

## **Computational Linguistics Application Using Python Programming**

Dr. Himpun Panggabean<sup>1</sup>, Dr. Cand. Andrew Tobing<sup>1</sup>  
<sup>1</sup>Universitas Methodist Indonesia, Medan, Indonesia

---

**Abstract:** This article deals with how python programming is implemented practically. It is composed of what computational linguistics is, why computational linguistics is important, why python programming language should be implemented, how it is conducted in linguistics analysis. Following each topic are tasks aimed at disposing the principles of the program.

**Keywords:** Python, computational, linguistics, application

---

### **I. What is computational linguistics?**

An often noticeable incomplete notion that seems to prevail in people's minds, in terms of their understanding of computational linguistics is that it is an area of linguistics that uses primarily computers as a tool for analysis. Though this notion is not wrong, it nevertheless can be misleading and fails to capture the essence of computational linguistics and reflect the role it plays in the field of linguistics. Computational linguistics' association with computers is due to the name's resemblance to the word "computer". However, the word "computational" here is more likely derived from the word "compute" or "to compute" which may or may not require computers in order to carry it out. Therefore, computational linguistics can be better understood as a branch of linguistics that places emphasis on mathematical (mostly statistical) computation. It is concerned more about giving a computational explanation of linguistic phenomena (Jurafsky, 2000).

### **II. Why is computational linguistics important?**

A major portion of computational linguistics nowadays is dedicated to the making of tools that can be used to allow us to work faster and more effectively. However as can be seen in the following US-based research group's statement, another area of computational linguistics is dedicated to answering some of linguistics' most profound theoretical questions.

"We study one of the most basic and distinctively human aspects of cognition: the ability to learn so much about the world, rapidly and flexibly. Given just a few relevant experiences, even young children can infer the meaning of a new word... These inferences go far beyond the data given... We want to understand the everyday inductive leaps in computational terms. What is the underlying logic that supports reliable generalization from so little data?"

("Brain and Cognitive Sciences," 2015)

In linguistics, a similar question that pertains to syntax, morphology and semantics, can be stated as follows.

*How do infants learn grammars and concepts?*

To this question, computational linguists would ask:

*How can this phenomenon of cognitive ability be explained from a computational point of view?*

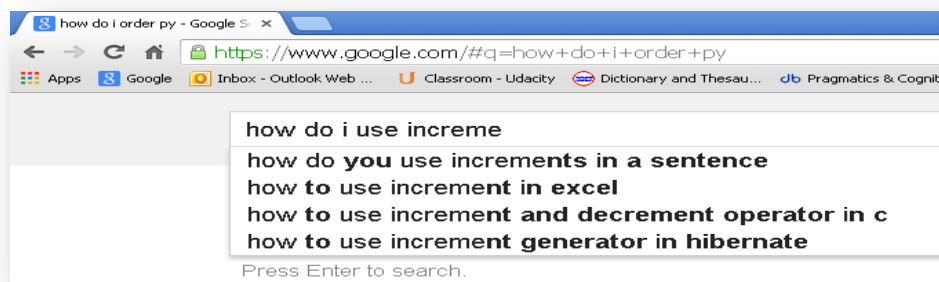
This is a major question that is now intensely driving the field of computational linguistics. Computational linguistics is therefore also interested and being quite fruitful in expanding theoretical linguistics.

As mentioned before, an immediately observable contribution by computational linguistics is the creation of useful tools. Look at the familiar list of names and images below, just to mention a few.

#### **1. Google Search Phrase Completion**

This function is able to suggest possible complete phrases that you might have in mind even when you have not finished typing words in the phrase. The basic method used is statistical analysis of lexical and syntactic association ("How Search Works," 2015). In Figure 1 below, we see that the phrase "how do I use increme..." has been typed in the box (notice that the word "increment" has not been completed yet) and so based on what is already in the box the Google engine performs computations which allows it to give prediction of what the user had in mind. The Google engine is not actually predicting what is in the mind of the user, which would be very mystical, but rather, it is suggesting a list of possibilities based on highest frequency of associations using all the data available within Google's database.

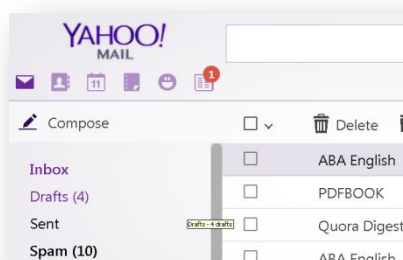
Figure 1



## 2. Spam Blocker

This function is able to classify certain mail as spam or unwanted text as spam or commercial mail. We of course have noticed in our email accounts how the mail service is able to detect these unwanted incoming letters (see “spam (10)” in Figure 2). The way our mail service does this is by analyzing the content of the incoming mail, and through statistical content analysis, it determines that certain mail are spam (Bekkerman, 2011). The approach is basically classification and the process may result in misclassification, where normal mail might be classified as spam due to certain features present within that mail. The accuracy level depends on the how well developed the computation used by your mail server.

