AI to Bridge the Borders: Multilingual Robots, Wikipedia and Tokyo 2020 Tourist Guides

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Who am I?

PhD, UMIST (University of Manchester)

Research areas:

natural language processing, linguistic annotation,
spoken dialogue systems, social robotics

IBM UIMA Innovation Award, 2008

Books:

*Introduction to Linguistic Annotation and
Text Analytics*, 2009

Dialogues with Social Robots (with K. Jokinen), 2017

Overview

WikiTalk and Wikipedia

Why Wikipedia?

Multilingual WikiTalk

SamiTalk: Robots for endangered languages

CityTalk

Robots for tourists

WikiTalk and WikiListen:

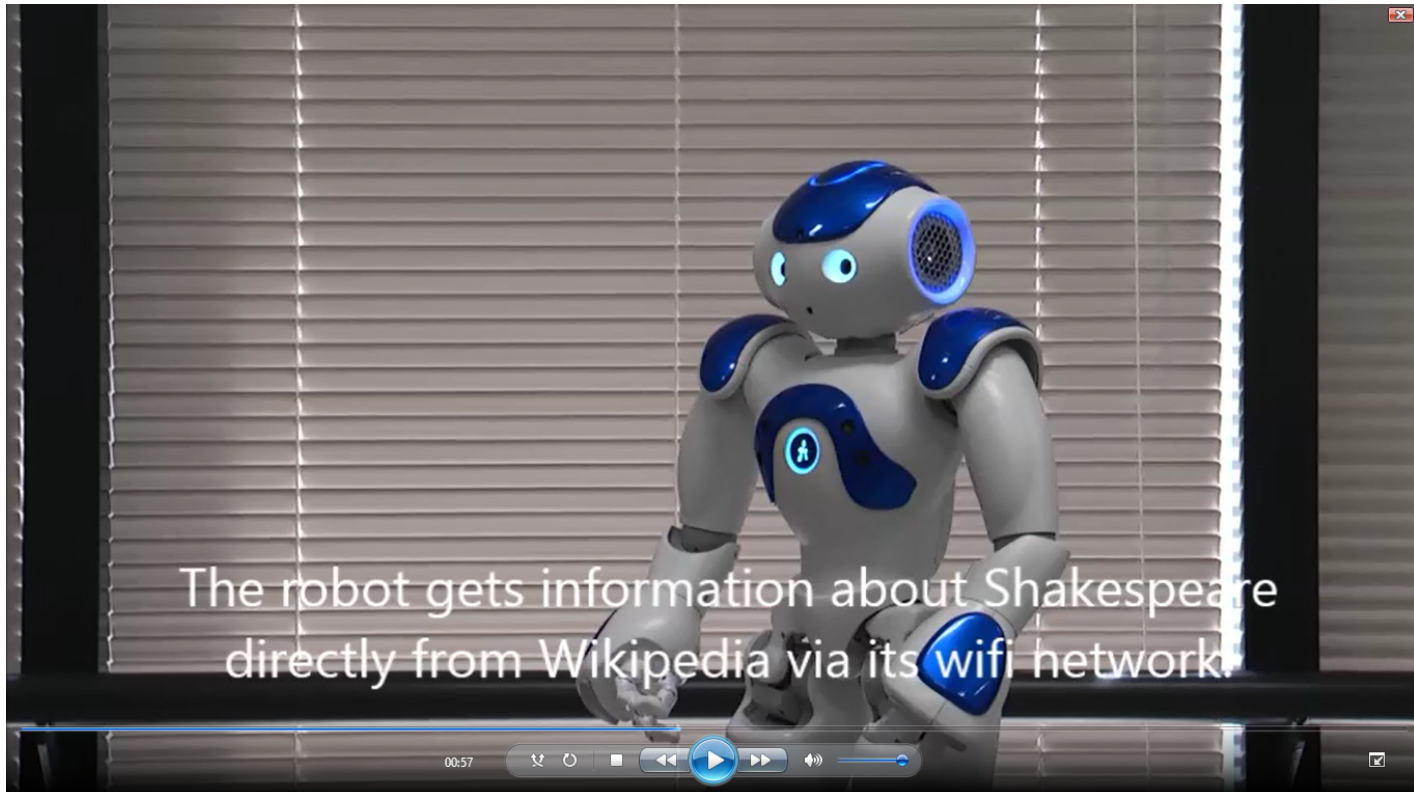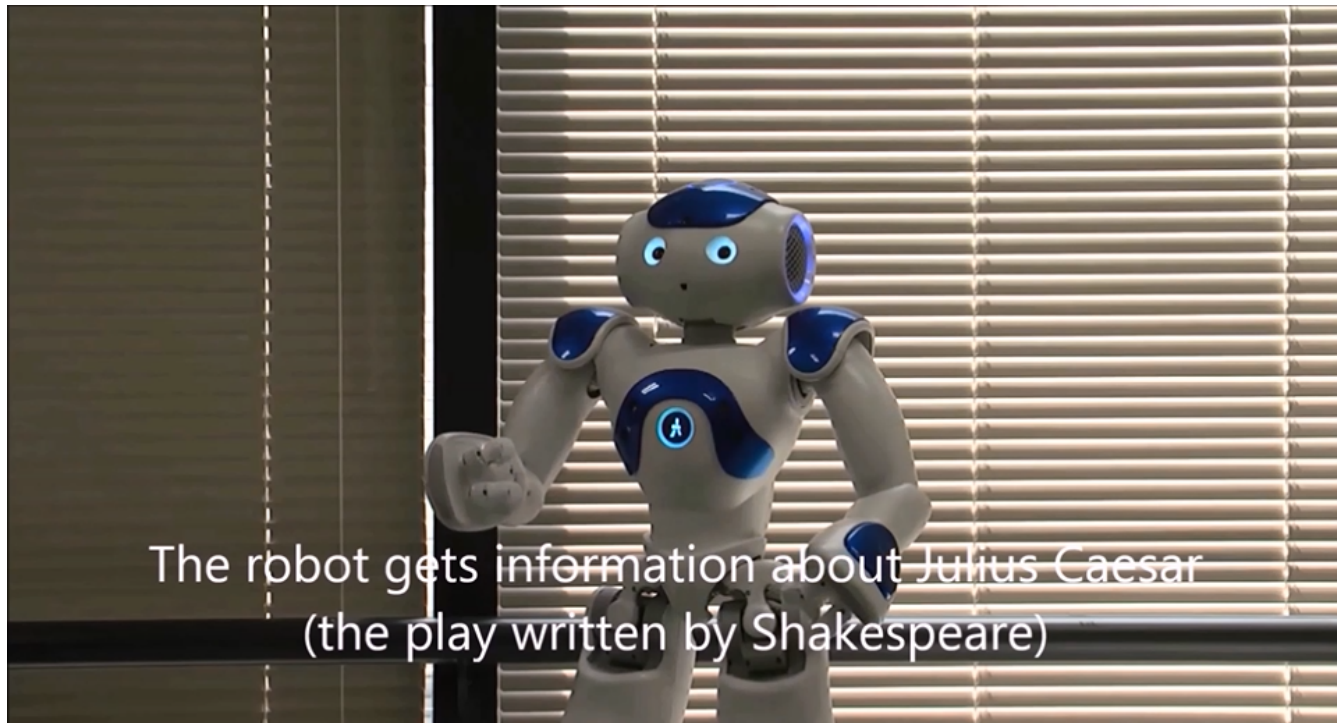Robots that listen and "join in" a conversation

