
    spam=dict()
    words = str.split()

    for word in words:
        if word in counts:
            counts[word] += 1
        else:
            counts[word] = 1
        spam[word]=(counts[word]+1)/76


    return spam
nonSpamForOthers=1/76
print("Not-
Spam classification value for other words not in Not Spam like Congrats et
c.: " + str(nonSpamForOthers))

print( word_count_notspam('dont worry I guess he is busy going for dinner
msg you later ok I will call you up when I get some cash'))
```

Output:

```
{'congrats': 0.027522935779816515, 'you': 0.03669724770642202, 'have':
0.01834862385321101, 'won': 0.01834862385321101, 'reply':
0.03669724770642202, 'to': 0.06422018348623854, 'our':
0.01834862385321101, 'sms': 0.03669724770642202, 'for':
0.027522935779816515, 'a': 0.027522935779816515, 'free':
0.027522935779816515, 'nokia': 0.01834862385321101, 'mobile':
0.01834862385321101, 'camcorder': 0.01834862385321101, '1':
0.01834862385321101, 'year': 0.01834862385321101, 'special':
0.01834862385321101, 'cinema': 0.01834862385321101, 'pass':
0.01834862385321101, '2': 0.01834862385321101, 'is': 0.01834862385321101,
'yours': 0.01834862385321101, 'this': 0.027522935779816515, 'claim':
0.027522935779816515, 'your': 0.027522935779816515, 'prize':
0.03669724770642202, 'I': 0.01834862385321101, 'am': 0.01834862385321101,
'pleased': 0.01834862385321101, 'tell': 0.01834862385321101, 'that':
0.01834862385321101, 'are': 0.01834862385321101, 'awarded':
0.01834862385321101, 'with': 0.01834862385321101, '1500':
0.01834862385321101, 'bonus': 0.01834862385321101}
Spam classification value for other words not in Spam:
0.009174311926605505
.....................................................NOT SPAM
BELOW.....................................................................
....
Not-Spam classification value for other words not in Not Spam like
Congrats etc.: 0.013157894736842105
{'dont':   0.02631578947368421,   'worry':   0.02631578947368421,   'I':
0.05263157894736842,       'guess':       0.02631578947368421,       'he':
0.02631578947368421,       'is':       0.02631578947368421,       'busy':
0.02631578947368421,       'going':       0.02631578947368421,       'for':
0.02631578947368421,       'dinner':       0.02631578947368421,       'msg':
0.02631578947368421,       'you':       0.039473684210526314,       'later':
0.02631578947368421,       'ok':       0.02631578947368421,       'will':
0.02631578947368421,       'call':       0.02631578947368421,       'up':
0.02631578947368421,       'when':       0.02631578947368421,       'get':
0.02631578947368421,       'some':       0.02631578947368421,       'cash':
0.02631578947368421}
```

Test Data

Text	Label
I am busy. I will msg you later.	?
Congrats! You are awarded a free mobile.	?

Classifying the sentence of Test Data as spam or not-spam:

- **"I am busy. I will msg you later."**

Y(spam)=p(spam)p(I/spam)p(am/spam)p(busy/spam)p(will/spam)p(msg/spam)p(you/spam)(later/spam)

= 0.5 * 0.018 * 0.018 * 0.009 * 0.009 * 0.036 * 0.009

= 0.000000000000425

Y(not-spam) = p(not-spam)p(I/ not-spam)p(am/ not -spam)p(busy/ not -spam)p(will/ not -spam)p(msg/ not-spam)p(you/ not -spam)(later not -/spam)

= 0.5 * 0.0526 * 0.0131 * 0.0262 * 0.0263 * 0.0263 * 0.0394 * 0.0263

= 0.00000000000649

The sentence will be classified as a not spam. Since the value of not-spam is greater than spam.

- **“Congrats! You are awarded a free mobile”**

Y(spam)=p(spam)p(congrats/spam)p(you/spam)p(are/spam)p(awarded/spam)p(a/spam)p(free/spam)p(mobile/spam)

= 0.5*0.0275*0.0366*0.0183*0.018*0.0275*0.0275*0.0183

= 0.000000000336

Y(not-spam)=p(not-spam)p(congrats/not-spam)p(you/not-spam)p(are/not-spam)p(awarded/not spam)p(a/not-spam)p(free/not-spam)p(mobile/not-spam)

= 0.5*0.0131*0.0394*0.0131*0.0131*0.0131*0.0131*0.0131

= 0.00000000000000995

The sentence will be classified as a spam. Since the value of spam is greater than not-spam.

Final Output

The final output of the test data:

Text	**Label**
I am busy. I will msg you later.	Not-Spam
Congrats! You are awarded a free mobile.	Spam