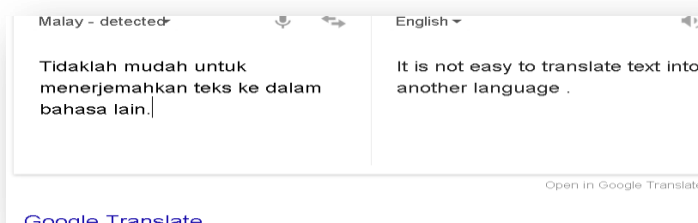
Figure 2



## 3. Google Translate

Google translate performs translation based on database of languages (“Inside Google Translate,” 2015). Indonesian speakers may assess the accuracy of the result as poor. This is directly related to the fact that Google’s volume of database for Bahasa Indonesia is insufficient, incomparable to its immensely huge English database. For other languages that have equivalent volumes of database with English, the results have been assessed as satisfying. Google translate also expects feedback and translation suggestions by users to inform to make adjustments.

Figure 3



## III. Why Python programming language?

Here we give five arguments commonly used as a reason to use Python programming language for computational linguistics.

1. Simple: Python is built upon principles of coding developed by many other earlier languages, but that these principles have been exploited for a simpler implementation in Python programming.
2. High level: Python is however a simplistic programming language. It can be used for the most sophisticated programming of functions.

3. Used for maths, science etc.: Python is widely used in mathematics and sciences.
4. A commonly programming language in computational linguistics: People in the computational linguistics community frequently use python programming language for their research and other related endeavors.
5. Free: Python's incredibility is that it is completely free from [www.python.org/downloads/](http://www.python.org/downloads/) Related plug-ins are also available for free and an abundance of tutorials can be found in the net.

#### IV. Implementing computational approach in doing linguistics

As a foretaste of how Python is used in computational linguistics, in this paper we shall sample how it is used in the area of lexical analysis. As had been clarified earlier, computational linguistics is concerned more about giving a computational explanation of linguistic phenomena. We therefore will present a demonstration of how this principle is implemented in computational linguistics, namely, in using the following statistical probabilistic model to compute likelihood of a phrase used by someone.

$$P(A | B) = \frac{P(B | A) P(A)}{P(B)}$$

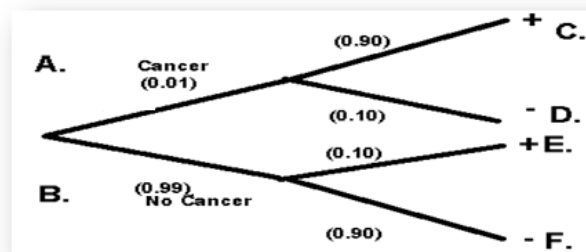
**Note:** the notation “|” signifies *given* or what we commonly know as *if*.

This statistical model is known as Bayes’ theorem. Its usefulness is its ability to determine probability value in cases when we have outside and inside probabilities, meaning that we may have probability values of two possibilities, but that these values are not immediately reliable for there is another layer of probability, where the earlier possibilities may also be split thus giving four other possibilities (Tenenbaum, 2010)

A clear explanation of this statistical model is appropriately needed and to do this, we look at the model’s application in general terms, i.e., its use in the medical field particularly with respects to probabilistic analysis of cancer cases based on tests among a number of people. We gather several observations from the tree diagram in Figure 5.

- 1) One percent of people in a certain age have cancer (A), while 99% do not (B).
- 2) 90% of people who have cancer actually have positive test results (C) and 10% of people who have cancer actually have negative test results (D).
- 3) 10% of people who do not have cancer actually have positive test results (E) and 90% of people who do not have cancer actually have negative test results (F).

**Figure 4.**



The above computational model can now be applied and understood as:

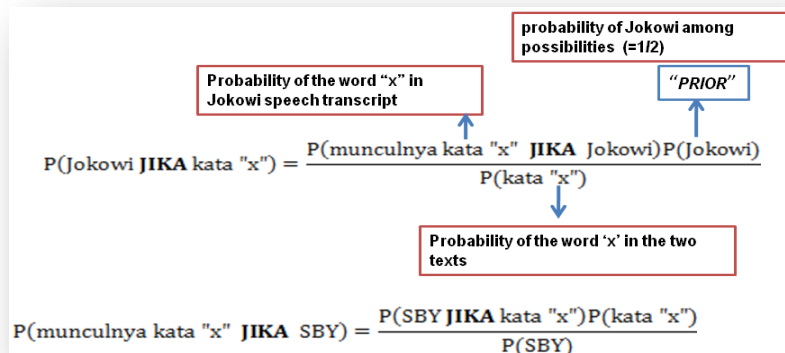
$$\begin{aligned}
 \text{Probability (Cancer if Positive)} &= \frac{\text{Probability (Positive if Cancer)} \times \text{Probability(Cancer)}}{\text{Probability (Positive)}} \\
 &= \frac{(0.90)(0.01)}{(0.01)(0.90)+(0.99)(0.10)} \\
 &= \frac{0.009}{0.108} = 0.083
 \end{aligned}$$

Therefore this computation allows us to attain the probability of C as a more representative prediction of the possibility of being Cancer Positive, if a person has been indicated by tests as having cancer, which in this case has a probability of 0.083. In other words, there is 8.3% chance of a person being positive if the person has positive results.

