

# Get the feeling

Yes, you have to.

# “You” and “I” Might be Not Important in NLP

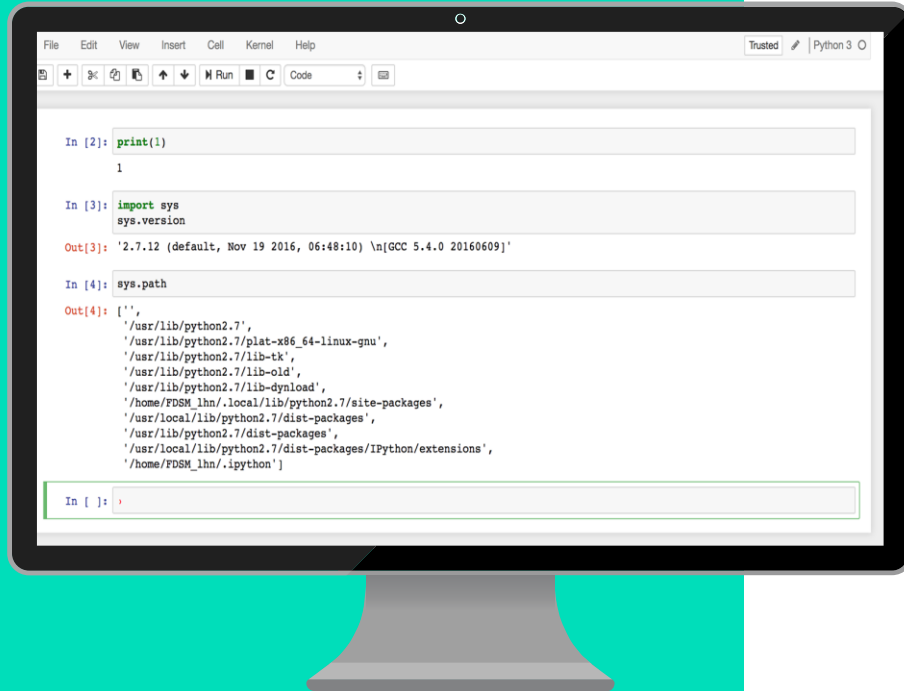


**TARC**

TUNKU ABDUL RAHMAN  
UNIVERSITY COLLEGE

BEYOND **EDUCATION**





## Desktop Software

Jupyter Notebook

# Dr. Tan Chi Wee

Senior Lecturer cum  
Programme Leader

Faculty of Computing And Information  
Technology, TARUC

Artificial Intelligence, Image Processing,  
Natural Language Processing

Email: [chiwee@tarc.edu.my](mailto:chiwee@tarc.edu.my)



slido



**What is the first thing that comes to mind when you think about Natural Language Processing?**

① Start presenting to display the poll results on this slide.

# Objectives

- 01 Natural Language Understanding
- 02 Natural Language Generation
- 03 Application



