Talking the talk: speech recognition technology proves a perfect fit for hospital's IT strategy

Speech recognition technology has been around for years. But developing software that works reliably with medical terms in a language only spoken by 5.3 million people? For Dr Finn Mathiesen, it's not all just talk

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With busy schedules and high caseloads, it has always made sense for doctors to dictate patient records rather than type them. For years, this time-consuming task has fallen to secretaries. But with technology now offering alternative solutions, is manual transcription increasingly becoming an anachronism?

Dr Finn Mathiesen, radiologist and neuroradiologist at Vejle Hospital in Denmark, certainly thinks so. For the past nine years, he has pioneered speech recognition at the hospital, where he is the Chief Medical Informatics Officer in charge of approving all IT equipment related to clinical work. Working in partnership with a Philips distributor, he has developed the first automated medical transcription system in Danish. Starting out with just two users – including himself – in the radiology department, the system has been so successful that the entire hospital and several others in the group now rely on it for case note transcriptions.

"The big advantage of having online speech recognition in a hospital is, of course, that all information is available all the time anywhere," explains Dr Mathiesen. "So if you have a patient who was admitted to the hospital at two o'clock at night, you do the paperwork on the system right away, and at three o'clock at night the nurse in the ward can read what this is about and what medicine was prescribed and everything else, because it's there already."

It's good to talk

Dr Mathiesen first came up with the idea of using speech recognition after noticing problems with the transcription workflow. "We had a 12-day answering time on the outpatient clinic, which was absolutely not satisfactory," he recalls.

After trying some partially successful solutions – including using long-distance private transcriptions secretaries and organising quiet transcription rooms away from telephones – he hit upon the idea of speech recognition. What Dr Mathiesen was looking for was a system of instant transcription. In that way doctors could dictate their patient notes and then electronically sign it off within minutes, while the case was still fresh in their minds.

"If you look at speech recognition that you can buy from IBM or Microsoft, for instance, you have systems that understand everyday languages," he says. "But the problem is that people speaking everyday languages don't need speech recognition. They aren't writing anything."

It was at this time, in 2001, that he came across the SpeechMagic system. SpeechMagic, produced by Philips and originally developed in Vienna, has the potential to "specialise" in certain areas. "You can't have one common speech recognition language because you need to have all the details," says Dr Mathiesen. "So what the SpeechMagic system does is take context from different professions."

He adds: "It's doing a kind of retrograde engineering to find the context – it takes out some normal text and then it's just looking at possibilities."

SpeechMagic needs a specific module to understand the context of specialist subjects. So, in 2001, the hospital made a deal with a local Philips distributor, Max Manus, to develop a module for understanding radiology in Danish. At the time, nothing similar existed in any Nordic language. Key to the project was one crucial detail: Vejle Hospital already operated on an entirely digital case note system.

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"Our hospital is totally digital, so we don't have any paper left. And we have been working very hard on that for the last 15 years," explains Dr Mathiesen.

Having a digital record enabled Dr Mathiesen and Max Manus to develop the radiology module. "What we did was, we took out all the words that we had said in our radiology department for a two-year period," he says. "That was 80 million words. And we had the text of those."

The transcriptions were sent to Vienna where an artificial intelligence system was used to "data mine" the words and learn the context in which they were used. Dr Mathiesen explains: "The AI makes a context list of the words. It's calculating the probability of the words occurring together in sentences. And it cannot misspell because it has taken the word from our lists."

The system was also trained to understand common Danish language by having 200 people from across Denmark read text from newspapers and analysing this for the sounds that make up the Danish language (interestingly, according to Dr Mathiesen, Danish only consists of 43 different sounds).

Dr Mathiesen says: "We got a first version of the program in 2001 and used it with just two doctors for about a year until we were satisfied with the recognition. We have used it in the radiology department since 2002. We have had no secretaries writing for the last eight years."

Personal learning

One of the more powerful aspects of the SpeechMagic system is its ability to be adapted for different doctors. To do this, every user has to create his or her own individual profile.

"For each doctor, it takes about four minutes to make that profile. You're reading from a text screen. We train new doctors who come to our hospital, we go in and train them and they have to read from the screen about four lines at a time. In the training file there are 45 screens but after about 15 or something like that the computer says that's 'fine I've got it now'. Then it makes the individual profile," says Dr Mathiesen.

He adds: "Normally we only train people for about four or five minutes. And that's it. Because it only has to get your voice profile for those 43 sounds."

Individual profiles do more than just learn a user's particular sounds, however. "When I work with the system over time – about one or two days – it has my preferences," explains Dr Mathiesen. "So if it has a sound that could be three different words, it will see that 99% of the time I mean a certain thing. It chooses words from the context list, but it also uses statistics that are personal to me so that it can learn what I usually say."

Live transcription

Although it originally operated with a delay of a few minutes, the system is now able to transcribe live as a doctor speaks. Running on a standard PC, but fitted with a special microphone with additional controls for moving the cursor, the doctor is able to speak directly into the computer and see his or her words come up in the relevant place on the electronic medical record. He or she can then sign off the document electronically, making it available to either the relevant doctor or department immediately.

And if the system makes an error, or doesn't recognise a word, the doctor can go into the record and immediately correct it. Later, a secretary or admin will be alerted to the amendment and can decide if a new word needs to be added to the context list. "So it's learning words, but there's a human filter on it so that no rubbish gets into the vocabulary of the system," says Dr Mathiesen.

Job versatility

After successfully trialling the system in the radiology department, new modules were made for psychiatry and pathology, and then a general medical one for use in electronic medical records common to all hospital patients. The system has now been in use across the whole hospital since 2007.

Something that Dr Mathiesen is keen to stress is that transcription software does not have to replace secretaries. Instead, time is freed up to do other admin duties or take on admin tasks that were, until then, taking up doctors' or nurses' time. "In our hospital, there were a lot of jobs that the nurses and doctors were doing that were actually secretarial jobs," he says. "We looked around the hospital when we got speech recognition to see what kind of jobs nurses and doctors were doing that they could be released from. So now secretaries are coming out into the wards and doing a lot of statistics – reporting and billing and things like that."

But while the system has been successful at Vejle Hospital, this success cannot be guaranteed everywhere. Dr Mathiesen says: "Doctors have to embrace it. If you want to, you can obstruct it – it's easy. If you have groups in the department that don't want it to work, you can obstruct it."

However, if managed correctly, all the signs are that instant transcription has huge efficiency benefits – which help not just the doctors and hospital but, crucially, the patient. "One of the mantras in our hospital is 'does this benefit the patient?' So if it can change the way we work in the hospital, if it's beneficial for the patient, we will do it," says Dr Mathiesen. ■