This same principle can be applied to texts, such as when we try to predict between two people who is the speaker or writer of a certain text, based on their previous known texts from which we can analyze frequent words used by each individual (Freitas, 2013). To give a practical example, we will compare two presidents who presented speeches in English in previous APEC meetings: Susilo Bambang Yudhoyono (SBY) and Joko Widodo or also known as “Jokowi” (See transcriptions of their speeches in Appendix). We will predict who is more likely to make the statement, “come to Indonesia”. In order to do this we need to compute several components of the formula as preliminary steps, namely: 1) Number of words per speech text; 2) Priors; 3)

Frequency of each word in text. We then apply the computational model to the analysis of the text as shown the following diagram (Figure 5).

Figure 5.



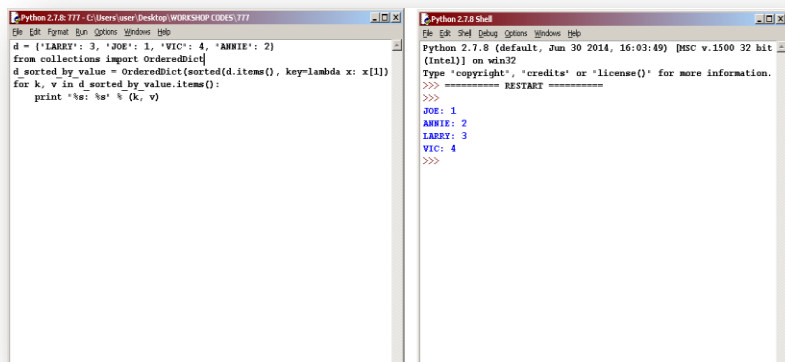
Once we understand the general principle behind this model we now can go through some Python basics to gain familiarity with it and understand some basic codings to complete the three preliminary steps mentioned previously.

**Python Basics:** Two screens

To use Python we first familiarize ourselves with the screens:

- **IDLE** (integrated development environment): this is where codings are written
- **Shell**: this is where output is shown

Figure 6.



**Python Basics:** Elements for coding

It might first be helpful for us to just skim through some very fundamental concepts and concepts in Python that we will often come across in this paper. Here we list fourteen of them.

1. objects
2. statements
3. print
4. operators
5. string
6. list
7. len()
8. dictionary
9. if conditional
10. for loop
11. def
12. {}
13. .split()
14. return

**Python Basics:** variables, objects, print

The way we instruct python to give out the general or final result of the coding that we have set up is to use the function called “print”. The basic use is demonstrated below. We do this on the IDLE screen.

```
x = 1
Print x

>>>
1
```

Note carefully that we must stay consistent in our use of upper case or lower case in setting up our statement “x=1”. Below, we continue further to apply this simple function.

```
print X+2

>>>
3
```

Try the following exercise to better understand the function.

**Exercise 1:**

Write two statements for variables x and y. When x and y are multiplied, then subtracted by 1, the result is 7.

**Python Basics: basic operators**

Apart from the operator “+” that we have used above, there are several other basic operators in Python that we might also often come across. Here we list a few.

1. - : subtract
2. / : divide by
3. \*\* : to the power of
4. += : increment

Try the following coding, which implements the operator \*\*

```
X = 9
print X **2

>>>
81
```

Try the following and notice that anything placed after the hex “#” sign WILL NOT affect the coding.

```
x = 1 #increment operator
print x += 5

>>>
6
```

**Python Basics: string ‘ ’ or “ ”**

String is a very useful element in programs and in Python. A string is basically a word that we treat as one unit. So here we make the assignment of variable “a” as the string ‘besok’ (we may either use single or double quotation marks).

```
a = ‘besok’
print a

>>>
besok
```

Try the following exercise to become more familiar with strings.

**Exercise 2:**

1. How do we instruct Python to print : *besok saya mau makan durian*, but we want each word to be a string in the coding?
2. How may we provide spaces between words in the output?

**Python Basics:** *list* [ ], *len*

*List* is a very useful element in programs and in Python. It is basically a function that we can use to determine a set of units, such as a set of strings, as in the example below.

```
buah = ['durian', 'rambutan', 'mangga', 'markisa', 'sirsak']
print buah

>>>
['durian', 'rambutan', 'mangga', 'markisa', 'sirsak']
```

Also we can instruct Python to give out only a particular unit within the set.

```
print 'buah'

>>>
?
print buah [0]           #0 position in list

>>>
?
```

From the above example we learn that python counts from 0 (0 is first on the list).

Try the following exercises for practice.