# 44,000,000,000,000 GB

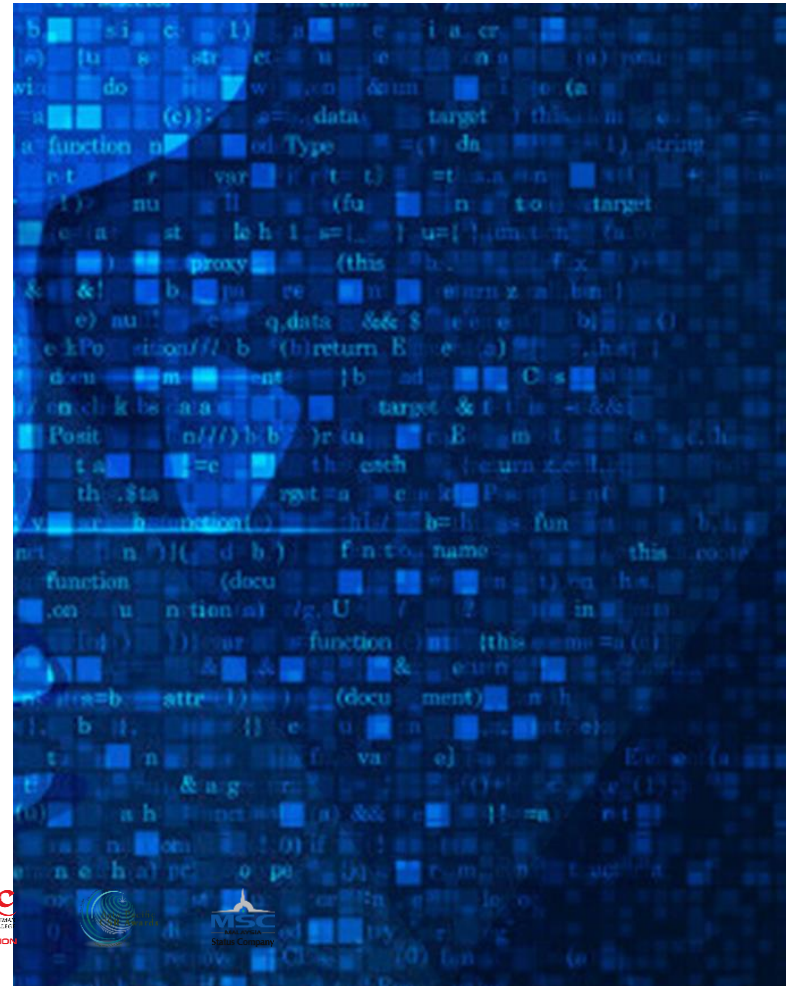
Data = Potential !



# NLP for Big Data

What everyone should know?

- Largely unstructured
- Constant growth
- Next GREAT opportunity







## What is NLP?

Language is meant for communication  
We can come to understand more about  
the world  
Succeed at building computational mode  
of language = Powerful tool for  
communicating the world

# What is NLP?

Study of interaction between computers & human languages

$\text{NLP} = \text{CS} + \text{AI} + \text{Computational Linguistics}$

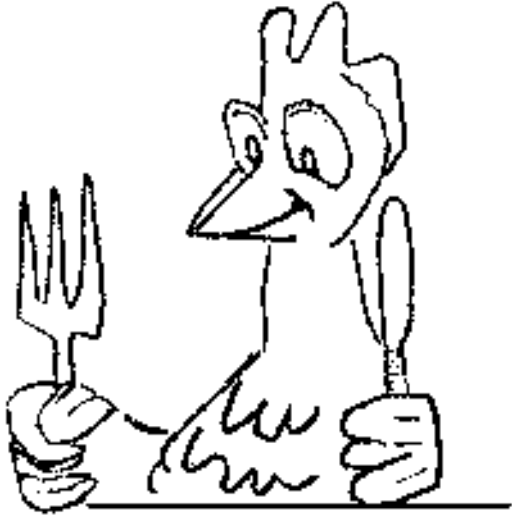
# NLP Problem:

## PROCESSING WRITTEN *TEXT*

using lexical, syntactic and semantic knowledge of the language as well as the required real world information

## PROCESSING *SPOKEN* LANGUAGE

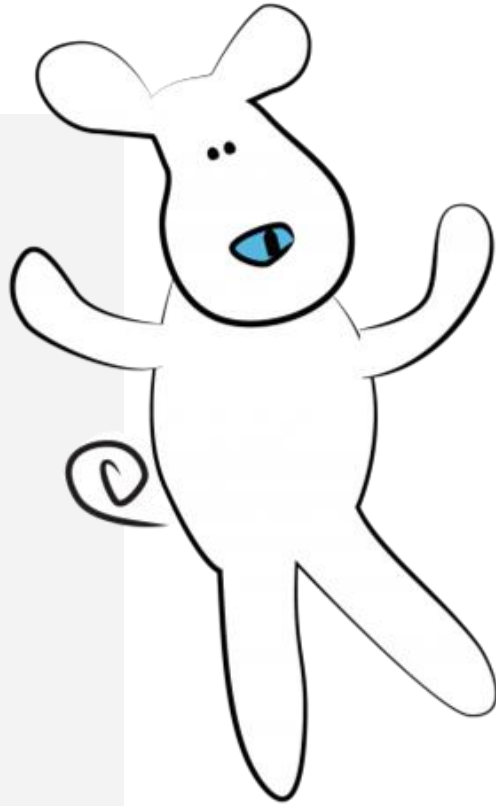
using all information mentioned before  
+  
phonology knowledge, speech recognition, speech synthesis



THE CHICKEN IS  
READY TO EAT

## NLP Problem

Some english sentences are incomplete  
descriptions = fragmented



## Some dogs are outside.

*Some dogs are on the lawn.*

*Three dogs are on the lawn.*

*.Moti, Hira and Buzo are on the lawn.*

The good side: Language allows speakers  
to be vague OR as precise as they like.