WikiTalk

WikiTalk and Wikipedia

- By connecting talking robots to Wikipedia, WikiTalk enables robots to talk fluently about thousands of topics using the latest information from Wikipedia.
- WikiTalk allows smooth shifts from the Wikipedia topic it is talking about to related topics just by saying the name of the related topic.
- WikiTalk is multilingual and already works in English, Finnish and Japanese using English, Finnish and Japanese Wikipedias.
- The robot switches languages smoothly if you say "English", "Suomi" or "Nihongo".

WikiTalk: Getting Started

The robot gets information about Shakespeare directly from Wikipedia via its wifi network.

Context in WikiTalk: *"Julius Caesar"* (Shakespeare Play or Roman General?)

The robot gets information about Julius Caesar
(the play written by Shakespeare)

https://www.youtube.com/watch?v=NkMkImATfYQ

Why Wikipedia? (1)

- Wikipedia has information about many topics
  - English Wikipedia: over 5 million articles
  - Japanese Wikipedia: over 1 million articles
  - Finnish Wikipedia: nearly half a million articles
- Wikipedia articles include ready-made text
- Robots can use texts to speak fluently
- Robots can talk at length, with many details

Why Wikipedia? (2)

- Wikipedia information is trustworthy
  - Wikipedia articles are written by humans
  - Wikipedia articles are edited by other humans
- Wikipedia has world-wide community base
  - Wrong information quickly corrected by others
  - Extreme views moderated by community
- Robots should not tell wrong information
- Robots should not say offensive views

Why Wikipedia? (3)

- Wikipedia has information in many languages
  - Over 300 different languages
  - Even small languages have their own Wikipedias
- Robots can speak many languages
  - Nao robot can speak about 20 languages that can be purchased from robot manufacturer
  - Other languages can be added by projects
  - Wikipedias are available for all these languages

Multilingual WikiTalk

- English WikiTalk
  - All Nao robots have English speech
- Finnish WikiTalk
  - Needs Finnish speech, Finnish Wikipedia
- Japanese WikiTalk
  - Needs Japanese speech, Japanese Wikipedia
- Other languages
  - Need speech and Wikipedia for each language
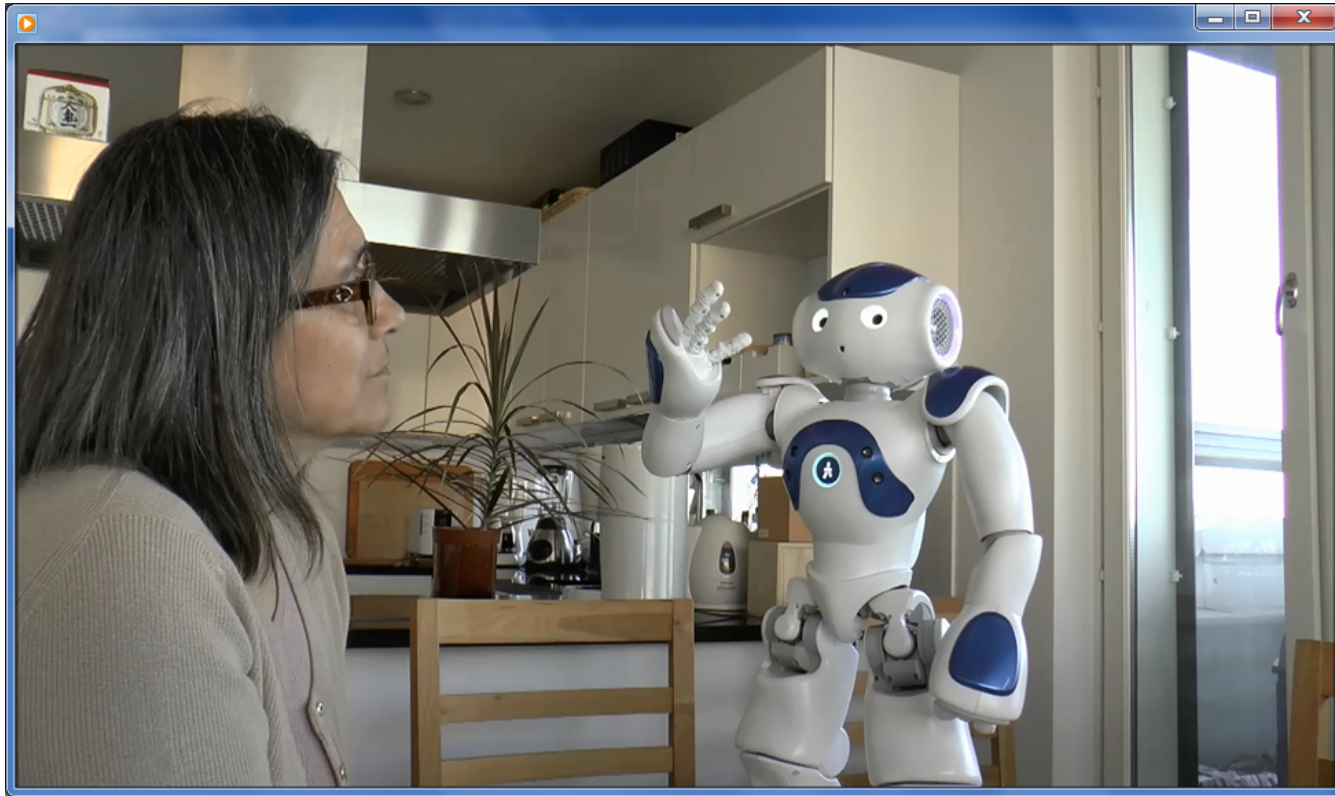
EU Robotics Week 2014 in Helsinki