**Exercise 3:**

Make Python print out: rambutan sirsak

Also try the following function.

```
print len (buah)

>>>
?
```

**Python Basics:** *dictionary*

The dictionary attaches a value or another variable to the elements in the list. So for example we can attach the value 6 to the string "banana" and 5 to the string "apple". Below we attach class scores to names of people.

```
class_score = {'Jerry': 6, 'Joe': 5, 'Jim': 7}
print class_score

>>>
?
```

**Exercise 5:**

Make Python print out Jerry's score only

Make Python print out Jerry and Jim's score

We might inquire now how we can arrange an ordered output. Some searching in the internet will be able to allow us to find the answer, namely that we use a specific instruction as seen below.

```
from collections import OrderedDict
URUTAN = OrderedDict(sorted(class_score.items(), key=lambda x: x[1]))
for A, B in URUTAN.items():
    print (A, B)

>>>
?
```

**Python Basics:** *if conditional*

If conditional is an extremely useful function by which we can separate things or in other words classify things. Below, having set up that "value = 7", we then tell Python that any value which is less than 10, must be labeled 'not perfect'.

```
value = 7
if value < 10:
    print 'not perfect'

>>>
?
```

Try also changing value to 10 and see the result. Afterwards, continue the above coding with the following.

```
else:
    print 'perfect'

>>>
?
```

By doing this, through alternation, we now explicitly instruct that any value not below 10 is 'perfect'. Also try the following coding and see the result.

```
Buah = ['pisang', 'apel', 'jeruk']
buah_kesukaan = 'pisang'
if buah_kesukaan in Buah:
    print 'enaak!'

>>>
?
```

**Python Basics:** *for loop*

The *for loop* is a very useful function where we are able to run a certain function, iterating it through a *list*.

Below, first we set up a list containing different types of cars, but that we do not yet specify that those strings represent types of cars. We then follow that with the statement "for jenis in Mobil", in which we are now specifying that what is inside the list Mobil are names of different types of cars.

```
Mobil = ['sedan', 'van', 'pick up', 'suv']
for jenis in Mobil:
    print jenis

>>>
?
```

**Figure 7.** Coding for computing number of words per speech text

```
Python 2.7.8 ONLY WORDS ORANG - C:\Users\user\Desktop\ONLY WORDS ORANG
File Edit Format Run Options Windows Help
teks = ['Jokowi Excellencies, distinguished guests, ladies and
def conditional(teks):
    kata = {} #1. Buatlah sebuah dict
    for line in teks: #2. Buatlah list () yg
        line = line.split() # dlm teks secara ter
        orang = line[0] #3. Tentukan bahwa kata
        jumlah_kata = len(line) - 1 #4. Update jumlah kata
#Cara mengkalkulasi jumlah kata dalam list adalah:
    if orang in kata:
        kata[orang] += jumlah_kata
    else:
        kata[orang] = jumlah_kata
    return kata
kata = conditional(teks)
print kata ['SBY']
```

**Three Components: Number of words, Priors, Frequency**

We now look at how the three components (1. Number of words per speech text; 2.Priors; 3.Frequency of each word in text) in the statistical model can be coded in Python (see Figures 7-9).

Note in the above coding that we determine the variable representing the two speech texts as **teks**. We initially enter the two texts by the two presidents as *strings*. Notice that the names of the respective president is inserted as the first word in the text to allow us to label the speaker to the text as also can be seen the texts shown in the appendix.

```
teks = ['Jokowi Excellencies, distinguished guests, ladies and ... Good morning', 'SBY Ladies and gentlemen, I am pleased to welcome ... Thank you.']
```

An early step in the procedure is to define a set of *conditionals* pertaining to the texts that we have supplied into the program.

```
def conditional (teks):
```

The first important conditional is to make a *dictionary* out (the conditionals must be indented). Note that the entries in dictionary is not yet specified. All that we are instructing is for Python to create a dictionary called **kata**.

```
    kata = { }
```

The next conditional consist of several instructions using a *for loop* to run four different functions through **teks**. Here we ask Python to label each element (two speeches) in **teks** as *lines*. So now we have two *lines* in **teks**. We begin with the following.

```
    For line in teks:
```

Then for this loop we instruct the following, which is an instruction to split a line into separate elements.

```
        line = line split ( )
```

The first instruction below is basically saying that the first element in each line is the name of the speaker associated with the text.

```
            orang = line [0]  
            jumlah_kata = len(line) -1
```

The second line states that the number of elements within a line is the total number of elements which we can compute using the function “len(line)” then subtracted by 1.

The conditionals that we define are explained on the right of the screen after the hexes. The conditional we use to calculating number of words per speech text is as follow.

```
                if orang in kata:  
                    kata [orang] += jumlah_kata  
                else:  
                    Kata [orang] = jumlah_kata
```

If we run the above coding as shown in Figure 7, Python will give out the number of words in each respective president’s text.

The procedure now for calculating priors and word frequency can be followed in Figure 8 and 9 respectively.



