

# Breaking down the barriers of human-computer communication

August 16 2018

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Many of us regularly ask our smartphones for directions or to play music without giving much thought to the technology that makes it all possible – we just want a quick, accurate response to our voice commands.

With more businesses using artificial intelligence for various applications and to engage with consumers, the industry is working to make those interactions more human-like, said Zhu "Drew" Zhang, associate professor of information systems and Kingland Faculty Fellow in Business Analytics in Iowa State University's Ivy College of Business. Zhang is contributing to that effort by improving how machines, such as smartphones and computers, understand and generate language.

"Computers were not built to handle the ambiguity of human language," Zhang said. "We have subtle ways of saying things with a similar meaning, using different words and linguistic structures and that is difficult for computational models to understand and mimic."

Zhang says in business scenarios, for example, consumers can express similar opinions with very different linguistic forms:

- First statement: Nothing about this camera is exciting.
- Second statement: I don't like this product.

Helping machines detect paraphrasing is one of the greatest challenges in the field of natural language processing. Zhang says attempting to code the overwhelming volume of linguistic rules and associated exceptions would be dauntingly unrealistic. Instead, researchers and industry leaders are using machine learning methods, which utilize large amounts of data to teach computers to recognize and understand language patterns in real use.

## **New model well received**

Zhang and Amulya Gupta, an ISU graduate student in computer science, developed a new computational model based on deep learning to improve accuracy, precision and recall of detecting statements similar in meaning, but different in wording, structure and length. They tested the

model using 50,000 sample sentence pairs, similar to the above example, and found it to be 80 to 85 percent accurate.

That is encouraging, but Zhang says it only addresses "a small slice of a larger problem" in the field of [artificial intelligence](#). He and Gupta recently presented a paper on their work at the Annual Meeting of the Association for Computational Linguistics in Australia. Zhang says it is one of the top conferences for industry players, including Google, Microsoft and Amazon, as well as leading academics working on this issue.

"Our research was very well received," Zhang said. "We talked with people at Microsoft and JD, the largest e-commerce company in China, and they saw potential in our work."

## **Making machines feel human**

Zhang says the goal is to continue improving the model to make it more applicable to a variety of [business](#) scenarios. Customer service bots are a good example. Instead of pressing buttons from a menu of options when calling to refill a prescription, most consumers still prefer talking to a person. Zhang says it is not only important the bot sound human, but it must have the flexibility to adapt to individual callers.

"This kind of capability adds a human touch," Zhang said. "The ability to manipulate languages is what makes the bot or other machines feel human."

**More information:** To Attend or not to Attend: A Case Study on Syntactic Structures for Semantic Relatedness. [acl2018.org/paper/1321](http://acl2018.org/paper/1321)

Provided by Iowa State University

Citation: Breaking down the barriers of human-computer communication (2018, August 16)  
retrieved 4 May 2024 from <https://phys.org/news/2018-08-barriers-human-computer.html>

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