

# Human Language Technology Department

**Li Haizhou**

Department Head



INVENTING THE FUTURE

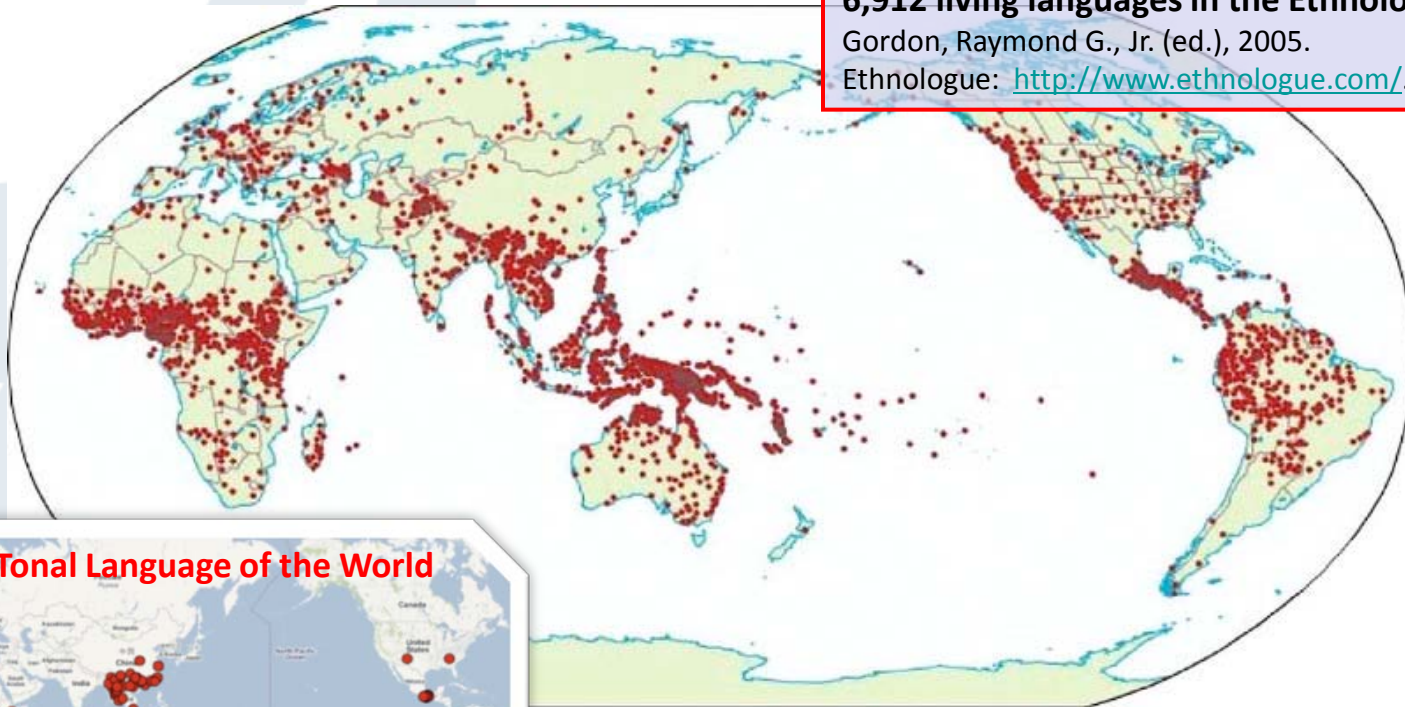
- Advance speech and language technologies for innovative services and products to empower the industry
- Develop enabling technologies for *low-resource Southeast Asian languages* to benefit the society

## Languages of the World

Each dot represents the geographic center of the 6,912 living languages in the Ethnologue database.

Gordon, Raymond G., Jr. (ed.), 2005.

Ethnologue: <http://www.ethnologue.com/>.