Figure 8. Coding for computing priors

```
Python 2.7.8: PRIORS - C:\Users\user\Desktop\CODES JUMAT\PRIORS
File Edit Format Run Options Windows Help
teks = ['Jokowi Excellencies, distinguished guests, la

def conditional(teks):
    priors = {} #1. Buatlah sebuah

    for line in teks: #2. Buatlah list
        line = line.split() # dlm teks secara
        orang = line[0] #3. Tentukan bahwa
        jumlah_kata = len(line) - 1 #4. Update jumlah

#Cara mengkalkulasi priors orang adalah:
    priors[orang] = 1.0/len(teks)

    return priors
priors = conditional(teks)

print priors ['SBY']
```

Figure 9. Coding for computing frequency of each word in text

```
def conditional(teks):
    frekuensi_kata = {} #1. Buatlah sebuah

    for line in teks: #2. Buatlah list ()
        line = line.split() # dlm teks secara
        orang = line[0] #3. Tentukan bahwa
        jumlah_kata = len(line) - 1 #4. Update jumlah

#this is to calculate probabilities
    if orang not in frekuensi_kata:
        frekuensi_kata[orang] = {}
    for i in range(1, len(line)):
        if line[i] in frekuensi_kata[orang]:
            frekuensi_kata[orang][line[i]] += 1
        else:
            frekuensi_kata[orang][line[i]] = 1
    return frekuensi_kata
frekuensi_kata = conditional(teks)

print frekuensi_kata ['SBY']
```

### Integrating the components into the statistical model

Now we integrate the threes component into the statistical model.

Figure 10.

```
File Edit Format Run Options Windows Help

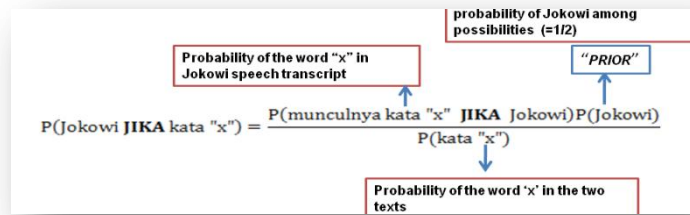
    if orang in kata: #to calculate jumlah kata
        kata[orang] += jumlah_kata
    else:
        kata[orang] = jumlah_kata

    priors[orang] = 1.0/len(teks) #to calculate priors

    if orang not in frekuensi: #to calculate frekuensi
        frekuensi[orang] = {}
    for i in range(1, len(line)):
        if line[i] in frekuensi[orang]:
            frekuensi[orang][line[i]] += 1
        else:
            frekuensi[orang][line[i]] = 1
    return kata, priors, frekuensi

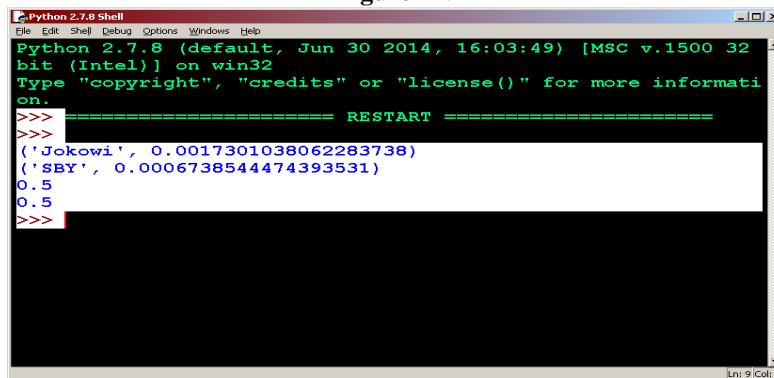
def classify(teks, priors, frekuensi, kata):
    teks = teks.split()
    for candidate in priors:
        probability = priors[candidate]
        for word in teks:
            if word in frekuensi[candidate]:
                probability *= (1. + frekuensi[candidate][word]) / kata[candidate]
            else:
                probability *= 1. / kata[candidate]
        print (candidate, probability)
kata, priors, frekuensi = conditional(teks)
classify("come", priors, frekuensi, kata)
print priors ['SBY']
print priors ['Jokowi']
```

Figure 11. Integrating the components into the statistical model



In the above coding, on the line third from the bottom, notice that we are in this case asking Python to compute likelihood of the word “come” to be used by each president. We of course can use any other word arbitrarily. Running the above coding, we get the following output in the Shell display.

Figure 12.



The results are interpreted the following way.

1. The likelihood for president Joko Widodo to use the word “come” in his speeches based on statistics exploiting his 2014 APEC address is 0.0017, while the likelihood for Susilo Bambang Yudhoyono to use the same word in his speeches based on statistics exploiting his previous APEC address is 0.0006.
2. When given to speech texts and given two possibilities of speakers (either Joko Widodo or Susilo Bambang Yudhoyono), based on frequency of certain words, we are able to determine who the speaker is most likely to be.

Now we ask Python to compute likelihood of the phrase “come to Indonesia” to be used by each president.

Figure 13..

```

priors[orang] = 1.0/len(teks) #to calculate priors

if orang not in frekuensi: #to calculate frekuensi
    frekuensi[orang] = {}
for i in range(1, len(line)):
    if line[i] in frekuensi[orang]:
        frekuensi[orang][line[i]] += 1
    else:
        frekuensi[orang][line[i]] = 1
return kata, priors, frekuensi

def classify(teks, priors, frekuensi, kata):
    teks = teks.split()
    for candidate in priors:
        probability = priors[candidate]
        for word in teks:
            if word in frekuensi[candidate]:
                probability *= (1. + frekuensi[candidate][word])
            else:
                probability *= 1. / kata[candidate]
        print (candidate, probability)
kata, priors, frekuensi = conditional(teks)
classify("come to indonesia", priors, frekuensi, kata)
print priors ['SBY']

```

Running the below coding, we get the following output in the Shell display.

