

I, robot

Can you translate without understanding the meaning? After all, that's what machines do. Michael Farrell gets his students/us doing the same thing. Try it for yourself...

You'll have read it all over the place by now: machine translation (MT) and generative artificial intelligence (GenAI) work by identifying patterns and reproducing them. They don't really understand language. They just replace tokens (words or subwords) with numeric vectors, perform various arithmetic operations on them and calculate probabilities at an amazing speed.

As the English linguist John Rupert Firth put it in 1957: 'You shall know a word by the company it keeps.' This concept is fundamental to various natural language processing techniques, including token embeddings and the transformer model. Token embeddings are the dense vectors that represent words or subwords, whose numerical elements are calculated according to the surrounding tokens in the training corpus. Transformers use attention mechanisms to weigh the importance of each token based on the vicinity of other tokens in the input sequence. Both of these are found in state-of-the-art neural machine translation systems – and, of course, GenAI.

And yet as we watch GPT-4 or Gemini pause for a second, then spit out one word after another, it is hard to help ourselves feeling that they are thinking, just as we do, and composing a reply based on reasoning and logic. We humans are hardwired to recognise and interpret human behaviour, and this predisposition leads us to project familiar patterns onto our surroundings. But we need to unlearn this tendency.

To try and convince my postgraduate students at the IULM University in Milan that a machine can translate without knowing anything about language or understanding a word of the sentences you give it, I assign them two fairly simple puzzles for homework at the end of their first lesson on machine translation and post-editing. These are designed to get the students 'thinking like machines'.

Puzzle number 1

Let the translation of the Upsilonese sentence

'Yyx yyw yyv' yyu yyt yys yyr yyq.

be the following sentence in Betaese:

'Bbc Bbd' bbe bbf bbg bbh.

And let the translation of the Upsilonese sentence

Yyp Yxy yxx yxw yxv yxu 'Yxt yxs Yxr'.

be the following sentence in Betaese:

Bbi Bbj bbk bcb bcc 'Bcd bce Bcf'.

What is the Betaese translation of the Upsilonese sentence below?

'Yxt yxs Yxr' yyu yyt yys yyr yyq.

Puzzle number 2

Let the translation of the Alphaese sentence

Aab aac aad aae aaf aab aag.

be the following sentence in Zetaese:

Zzy zzx zzw zzv zzu zzt.

And let the translation of the Alphaese sentence

Aab aac aah aae aai.

be the following sentence in Zetaese:

Zzs zzt zzq zzv zyz.


What is the Zetaese translation of the Alphaese sentence below?

Aab aac aah aae aaf aab aag.

In each puzzle, the students are given a mini bilingual corpus consisting of two aligned sentence pairs. They are then asked to translate a new sentence which is not included in the corpus by applying Firth's principle and observing the 'company' each word 'keeps' in the 'training' data.

All will be revealed...but not quite yet

Do these puzzles demonstrate that, given enough examples (an enormous bilingual corpus for instance), it is always possible to translate accurately between two languages that you do not know without understanding the meaning of the sentence you need to translate? In other words, is all you need a large enough language model to translate everything perfectly?

The answer is no, they don't. But I'm not going to explain why not here. For that, you will have to wait until the next issue of the *Bulletin*, where I will give the correct solution to these two puzzles, which I think you might find surprising. And of course I will tell you why humans cannot be done without. 



Michael Farrell is primarily a freelance translator and transcreator. Over the years he has acquired experience in the cultural tourism field and in transcreating advertising copy and press releases, chiefly for the promotion of technology products. Being a keen amateur cook, he has also translated texts on Italian cuisine. In addition, he is an untenured lecturer in post-editing, machine translation and computer tools for translators at IULM University, Milan, Italy; the developer of the terminology search tool IntelliWebSearch; a qualified member of the Italian Association of Translators and Interpreters (AITI); and a member of the Council of Mediterranean Editors and Translators (MET).