

Breaking the Language Barrier

Automatic Simultaneous Translation Service for University Lectures

Academic lectures and technical presentations often provide high-quality contents while addressing an audience speaking various mother tongues. As a result of the language barrier between the person speaking and the interested listeners, many lectures and presentations do not reach the complete audience.

Lectures at Karlsruhe Institute of Technology (KIT) are predominantly held in the German language. Hence, foreign students wishing to study at KIT have to learn German until they reach the high level required for understanding scientific and technical presentations of complex content. For this reason, foreign students mostly attend preparatory German courses of one year duration. However, experi-

ence shows that knowledge of the German language after one year of learning is not sufficient to follow German lectures and to speak on the level needed.

As human interpreters to overcome the language barrier would be too expensive, we propose our automatic simultaneous lecture translation system to solve the problem. For this purpose, we apply techniques of spoken language translation (SLT). These techniques combine automatic speech recognition (ASR) with machine translation (MT) and other auxiliary components for the system to simultaneously translate spoken German into English on a permanent basis.



Automatic simultaneous lecture translation: A service for foreign students at KIT.

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Lecture Translator

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Keynote Leopoldina - Alexander Waibel V/H

German (de) roblem ist dabei immer die Kommunikation. Wie kommunizieren wir miteinander. Als ich anfing, als Student war das einfach nur eine Frage. Wie bekomme ich etwas in den Computer rein überhaupt. In der Zwischenzeit ist das deutlich komplizierter geworden.

Wir haben also hier Roboter, die mit in der Interaktion beteiligt sind. Wir haben Menschen, die mit Menschen sprechen. Wir haben Maschinen und Daten und Internet, Informationsquellen, bei denen überall diese menschliche Information in vielen verschiedenen Weisen zur Verfügung stehen. Und nicht notwendigerweise wir in Programm verständlicherweise vorliegen. Das heißt, es ist nicht nur noch Text, sondern wir haben Bilder.

Wir haben, wie die, wir haben, taktile Information. Wir haben Roboter. Nun, wie kommt also eine Maschine, damit klar, dass sie hier die Kommunikation von...

English (en) and thus, there are opportunities here. And it is a science that has been a science for many years, and also many years, and for the fellow member of the election, to use artificial intelligence in a way that it can actually solve practical problems.

Communication is always an important problem. How do we communicate with each other? When I started as a student, we just asked a question. How do I get something into the computer at all? In the meantime, this has become much more complicated.

So we have robots involved here that are involved in interaction. We have people talking to people. We have machines and data and the Internet, sources of information, where all of this human information is available in many different ways. And not necessarily we are understandably available in the program. That is, it is not just text, but we have images. We have like this, we have tactile information. We have robots. Well, how come...

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The result of the speech recognition and translation is permanently displayed on a webpage (lecture-translator.kit.edu).

The system works with the help of a cloud-based service infrastructure. The speech of the lecturer is recorded by a local client and transmitted to the infrastructure. A service then administrates data flow through the ASR, MT, and other components. The final result is accessible via a webpage (lecture-translator.kit.edu) that permanently displays the result of speech recognition and translation.

In addition, the system archives the lectures and allows for a later search via text queries. The automatic lecture translator has been installed as a permanent service in various lecture halls of KIT since 2012.

The speech recognition part of the lecture translation can also be used to provide real-time transcripts of speeches and lectures, e.g., in the form of subtitles. This makes content better accessible, e.g., for hearing impaired or for audiences in public spaces, in which they cannot listen to the sound of broadcasts but can read the subtitles on the screen. For the European Parliament, we implemented a proof-of-concept in which we provided real-time subtitles of plenary sessions of the European Parliament in English, French, German, Italian, and Spanish via a website.

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