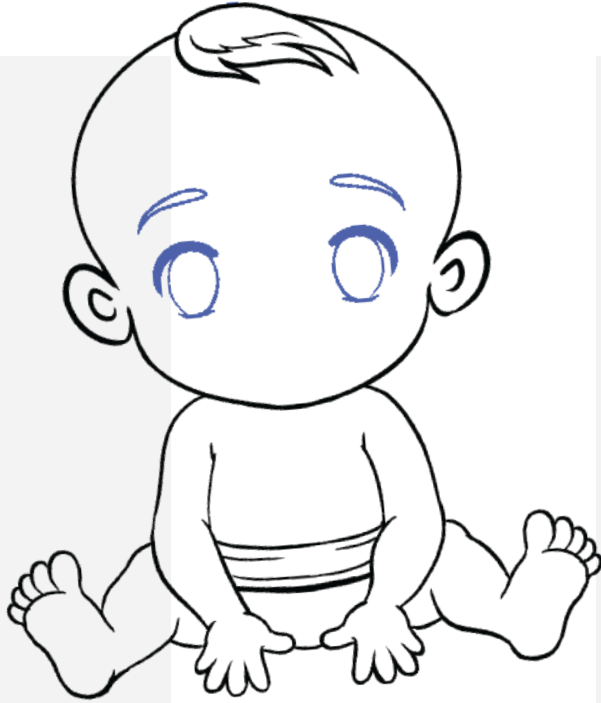
# Where's the water?

*In a lab: it must be pure.*

*When you are thirsty: water bottle.*

*Dealing with a leaky roof: it can be filthy*

The good side: Communicate about an infinite world using a finite number of symbols.



## Born

*Mary was born on October 11.  
Mary's birthday is October 11.*

The good side: When you know a lot,  
facts imply each other. Language is  
intended to be used by agents who know  
a lot.



# More Languages Than English

German: Donaudampfschiffahrtsgesellschaftskapitän (  )

Chinese: 50,000 different characters (2-3k to read a newspaper)

Japanese: 3 writing systems

Thai: Ambiguous word boundaries and sentence concepts

Slavic: Different word forms depending on gender, case, tense



# Write “if-then-else” Rules?

# YES









# NO

No, a BIG NO. It leads to very large and complex codebases. We as a human are still struggles to capture trivial cases.

# Why NLP?

- Huge amount of data
- Applications for processing large amounts of texts require NLP expertise

# Unstructured data

 Text files and documents	 Server, website and application logs	 Sensor data	 Images
 Video files	 Audio files	 Emails	 Social media data

**Gartner®**

unstructured data is growing at **50%** year to year

# Motivation for NLP

1. Getting computers to perform useful task with human languages
1. Enables computer interaction
1. Computer modeling of NLP helps us to:
  - a. Understand (other) languages processing in human
  - b. Understand other human cognitive processes