G. Wilcock, Kyoto University

"This robot speaks Finnish and
can tell you what a robot is"

(Helsinki newspaper headline)

http://www.iltalehti.fi/iltvdigi/201411290140927_v4.shtml

G. Wilcock, Kyoto University

Finnish WikiTalk

https://www.youtube.com/watch?v=q0aSgPns4dE

G. Wilcock, Kyoto University

Multilingual WikiTalk:
English and Japanese

https://www.youtube.com/watch?v=NkMkImATfYQ

G. Wilcock, Kyoto University

SamiTalk: Towards Robots that Speak Endangered Languages

The robot is speaking North Sami, the most widely-spoken Sami language.

https://drive.google.com/file/d/0B-D1kVqPMlKdeXhXbnlUMmtYcU0

The Sami Languages in 2012
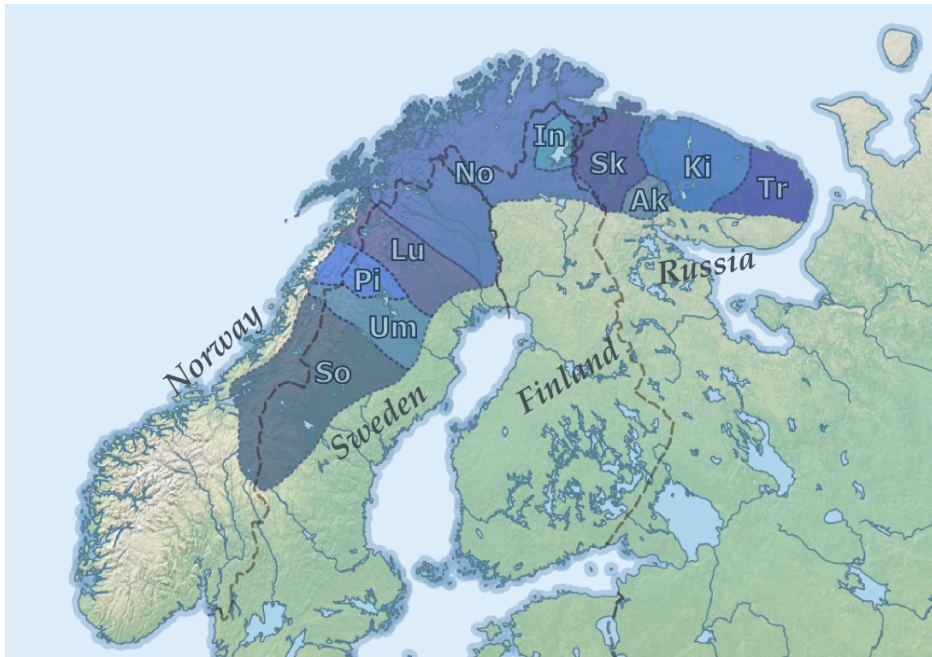
Map	Language	Speakers
So	South Sami	500
Um	Ume Sami	10
Pi	Pite Sami	40
Lu	Lule Sami	1000
No	North Sami	30000
In	Inari Sami	350
Sk	Skolt Sami	300
Ak	Akkala Sami	0
Ki	Kildin Sami	700
Tr	Ter Sami	10

CitiTalk: Robots that Tell Tourists about Hotels and Restaurants

Would you like an expensive, medium, or cheap hotel?

