

Predictive analysis: Genetics and evolution inspire new generation of computational intelligence systems

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Large parts of our lives are now being monitored and analysed by computers. Log on to Amazon and intelligent data analysis software can recommend a selection of books you might like to read. Far from being a sinister intrusion into people's privacy, the purpose of these systems is to improve our lives.

Professor Bogdan Gabrys, chair in [computational intelligence](#) at BU's [Smart Technology](#) Research Centre explains: "There is a huge explosion in the amount and availability of data we are generating on a daily basis but unless you use it in the right way that information is not going to be very useful. We have been working with a number of companies who want to use the data they obtain during their daily business to make predictions about sales and model customer behaviour."

Known as predictive analysis, the work by Professor Gabrys and his colleagues goes beyond simply crunching numbers. They are developing computer programs capable of learning. With this intelligent software, computers can make judgements about the quality and reliability of the data they gather. They look for patterns and adapt according to what the information will be used for.

"We are trying to design adaptive algorithms that learn on the basis of the data they receive," says Professor Gabrys. This has led to the Centre's work supporting businesses in the tourism and communications

industries:

"We have been working with Lufthansa Systems so the airline can accurately forecast demand for different types of plane tickets. Customers going on holiday in economy class tend to book their tickets a few months in advance. If the planes fill up with economy customers, they have to turn away lucrative business and we've found first class customers tend to book late."

"[Communications companies](#) like BT also want to be able to predict whether a customer is going to switch providers as it costs BT between five to eight times more to get a new customer than to retain an existing one. So we have been helping them detect if someone is likely to change service provider, so they can then be proactive, contact such customers with a good offer or just give them more of a personal touch."

Building a learning computer system capable of adapting according to the information that is fed into it is no easy task. Most prediction software until recently has been tailor made to solve specific problems. This can make them expensive to maintain and hard to adapt.

For this, Professor Gabrys and his team have turned to one of the most successful problem solvers on the planet for inspiration - Mother Nature herself. They are building systems which process information in a similar way to the human brain, with its networks of neurons that constantly rewire themselves as we learn.

They have also drawn inspiration from genetics and natural evolution in the behaviour of insects such as bees and ants as well as flocking and swarming behaviour in birds and fish to devise robust learning and optimisation algorithms.

Professor Gabrys says: "We are trying to build more flexible systems and

push the boundaries of how intelligent these systems are."

So with ever more intelligent systems, will computers soon take the guesswork out of our everyday lives with accurate and reliable predictions?

Professor Gabrys is not so sure: "If someone tells you they can reliably predict really complex systems such as economies or financial markets one year ahead, do not believe them. Some things are predictable and some are not. The critical aspect in what we do is knowing the difference between them."

Provided by Bournemouth University

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