Figure 14.

```

Python 2.7.8 (default, Jun 30 2014, 16:03:49) [MSC v.
1500 32 bit (Intel)] on win32
Type "copyright", "credits" or "license()" for more i
nformation.
>>> ===== RESTART =====
>>>
('Jokowi', 2.255589386174078e-07)
('SBY', 3.5494109632560875e-08)
>>>

```

The results are interpreted the following way: that the likelihood for president Joko Widodo to use the phrase “come to Indonesia” in his speeches is 2.255e-07, while the likelihood for Susilo Bambang Yudhoyono to use the same phrase in his speeches based on statistical analysis of his previous APEC address is 3.549e-08. Thus it is more likely for president Jokowi to invite people to Indonesia by saying “come to Indonesia”

## V. Conclusion

In this paper we have demonstrated how computational linguistics does not merely make use of computers to perform linguistic analysis, but more importantly uses computers to perform computational tasks to produce analysis of linguistic data.

It is important to familiarize ourselves with the notion of computational approaches to linguistics and how powerful computer programs, such as Python can facilitate this approach, by having the ability to perform complex tasks and process vast amounts of data in order to produce analysis that would be impossible without computer technology.

Here we have presented a brief but hopefully insightful explanation of computational linguistics, with the aim of giving significant understanding as to how it is at work behind technologies that we so often use on a daily basis in our lives.

## References

- [1]. Bekkerman, R. (2011). *Scaling up Machine Learning*. Cambridge: Cambridge University Press Freitas, L. (2013) *Computational Linguistics* [PowerPoint slides] retrieved from [https://manual.cs50.net/seminars/#com-putational\\_linguistics](https://manual.cs50.net/seminars/#com-putational_linguistics)
- [2]. *How Search Works in Google inside search*. (2015, Jan 20). Retrieved from <https://www.google.com/url?sa=t&source=web&rct=j&ei=rhi>
- [3]. *Inside Google Translate*. (2015, Jan 20). Retrieved from
- [4]. [https://translate.google.com/about/intl/en\\_ALL/](https://translate.google.com/about/intl/en_ALL/)
- [5]. Jurafsky, D. & M. James (2000). *Speech and Language Processing*. New Jersey: Prentice Hall
- [6]. Tenenbaum, J. (2010). *Bayesian Models of Human Learning and Reasoning*.
- [7]. [PowerPoint slides] retrieved from [www.mit.edu/~slides/mathpsych03%20-light.ppt](http://www.mit.edu/~slides/mathpsych03%20-light.ppt) Brain and Cognitive Sciences. (2015, Jan 20). Retrieved from [bcs.mit.edu/people/tenenbaum.html](http://bcs.mit.edu/people/tenenbaum.html)

## Appendix

### Transcription of two Presidential APEC speeches

#### Joko Widodo APEC 2014

(Retrieved from [www.rappler.com/world/regions/asia-pacific/indonesia/74620-full-speech-joko-widodo-apec-summit-beijing](http://www.rappler.com/world/regions/asia-pacific/indonesia/74620-full-speech-joko-widodo-apec-summit-beijing))

‘Jokowi Excellencies, distinguished guests, ladies and gentlemen, and CEOs, good morning. First, on behalf of the Indonesian Government and the people of Indonesia, I would like to thank you for coming to my presentation. Today, I am happy, I am very happy, to be with you, because you know I was a businessman years ago. So, this morning, I am very happy because we can talk about business, about investment with all of you. The picture shows you our map of Indonesia. We have a population of 240 million and the distance is like from London in UK to Istanbul in Turkey. And imagine, we have 17,000 islands. 17,000 islands. Our national budget for 2015 is \$167 billion and for fuel subsidy is \$27 billion. Its huge. So we want to channel our fuel subsidy from consumption to the productive activities. From consumptive activities to productive activities. We want to channel our fuel subsidy to the farm for seeds, for fertilizers, and also for irrigation. And we want to build dams – 25 dams in 5 years from our fuel subsiy to maintain the water supply to the farming area. Some subsidy we want to channel to the fishermen, to give them boat engines, to give them refrigerators. We want to increase the income of the fishermen. Some fuel subsidy we want to give to micro and small enterprises in the villages. We want to help them raise their working capital. And some subsidy we want to channel to the health program, the education program. And some subsidy we want to channel to infrastructure. In 5 years we want to build 24 seaports and deep seaports. As you know, we have 17,000 islands, so we need seaports and we need deep seaports. And this is your opportunity: 24 seaports and deep seaports. The picture shows our Jakarta Port,