https://www.youtube.com/watch?v=OhjIJp8XBEA
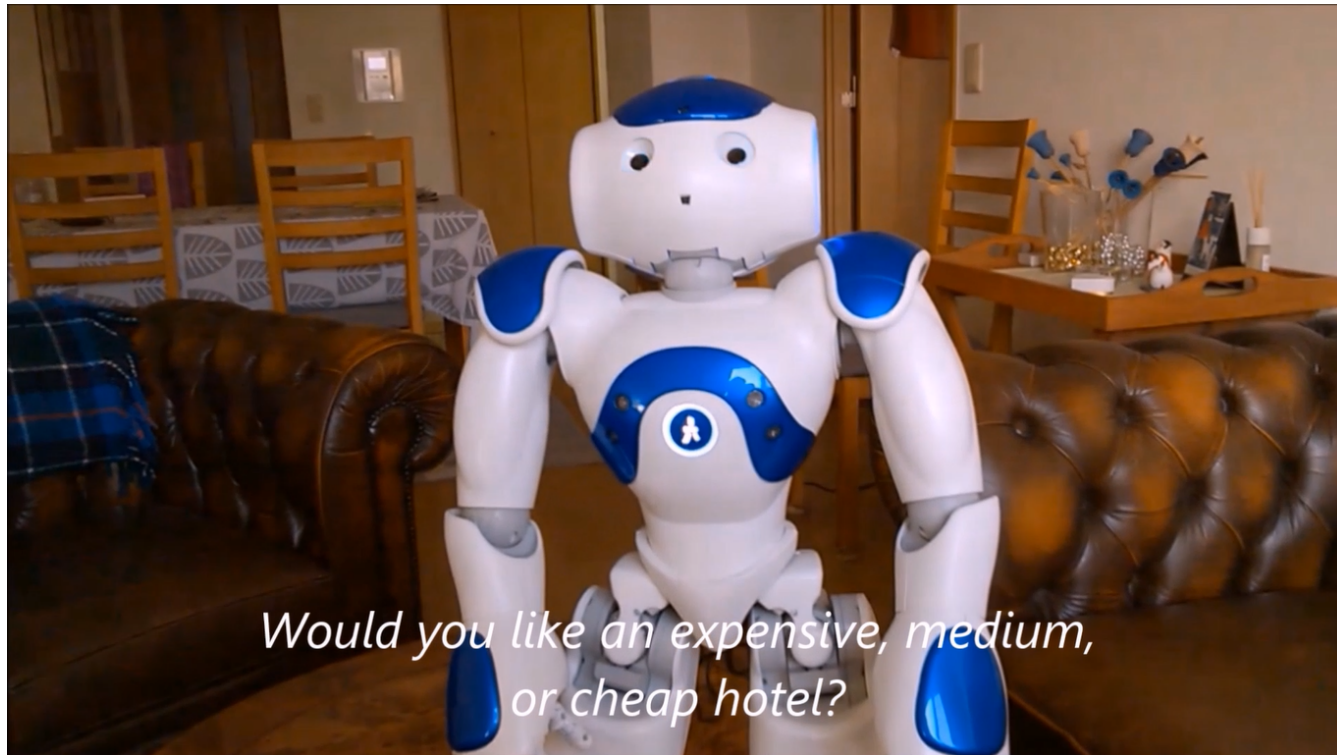
CitiTalk and PyDial

- PyDial is an AI-based dialogue research toolkit from University of Cambridge
- CityTalk uses
  - PyDial dialogue modules
  - Robot speech modules
- CityTalk adds
  - Hotels and restaurants for Tokyo 2020
- (Tokyo Waterfront area)
- A new natural language generator

Next Steps: WikiListen

- Wikipedia-based listening
  - Wikipedia reference linking (*wikification*)
  - Open-domain named entity recognition
- Integrate with new speech recognition
- Wikification more practical and natural than syntactic parsing or General AI

Open-Domain Listening Robot

- Wikipedia-based Listening Robot
  - Recognizing any topic (open-domain)
  - Even new community-created topics
- Wikipedia-based Listening + Talking Robot
  - Able to "follow" topics in human conversation
  - Able to "join in" conversation with correct topic
  - Extends human-robot interaction capabilities