# Use Cases of NLP



## Use Cases of NLP

Google

 tinder

amazon echo

文A

# Natural Language Processing by Market Sector

1

## Autonomous Vehicles

Voice Recognition, Voice Commands

2

## Healthcare

Deep Learning & Data Mining:  
Access Client Information

3

## Social Media & News

Machine Human Interactions

4

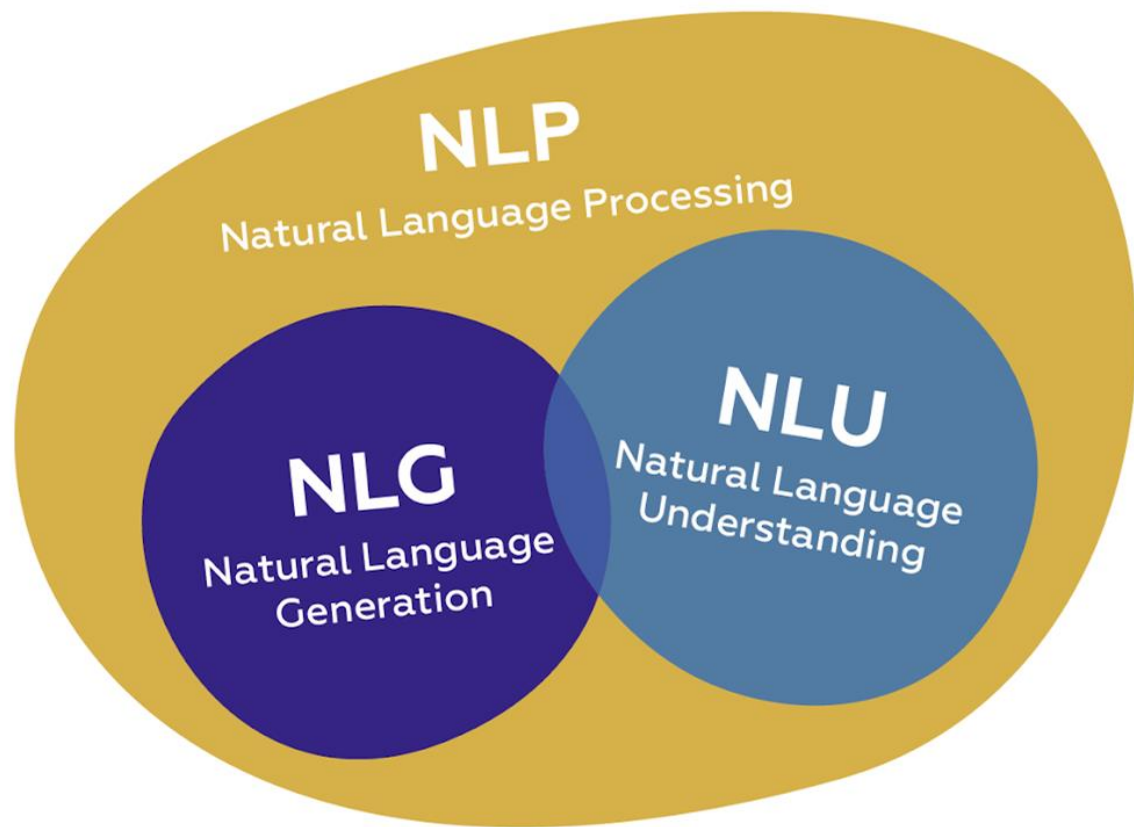
## Banking & Security

Data Mining, Better first response time

5

## People & Culture

How we transcribe information & communicate and interact with one another





# Natural Language Understanding

NLU uses algorithms to reduce human speech into a structured ontology.

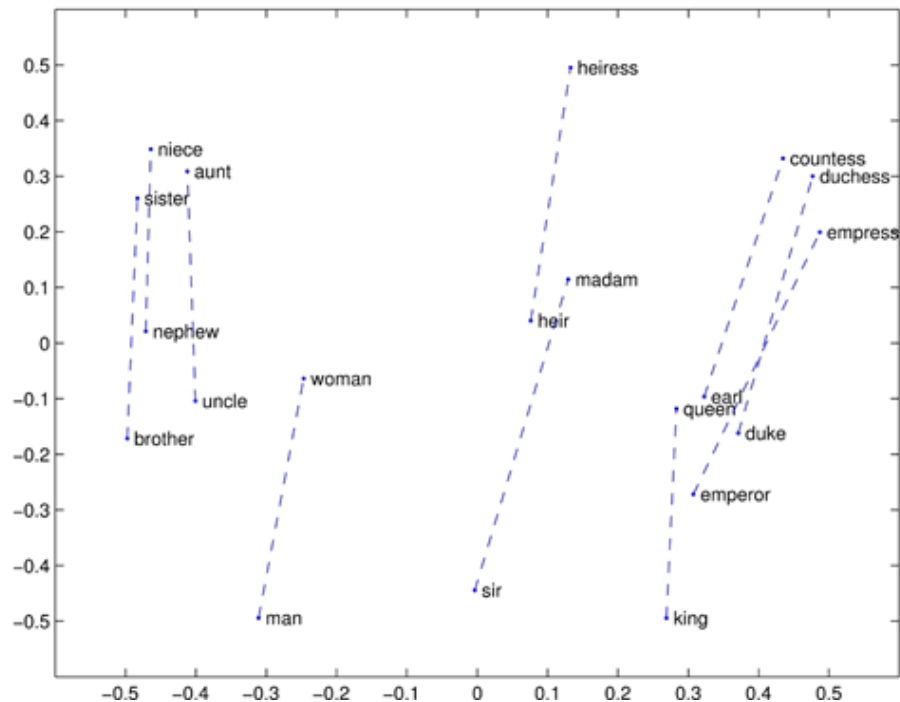
# It's best to view **NLU** as **first step** towards NLP