Tanjung Priok port. In 2009, the capacity is 3.6 million TEUs a year, and our plan in 2017 is around 15 million TEUs a year. This is the potential ports in Indonesia. This is your opportunity. We want to build in Sumatera island, in Kalimantan island, in Java island, in Sulawesi island, in Maluku island, also in Papua island. And we plan to build our railway track, railway network. Now we have already in Java and we want to build in Sumatera island, in Kalimantan island, in Sulawesi island and also in Papua island. This is your opportunity. Now we talk about mass transportation. We want to build our mass transportation in 6 big cities in Indonesia. We have started in Jakarta last year, and we want to build in Medan, in Makassar, in Semarang, in Bandung, in Surabaya. So, this is also your opportunity, because you know our national budget is limited. Now we talk about our maritime agenda. We want to build sea toll. What is sea toll? Sea toll is maritime transportation system to make our transportation cost lower, to make our transportation cost more efficient. We want to build from the west to the east. We hope not only the vessels can enter our sea toll but also mother vessels can enter the sea toll. So, the price, the cost of the transportation is more efficient. For example, the price of the cement, one sack cement, in Java island is \$6 per sack cement. But in Papua island the price is \$150 per sack cement. Imagine, 25 times. So we hope with our sea toll the price in our islands is the same. Electricity. We need power plants. We need around 35,000 megavolts to build our industries, to build our projects, to build our industrial zones, our manufacturing zones. So, we need power plants. This is also your opportunity to invest in this project. Because we need our power plants for manufacturing, for industrial zones. Many investors, a lot of investors, when they come to me, most of them they always complain about land acquisition. I will push my ministers, my governors, my mayors, to help clear this problem. I have experience with land acquisition when I was a governor. We have a project, the Jakarta Outer Ring Road, started 15 years ago but was stopped 8 years ago, because we have a problem here: 1.5 kilometers unfinished because there is 143 families who do not accept with the compensation price. So last year I invite them. I go to them then I invite them to lunch and dinner. Four times. Ah, this is me. I invite them and then we talk about the problem. Four times. Four times meeting. And the problem is cleared. And now the toll road has been used (starting) 7 month ago. Now we talk business permit. We have national one-stop service office that can help you, that will serve you, that will facilitate you, that will give you your business permit. For example, principle business permit needs 3 days to process. Finally, again on behalf of the Indonesian government and the people of Indonesia, I would like to thank you for your listening (to) my presentation. We are waiting for you to come to Indonesia. We are waiting for you to invest in Indonesia. Thank you. Thank you. Good morning.'

### **Susilo Bambang Yodhoyono APEC 2013**

(Retrieved from [kemlu.go.id/Pages/SpeechTranscriptionDisplay.aspx?Name1=Pidato&Name2=Presiden&IDP=8071=en](http://kemlu.go.id/Pages/SpeechTranscriptionDisplay.aspx?Name1=Pidato&Name2=Presiden&IDP=8071=en))

'SBY Ladies and Gentlemen, I am pleased to welcome you to Indonesia and I trust that all of you are enjoying the island of Bali, which is also known as the island of the God. It is indeed a great honor for me to address this APEC CEO Summit. And I am pleased to see such huge participation by the regions – and worlds – corporate community here today. I wish to thank also my fellow APEC Leaders, many of whom would also have the honor to speak to this forum. This APEC CEO Summit is also an opportunity to showcase the phenomenal growth of the private sector in our region. The rapid expansion of business has totally changed our 21st century economic landscape for the better. Governments will remain important in formulating economic policies. But, without the help of the private sector, we might not be able to provide more jobs for our citizens. And we know that whatever country one comes from, the top national and local agenda is going to be : jobs. This is why I am also glad to welcome the participation of Union Leaders at this Summit. For we are all in this together, and we need to work together – and harder – to achieve shared prosperity. Already, global growth in 2013 is showing different dynamics. Advanced economies are experiencing recovery and showing positive growth, while emerging economies—including BRICS economies—are facing a slowdown. They are also suffering from large trade deficits, capital flight and depreciating currencies. This is also true for the APEC region. In some APEC advanced economies, growth is gaining strength. Meanwhile, APEC emerging economies need further momentum for growth. Not withstanding this, APEC economies remain a crucial source of global growth. According to the IMF, as a group, APEC is expected to grow by 6.3 percent in 2013 and by 6.6 percent in 2014 – which is more than twice the world average. At present, APEC economies account for 54 percent of global gross domestic product and 44 percent of global trade. Within the region, moreover, trade has grown nearly seven-fold since 1989, reaching over 11 trillion US dollars in 2011. In the past 25 years, average tariffs in APEC have declined by close to 70 percent. The cost of conducting business across borders decreased by two successive rounds of 5 percent tariff reductions: resulting in nearly 59 billion US dollars of savings for businesses. All this shows that with its combined potential, APEC is in the ideal position to help the recovery of the global economy. Therefore, APEC members—through individual and collective measures—must put extra efforts to promote growth. Let me highlight some of the possible measures. First and foremost, we all need to do our part to prevent protectionist policies, and continue on our path of trade liberalization in ways that uplift the well-being of all our citizens. We must also ensure that our trade relations are not only strong but also