## Tonal Language of the World



# Human Language Technology

Speech  
Recognition



Voice Analysis  
& Synthesis



Dialogue  
Technology

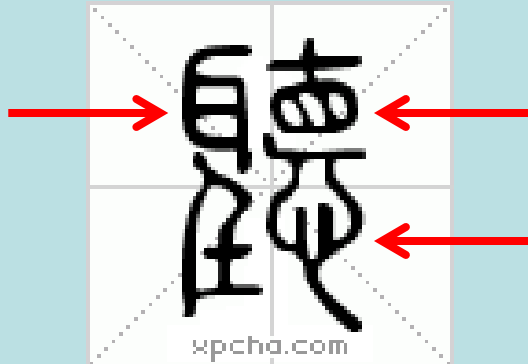


Machine  
Translation





Acoustic  
Modeling  
(the ear)



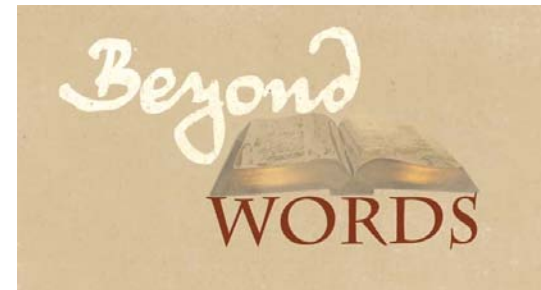
Speech  
Acquisition  
(attention)

Language  
modeling  
(the heart)

Chinese character 'to listen'

- Large Vocabulary Continuous Speech Recognition
- Command & Control
- Spoken Term Detection
- Spoken Document Retrieval

- Speaker Recognition
- Singer Recognition
- Language Recognition
- Accent/Dialect Recognition
- Emotion/Intoxication Detection





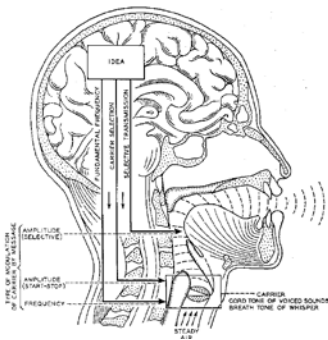
- Speech to Singing Synthesis
- Expressive Speech Synthesis