before a machine can process a language, it must first be understood.



# Natural Language Understanding

- Deriving meaning from natural language
- Imagine a Concept (aka Semantic or Representation) space
  - In it, any idea/word/concept has unique computer representation
  - Usually via a vector space
  - NLU >> Mapping language into this space

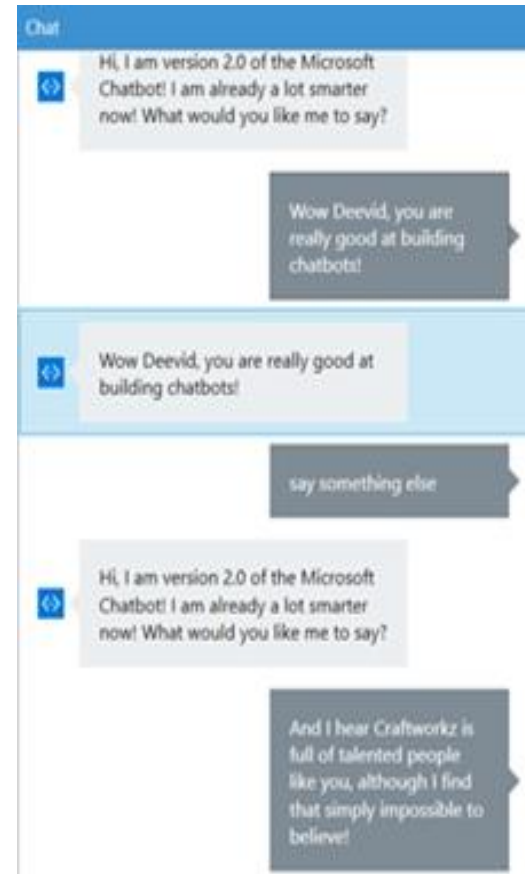


# Natural Language Understanding

NLU uses algorithms to reduce human speech into a structured ontology.








# Natural Language Generation

- Mapping from computer representation space to language space
- Opposite direction of NLU
- Usually need NLU to perform NLG!
- NLG is really hard! 🤖



# NLU Application


- **ML on Text (Classification, Regression, Clustering)**
- Document Recommendation
- Natural Language Search
- Sentiment Analysis
- Text Summarization
- Relationship Extraction
- Topic Modeling
- ...and more!

	Inbox	813
	Junk Email	202
	Drafts	3
	Sent Items	
	Deleted Items	477
	Archive	
	Notes	

# NLU Application

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## People Who Viewed This Item Also Viewed



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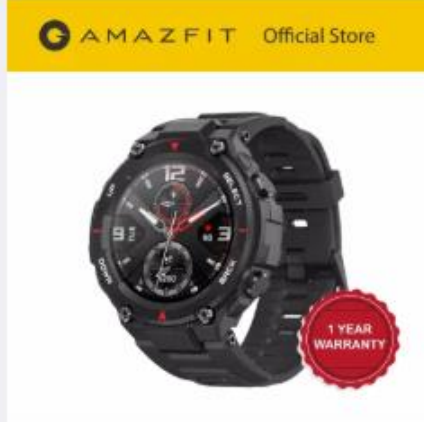
**ROCK BLACK**

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# NLU Application

- ML on Text (Classification, Regression, Clustering)
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**Dandelion API**

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Entity Extraction DemoText Similarity DemoText Classification DemoSentiment Analysis DemoIntegrations

## Sentiment Analysis: detect sentiment and emotions in short texts.


The **Sentiment Analysis API** tells whether the expressed opinion in short texts is positive, negative, or neutral. Given a short sentence, it returns a label representing the identified sentiment, along with a numeric score ranging from strongly positive (1.0) to extremely negative (-1.0).

