

# “The future belongs to cognitive systems”

At the IBM Research laboratory in Zurich, research is under way into cognitive informatics and its exciting areas of application – let's take a look.

**connect: We're aware of artificial intelligence from science fiction, but it's already a reality. What should we know about it?**

**Cristiano Malossi:** Artificial intelligence has captured the public's imagination ever since the term was coined in 1955. But like so many other advanced technologies that were conceived of before their time, artificial intelligence was misunderstood. It was monopolized by Hollywood and misrepresented by the media. It was described as many things: from savior to the scourge of humanity. Those of us that deal with serious information technology understand the enormous potential of intelligent systems. This technology – which in our view will be cognitive and not “artificial” – will in future have very different features than those generally ascribed to artificial intelligence.

**What do you understand by cognitive informatics?**

Cognitive informatics refers to systems that learn on a large-scale basis, systematically think on a logical basis and interact with people in a natural way. Rather than being explicitly programmed, these systems learn from their interactions with us as well as from their experience with their environment and draw conclusions from it. Cognitive systems are probabilistic. They generate

not only solutions to numerical problems but also hypotheses, cogent arguments and recommendations on more complex data series. They can interpret in a meaningful way those 80% of worldwide data that are described by IT specialists as “unstructured”. This enables them to keep pace with the volume, complexity and unpredictability of information and systems in the modern world.

**Give us an example.**

Let's take healthcare. There are more than 7,000 rare diseases in Europe. When a patient with a rare disease visits a doctor, an average of five kilograms of medical documents are created. These include CAT scans, x-ray images, doctor's notes and prescriptions. In addition, the medical industry publishes hundreds of papers a month.

**Given this flood of data, how can a doctor arrive at the correct diagnosis for a patient quickly?**

A team of physicians in Germany came up with an idea for how to examine the 6,000 patients at the University Hospital of Marburg's Center for Undiagnosed and Rare Diseases (known as ZusE in German) whose diseases have not yet been diagnosed. Last year they met with my IBM colleagues to use cognitive informatics to analyze these data and thus support the doctors. In a 12-month pilot project, the Watson computer program recorded the medical documents of patients as well as the medical documentation for well-known cases. The diagnosis it offered coincided with that of the doctors. The upshot of this is that physicians can spend more time with more patients.

**Who are the biggest players in the field of cognitive informatics?**

Public understanding of artificial intelligence is promoted by the likes of the Partnership on Artificial Intelligence to Benefit People and Society (Partnership on AI), which was set up last year. Its members are Amazon, Apple, Facebook, Google/DeepMind, IBM and Microsoft. They will be working together to conduct research, recommend best practice and publish research results under an open license.

**What does this mean for the financial sector?**

Few sectors are more heavily inundated with data than the financial sector. Last year alone, for example, 20,000 new regulatory requirements were created. The complete catalog of provisions is likely to encompass more



When Cristiano Malossi isn't in the laboratory trying to simulate the world's problems, he can be found flying around the race track in his self-tuned Audi S3.

than 300 million pages by 2020. At that rate the limits of human capacity will soon be exceeded. Today the cost of managing the regulatory environment amounts to more than 10% of the total operating costs of the leading banks, or a total of USD 270 billion, annually.

This workload is ideally suited to cognitive skills, which should enable financial institutions to integrate regulatory changes, understand their obligations and close gaps in systems and practices in order to meet compliance requirements more efficiently and more speedily.

#### **What is IBM doing in this field?**

The basic cognitive platform that we are building is now broad and flexible enough to help companies with the transformation of their industries. Here in Zurich we are concentrating on the use of cognitive informatics for discovering things. Imagine at the click of a mouse being able to discover a new type of metal that can be shaped and is corrosion-resistant and thermostable.

The scientists at IBM use our cognitive system, Watson, as well as advanced algorithms to facilitate the discovery of new materials through to new energy sources. They are doing this on the basis of decades of internal research, patents and peer-reviewed publications, but also external sources.

#### **IBM and SIX have entered into a new partnership in relation to your cognitive system, Watson. What does Watson offer?**

Yes, we very much appreciate your business. In February 2011, the Watson cognitive informatics system from IBM was introduced to the world and beat contestants Ken Jennings and Brad Rutter on the quiz show Jeopardy! It was the first demonstration of cognitive informatics on a large scale. Watson's ability to answer subtle, complex questions full of plays on words highlighted that a new era in information technology has dawned.

Since then Watson has dealt with increasingly complex data sets and developed an understanding, logic and learning ability that extend beyond decryption. Indeed cognitive informatics aims to shed light on aspects of our world that were not previously visible. This is particularly true in relation to patterns in unstructured data and the findings obtained. This enables us to take more informed decisions on more serious matters.

The true potential is exploited by the combination of data analysis and statistical evaluation by computers with definite human qualities. The latter include setting independent objectives, common sense and ethical values.

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