**Prosody**

**speech**

**Content**

**Timbre**



- Text-to-Speech Synthesis

- Voice Conversion
- Voice Impersonation



Chat Bot

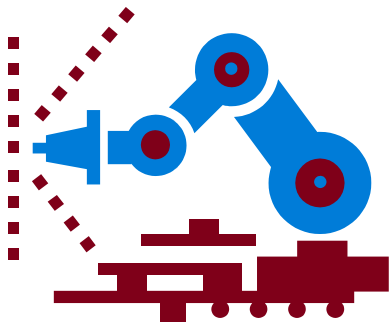


Chat

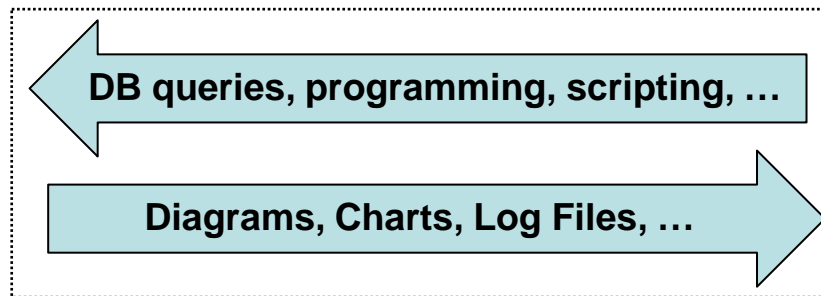


Goal Driven

Robot



Situated Dialogue



Human Operator





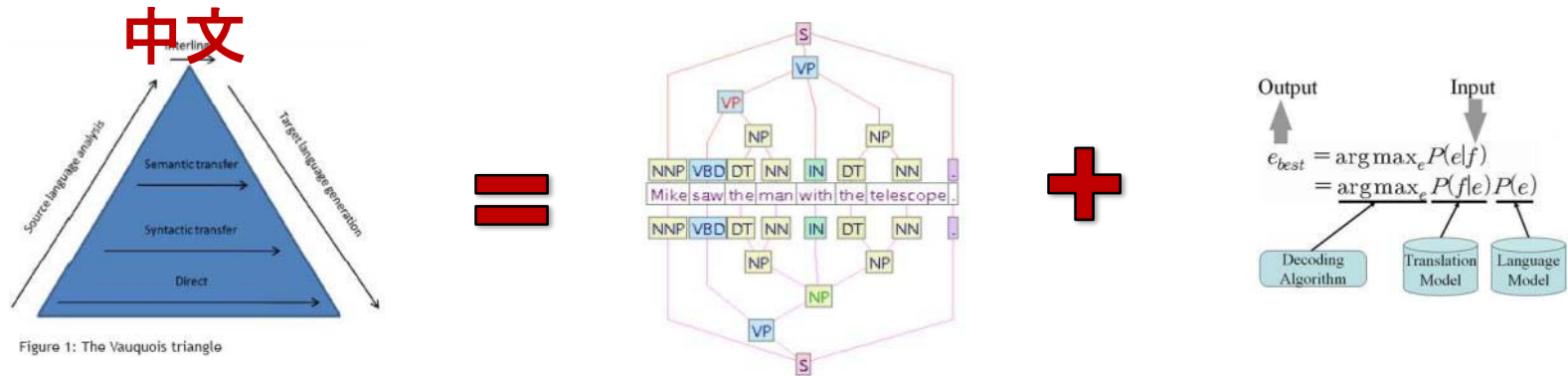
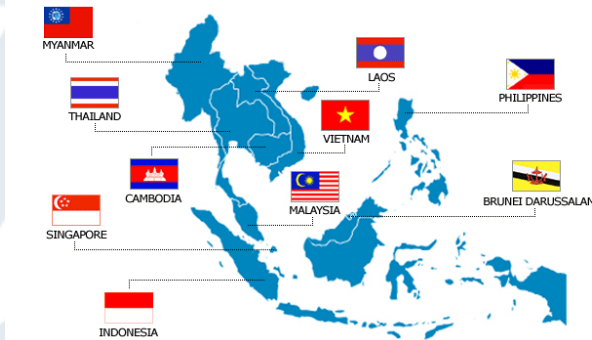


Figure 1: The Vauquois triangle

- Chinese as the pivot language for Asian languages
- Linguistically-motivated syntax-based statistical approach



home.

THE STRAITS TIMES THURSDAY, JULY 30 2009 PAGE B5

## Speak and be heard in 9 languages

Instant translator aims to break language barrier in Asia-Pacific

By Sze Wen Loo

It could be about three years before tourists, businessmen and students can communicate with native speakers of languages like Hindi, Vietnamese or Korean, even if they don't know a single word of those languages.

That's thanks to a special speech-to-speech translation software, which can translate nine languages, namely Malay, Hindi, Japanese, Vietnamese, Korean, Bahasa Indonesia, Thai, Mandarin and English.

Led by Japan, eight countries, including Singapore, are collaborating on the project.

At least, it's being beaten down by researchers who have written an instant translation program to be used on cell-phones and other devices.

The aim is to overcome the language barriers in the Asia-Pacific region, Dr Li said.

Singapore was in charge of the algorithm and selecting the program to translate the Malay language. Researchers recruited people to read all newspaper articles, so the artificial intelligence in the program would learn the language and recognise different words and intonations.

The project's first phase is to make the various languages "speak" to one another - called yesterday.

The next phase will focus on bringing more member countries - and languages - on board. The group will also work with telecommunication companies and other parties to commercialise the technology for use by the public, which is likely about three years away, said Dr Li.

Four operators may find it particularly useful, said Mr Reth Li, a spokesman for SA Times.

swlhigh.com.sg

HOW IT WORKS

1. User speaks into the handset on a telephone or personal digital assistant and speaks in Malay.
2. The speech is transmitted to eight servers in Asia.
3. The program scans the Internet text and his friend hears what he said. The whole process takes only one to two seconds both ways.