balanced. Second, we need to intensify efforts to stimulate investment within our region so as to maintain growth and create jobs. There is tremendous opportunity for this as we are experiencing a rapid growth of middle-class. Third, we need to develop more and better infrastructure as an essential element for our connectivity. This will of course help not only to facilitate trade and investment, but also boost job creation. APEC needs to tackle inefficiency in the supply chain. We have to make it easier, cheaper, and faster to conduct trade in goods and services across borders. In this regard, it is crucial that we promote the APEC 2013 priority in connectivity. We welcome public-private-partnerships to develop needed infrastructure. Fourth, to ensure growth with equity, we must embrace the SMEs that form the backbone of all our economies. Fifth, we must work together to ensure the financial stability, which is an absolute requisite for sustainable all economic activities, including trade and investment. APEC members can help stabilize global financial market, through bilateral as well as regional initiatives. These include Regional Financing Agreements (RFAs) and Financial Stability Board (FSB). Chiang Mai Initiative Multilateralization is a good example of close collaboration among some APEC members. Sixth, to ensure development for all, we must not forget to provide social safety net for the poor and financial inclusion for shared prosperity. Seventh, APEC economies can only achieve all this if we intensify our policy consultation and coordination. Ladies and Gentlemen, As we set the theme and priorities for APEC 2013, Indonesia envisions the future of this region as prosperous, stable, dynamic, inclusive, and forward-looking. Our theme, Resilient Asia-Pacific – Engine of Global Growth, is all about drawing on our strengths. Our objective is to make the region the epicenter for the worlds economic advancement. And in that light, Indonesia has set three priorities for our APEC year. I believe through close collaboration with the business community, APEC can achieve these priorities. The FIRST priority is: Attaining the Bogor Goals. APEC economies have achieved tremendous progress toward achieving the Bogor Goals. But while APEC has reduced average tariffs from 16.9 percent in 1989 to 5.7 percent in 2011, restrictive non-tariff measures, lengthy customs procedures and poor transport infrastructure still pose challenges to trade. Therefore, as we continue to work for trade and investment liberalization, as well as deeper regional economic integration, we must have the capacity to tackle those challenges. We have to be able to address growing trade barriers, financial instability and fluctuating commodity prices. SECOND, priority is Achieving Sustainable Growth with Equity. Today, APEC economies are confronted by new challenges that could cause disruption and stunted growth. Among them is population growth. The global population has grown from just over five and a half billion people in 1994 to more than seven billion today. By 2045 there will be 9 billion people worldwide. And much of this population increase will come from the Asia Pacific region, placing a great burden on the supply of energy, food and water for our people. We cannot achieve APECs goals without ensuring the principles of inclusion in our economic growth and development. Therefore, maintaining the growth path that is sustainable and inclusive is of great importance. And our efforts should focus on economic empowerment, engagement of stake-holders, enhancement of SMEs global competitiveness through innovation and tapping womens productivity in the economy. It is also critical to ensure financial inclusion, strengthen food security and improve access to health services. And the THIRD priority is Promoting Connectivity. Unlike in 1994, the advent of new technologies has opened new ways for people to do business with each other, across countries, and across conti-nents. Improving connectivity, therefore, becomes a critical priority. I believe that a focused and improved physical, institutional and people-to-people connectivity will help integrate our region. It will also facilitate the flow of goods, services, capital, and people of the Asia-Pacific. Thus, we must work together to strengthen connectivity through infrastructure development and the promotion of infrastructure investment. Indonesia will work with APEC Leaders and all stakeholders to advance these 3 priorities. After all, our success is strongly tied to the success of others. Like other emerging markets, Indonesia is facing some head-winds resulting from financial market turbulence. Yet, this situation is manageable and the Indonesian Government is responding to it with a package of policy measures, including substantive structural reform. As a result, in recent times Indonesias financial market has stabilized. We believe this is only a short-term challenge, and we are confident in the long-term prospects to invest and grow is enormous as Indonesia will remain a land of opportunity and growth. Today, Indonesia has become a trillion dollar economy with a large middle-class. Our democracy is strongly rooted, and this makes Indonesia well placed for your investment. McKinsey predicted that Indonesias business opportunity will increase up to 1.8 trillion US dollars in 2030. This opportunity ranges from consumer services, agriculture and fishery, resources to education industry. Infratructue. We continue to create a better business and investment environment and addressing many of the challenges. We have made steady progress, including from major bureaucratic reforms to strengthen government institutions. To accelerate development, in May 2011, we launched the Master Plan for the Acceleration and Expansion of Indonesias Economic Development 2011 – 2025 (MP3EI). In the next 14 years, we are targeting to reach over 460 billion US dollars worth of investments in 22 main economic activities, integrated in eight programs. These include agriculture, mining, energy, industry, marine, tourism and telecommunications. Therefore, the Master Plan offers a great deal of opportunities for international investors. As a final point, also in my capacity as the chief salesperson of Indonesia Inc., I invite you all to seize the business and investment opportunities in Indonesia. Let us build a strong partnership and forge a resilient APEC. Let us also ensure that APEC continues to bring prosperity to all the people in the APEC region. Thank you.'