This demo uses a pre-built model designed to detect expressed sentiment in **product reviews** (mobile apps reviews taken from the iTunes Store).

Choose an app:InstagramPick a random app

Analyze!

review	lang.	score
The new heart update in messages is dumb and annoying. Nobody wants to see hearts float up every time you like a message. Also the way the heart looks now needs to go back to the old design.	en	-0.6
These disgusting pimple popping and skin extraction videos show up on my explore page every single day 90% of the time I open this app. I click "not interested" and it makes no difference. I'm deleting this app. It's disgusting, the "not interested" feature does not work! If anything it gives me MORE things I don't want to see! So many people have this same issue. Why is this such a gross problem?	en	-0.7

Overall sentiment:  
  
Score: -0.2

<https://bit.ly/2LB6W1C>

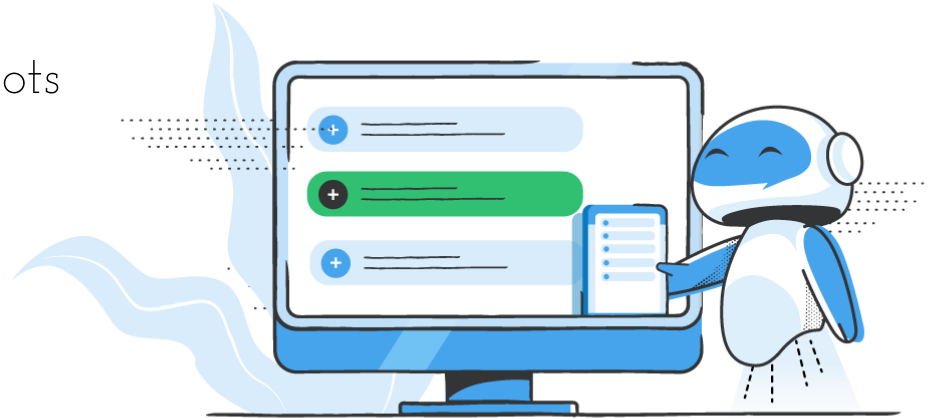


# Natural Language Generation

Natural language generation (NLG) is the use of artificial intelligence (AI) programming to produce written or spoken narratives from a data set.

# NLG Application

- Image Captioning
- (Better) Text Summarization
- Machine Translation
- Question Answering/Chatbots
- ...so much more



# NLG Application: Image Captioning

- Automatically generate captions for images



man in black shirt is playing guitar.



construction worker in orange safety vest is working on road.



two young girls are playing with lego toy.



boy is doing backflip on wakeboard.

# NLG Application: Machine Translation

- Automatically translate text between language

<b>Input sentence:</b>	<b>Translation (PBMT):</b>	<b>Translation (GNMT):</b>	<b>Translation (human):</b>
李克強此行將啟動中加總理年度對話機制，與加拿大總理杜魯多舉行兩國總理首次年度對話。	Li Keqiang premier added this line to start the annual dialogue mechanism with the Canadian Prime Minister Trudeau two prime ministers held its first annual session.	Li Keqiang will start the annual dialogue mechanism with Prime Minister Trudeau of Canada and hold the first annual dialogue between the two premiers.	Li Keqiang will initiate the annual dialogue mechanism between premiers of China and Canada during this visit, and hold the first annual dialogue with Premier Trudeau of Canada.

Example from Google®'s machine translation system (2016)

# Summary

- Natural language processing (NLP) is a sub-field of artificial intelligence that is focused on enabling computers to understand and process human languages, to get computers closer to a human-level understanding of language.

