Network designed to help health care professionals

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European researchers have developed a computer system designed to give health care professionals access to a broader range of medical information.

However the system, which was meant to allow them to share medical information across a network, highlighted the limits of computer 'understanding'. Unlike humans, computers can't yet make the connecting leaps among various bits of information.

The EU-funded Doc@Hand project set out to improve coordination among health professional by improving access to information. The researchers aimed to 'push' information to health professionals making decisions about patients' healthcare, rather than expecting those professionals to 'pull' out all the relevant data.

The data could be delivered to the health professional's computer or to a mobile device. Easy access to information should lead to speedier and better decision-making.

For example colon cancer patients suffering from anaemia can experience shortness of breath. The medical term for this shortness of breath is 'dyspnoea'. If you asked the patients to discuss dyspnoea they wouldn't know what you were talking about. If you asked them about their 'shortness of breath' they might have plenty to say on the subject.

Professionals in areas such as healthcare for the chronically ill need to

ensure people at all levels are talking the same language if they are to use IT tools to improve their coordination and decision-making, according to recent research results.

The Doc@Hand project was part of a drive to tackle colon cancer by a network of hospitals and other health organisations in Catalonia through improved screening and early referral of potential cases by primary care doctors to cancer specialists at the Hospital Clinic de Barcelona.

The cancer patients receive healthcare from a wide variety of health professionals – nursing staff and carers, primary care doctors, and specialist cancer consultants, amongst others.

Keeping results relevant and useful
Through Doc@Hand, health professionals could access the web, communications tools, clients' medical histories, and databases of medical research.

By drawing on the user's profile and his or her previous search history, the system is designed to improve the quality of information it returned. It also used a powerful XML-based search engine and a subsystem that included a linguistic parser and a system of ontologies.

An ontology defines the concepts and relationships used to describe and represent a domain of knowledge. It specifies standard conceptual vocabularies with which to exchange data among networked systems, provide services for answering queries, publish reusable knowledge bases, and offer services to allow interoperability across multiple systems and databases.

Ontologies are intended to enrich some computerised information searches. Computers are very good at finding key words, presenting information and linking information sources together.

But they are very poor at understanding what that information actually 'means'. Therefore, they are poor at finding information that relates to your search but does not contain any of the key words you entered.

Ontologies attempt to get around the 'meaning' problem by grouping together 'classes' of concepts with similar meaning. A search for one word will deliver results for all words in that 'class' that can be regarded as semantically equivalent. Before the search results are delivered to the user, they will checked against a set of relevancy rules.

Therefore searches using an ontology should be richer than a normal keyword search because they will deliver results for all words in the 'class' that meet the relevancy rules, not simply web pages that contain the original search keyword.

The researchers first tested Doc@Hand by feeding clinical notes into the system and comparing its results to the information health professionals said they would expect. The system performed rather well, providing about 92% of the expected information.

In operation in the hospitals' wards and clinics it performed less well. There were some problems with the immaturity of the software and the fact that it was trying to cope with both Spanish and Catalan. But the major problem was that the 'softer' the language became, the poorer the results.

For example, if the system was fed data on the iron content of a patient's blood it could spot anaemia very easily and provide the relevant information. However, if it was only fed symptoms, it was far less likely to spot the problem.

Language lessons

The ontologies the researchers created delivered reasonable results in limited areas, but they were not powerful enough to handle the variety of mainstream daily communication.

”If you want to be comprehensive in your descriptions of all things concerned with the patient, you can only work within a very specific environment,” says Albert Alonso, a member of the Technology Innovation Unit at the Hospital Clinic de Barcelona who worked on Doc@Hand. “We have proven it can work in a specific domain where it is possible to set borders.”

The project highlighted an important lesson for health professionals seeking to coordinate the delivery of medical and care services to chronically ill patients, according to Alonso.

“The language barrier is alive and well,” he says.

Agreeing on the language that will be used and ensuring that everyone understands what is meant is the starting point for collaborations across organisations and across levels of care.

Education sessions involving both the health professionals and the patients are important in the management of chronic patients. These provide the forum to settle language differences. Collaborations also need a central management point, according to Alonso.

“Ontologies are an effective way of sharing a formal and commonly agreed upon representation of a domain of knowledge,” he says. “If we can find agreement on how we express different things around this process of care and we are only talking about a very specific context, then perhaps we are in a position to develop ontologies that really deliver.”

The research has resulted in a valuable lesson about the importance of shared terminology and the limits of ontologies in large-scale collaborations. Doc@Hand received funding from the EU's Sixth Framework Programme for research.

Source: ICT Results

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