

Artificial intelligence can help doctors

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Credit: University of Agder

The computer gathers relevant disease information from 200 documents in just a few seconds. Doctors have no chance at matching its tempo.

"This technology contributes to more accurate and updated information about pain and risk, and makes this information available to doctors involved in patient care. The research results show, at this stage, that the system's precision is not far off the level of experienced clinicians, and

the computer is in addition much quicker than the doctors," says Geir Thore Berge.

He is a qualified nurse, and works with IT and [information systems](#) at the Department of Technology and e-Health at Sørlandet Hospital HF. As a PhD research fellow, he is associated with the Centre for e-Health and Care Technology and the Department of Information Systems at the University of Agder (UiA).

Together with Senior Consultant Dr. Tor Oddbjørn Tveit at the hospital, and Professor Ole-Christoffer Granmo at UiA, he conducts research into the structuring of health information at Sørlandet Hospital. With the help of new formulae (algorithms), Berge has developed a system which recognises linguistic patterns and expressions in large quantities of data.

"There are on average around 200 documents in a patient's medical records, and in the A&E in particular it is preferable that the doctor rapidly gains an overview of, for example, the patient's allergies, in order to be able to make correct decisions about treatment," says Berge.

The computer does not inform the doctor of the type of treatment called for, but it does find relevant information about the patient so that the doctor can make a safer decision.

Artificial creativity

With the help of formulae (algorithms), the system retrieves the relevant information by association based on the patient's documents. The formulae are so-called "learning algorithms". In short, this means that the system does not just mimic and retrieve information which is loaded into it, but it is also capable of putting this information together in new ways.

Professor Ole-Christoffer Granmo has carried out fundamental research in this area. Granmo has developed a language tool based on [artificial intelligence](#) with the ability to learn any language after being fed a large quantity of text. Berge has only found two academic articles in a worldwide search which address this same type of formula and tool, but these are not completely self-learning, and have not been trialled in practice either.

"We have tried out Granmo's formulae, which are completely self-learning, and we have also got them to work in practice," says Berge.

Berge has developed a computer system which feeds Granmo's algorithms with the correct rules and terms, whilst Senior Consultant Tveit has been supportive on the medical front. System tests have worked out so well that Sørlandet Hospital has already decide to trial it on their own patients in the operative and intensive departments during the spring.

Promising results

"The results so far are very promising. The system captures the context of meaning and associations, and is smarter than it was earlier. Nine out of ten relevant pieces of information connected to allergies were retrieved," says Tor Oddbjørn Tveit.

It was Tveit who initially suggested testing the new algorithms on allergies.

"Allergies can be difficult and complex, and if the system can learn this field, it will most likely also be able to transfer to other areas of illness," says Tveit.

The senior consultant is surprised at the progress of the research project.

"I didn't think that artificial intelligence would be able to gain a hold on all of these variables so quickly, so precisely, and in an associative fashion. But the system really does this. It provides a very good overview of what you must think through before you – as a doctor – make a decision," says Tveit.

Testing for three months

Now, the new electronic decision support system is being tested out in clinical practice.

"Now we are in the process of testing out the system on patients in the operative and intensive departments. We are going to spend two or three months on this," says Tveit.

If the system works as well in practice as it has done in theoretical trials, Tveit reckons that the technical elements are so solidly in place already that the new algorithms will be able to be put into use almost immediately.

"In purely technical terms, it can be put into use straight away. What will, potentially, take time, are the commercial, legal and bureaucratic considerations and clarifications," says Tveit.

He emphasises that there are four factors which must be in place before a new system for information structuring can be put into use at the hospital.

"The system must, firstly, provide relevant information. Secondly, it must avoid irrelevant information, and thirdly, it must find it quickly. Fourthly, there must be a qualified doctor to interpret the information that the machine retrieves" says Tveit.

Doctors are still the most important factor

He emphasises that, just as with other medical aids at the hospital, you cannot rely on the equipment alone.

"Artificial intelligence used in the hospital's computer system will be able to help doctors make safer choices for the good of the patient. It will function similar to an x-ray or a blood test. If it is to be of any value, the doctor has to interpret the x-ray or blood test – and the [information](#) from the computer – before deciding on a potential treatment," says Tveit.

Provided by University of Agder

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