The program translates the text into English, the other languages, and then into the target language, for example Japanese.

The eight participating countries are Singapore, Japan, China, South Korea, Thailand, Indonesia, Vietnam and India.

Simply speak your own language, say Malay, into the handset, such as a telephone or personal digital assistant, and the software does the rest.

The project is the first of its kind that deals with Asian languages, said the project team leader for Singapore, Dr Li.

The project started in Japan in 2006 with six members. Last year, the Institute of Information Research, an Agency for Science, Technology and Research (A\*STAR) facility, joined the project.

Baidu-I<sup>2</sup>R Research Centre - Baidu's first overseas research laboratory  
***“Baidu and I<sup>2</sup>R set up joint laboratory in Singapore”, A\*STAR Press Release***  
***23 February 2012***

- Speech Information Processing
  - Asian Language Processing
    - Multimedia



Baidu 翻译



百度翻译APP





# In the News

**News**

## Using your voice to lock your phone

Researchers say each voiceprint is unique, making it hard for imposters to copy. OO GIN LEE reports

**A**ll you have to do is speak to lock and unlock your phone. High-tech smart phones from a Singapore research institute have made what is believed to be the world's first smartphone that can be unlocked by the owner's voice.

Launched only for the China market last November, the Lenovo A586 has a unique feature in its security settings. Like most Android-based smartphones, users can lock the screen using a PIN number, password or a pattern.

Dr Li Huihui, a senior researcher with the Institute of Information Research's Institute of Information Research (IIR), said: "Each person has a unique voiceprint, like the way we have fingerprints."

This unique voiceprint is formed from a variety of factors including the length of an individual's vocal chords as well as the amount of space in a person's mouth. When the voice signal is captured, the software extrapolates backwards to determine these unique identifiers in a person, added Dr Li.

The phone should still unlock if the owner makes a few minor errors but it will remain protected against imposters.

The voiceprint smart was developed here at the Institute of Information Research's Institute of Information Research (IIR). The successful commercialisation of the voiceprint project marks a major milestone for the centre, which was set up last year. This centre is the China Internet search giant's first overseas joint research facility.

The Lenovo A586 makes use of Baidu Cloud, a special version of the open source Google Android mobile operating system that is developed by Baidu.

Baidu spokesman Mr Chen Yu said the voiceprint technology has become a very important function of Baidu Cloud, and that his company will "embed this technology as much as possible" in future products.

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**TECH TOONS**

Safe, that's occupied. Smartphone is using it as cloud computing.

**BBC NEWS TECHNOLOGY**

Home UK Africa Asia Europe Latin America Mid-East US & Canada Business Health Sci/Env

18 December 2012 Last updated at 23:41 GMT

1.5K Share

**Speak to unlock**

No more passwords, pin codes to remember, or finger swiping - you could soon be unlocking your smartphone with your vocal chords.

**facebook**

Email or Phone  Password

☐ Keep me logged in

[Forgot your password?](#)

**Lee Hsien Loong is on Facebook.**

To connect with Lee Hsien Loong, sign up for Facebook today.

**Lee Hsien Loong**

99,589 likes · 18,766 talking about this

Public Figure

This is Prime Minister Lee Hsien Loong's Facebook page. It is maintained by the Prime Minister's Office, Singapore. Updates by Mr Lee are signed LHL.

About

Photos Videos Likes House Rules

99,589

HOUSE RULES

Loong shared a link.

**PRESIDENT'S SCIENCE AND TECHNOLOGY AWARD**

Guest of Honour  
President Tony Tan Keng Yam  
25 September 2013


Startup companies in Singapore history describes three smartphone check phones to replace PINs bread maker

www.blk71.com)

experts to importantly nes and startup and

ital signs at one using your at makes ready-

**A\*STAR I<sup>2</sup>R**



Thank you!  
<http://hlt.i2r.a-star.edu.sg>