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## Understanding Humans and the Real World Using Fast and Accurate Language Technologies

Humans think with languages, and verbalize their experiences in the real world to convey them to others. Aiming to observe humans and the real world from text and aiding our communication and language understanding, our laboratory studies on **natural language processing** that computerizes text efficiently and accurately with computers. The pursuit of such technologies leads to **computational linguistics** that reveals the mechanism of languages and human intelligence.

<http://www.tkl.iis.u-tokyo.ac.jp/~ynaga/index.en.html>

### Observing human mind from text

We attempt to observe inherently unobservable human mind from their words. Specifically, we have so far presented a method of inducing values from what people write. Using a neural network, we provide a mathematical modeling of interpersonal variations of word meanings (Fig. 1). We have just undertaken a research project that aims to observe and remedy physical and psychological conditions of speakers from a conversation with a chatbot.

### Knowing the real world from text

Leveraging people who post their experiences in the real world as social sensors, we develop a system that “reads” social situations from massive microblog posts. We have so far invented a method of adaptively speeding up text analysis (syntactic parsing) for “bursts” in a text stream, by exploiting redundancy in text. We are working on discovering and typing emerging entities and compiling acquired knowledge from time-series text (Fig. 2).

### Aiding human communication

We study on machine translation and dialogue systems that aid human communication. We have so far developed a human-like chatbot that elicits the interlocutor’s emotion, and multimodal machine translation and dialogue system based on non-verbal information such as time, user profiles, and images (Fig. 1). We are also working on multilingual models, text simplification and grammatical error correction to resolve language barriers.

Our laboratory emphasizes on transferring research outcome to social implementation. We have so far implemented trend analysis (Fig. 4) on accumulating social big data (Fig. 3). We are now implementing our chatbot on smart speakers for supporting healthcare of the elderly. We welcome students who are willing to design novel and important NLP tasks rather than solving classic tasks on worn-out datasets as well as those who want to study languages from scientific perspectives.

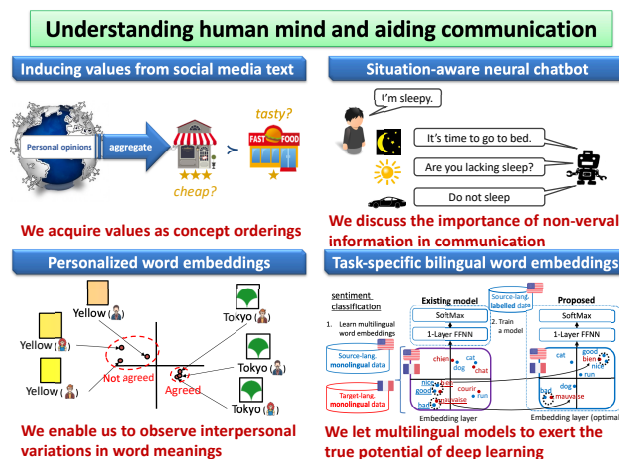


Fig. 1: Observing humans and aiding communication.

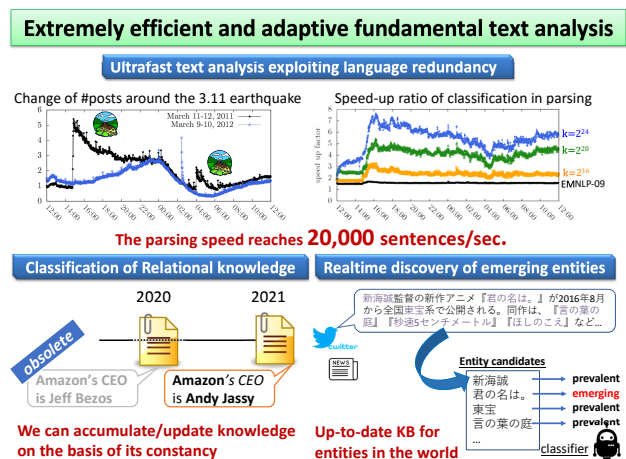


Fig. 2: Extremely fast and adaptive fundamental text analysis.

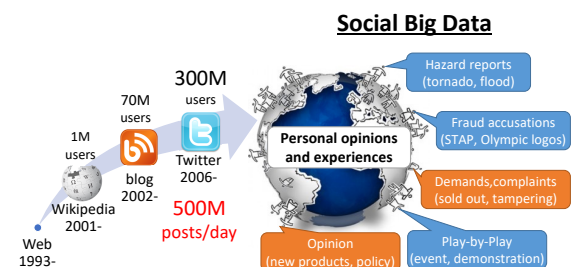


Fig. 3: Social Big Data.

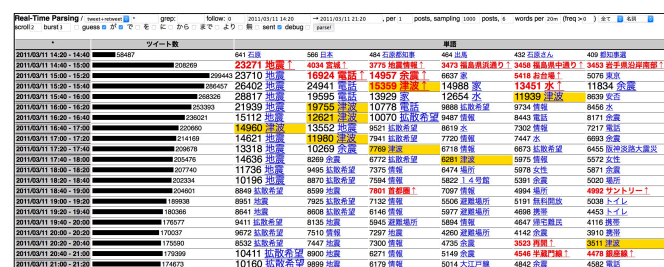


Fig. 4: Trend analysis on the 3.11 Earthquake.

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