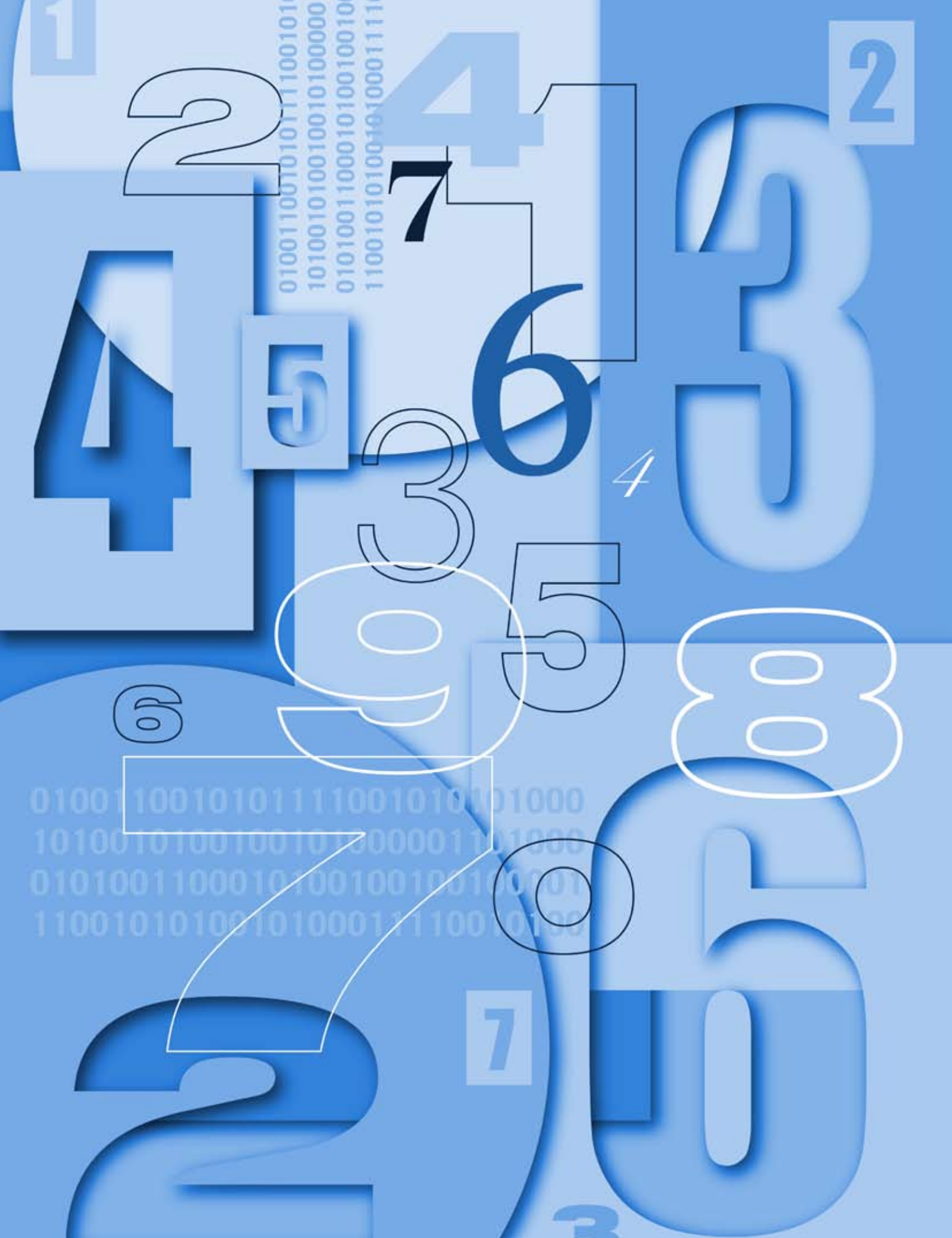

Data Mining with a Twist

Abstract Algorithms, a small Bangalore-based company, could be showing the way to making millions using nothing more than a bunch of mathematical steps, says **Arun Katiyar**

Twenty years ago, a bank account book was updated manually by a clerk; loans were given out based on forms filled by the loan seeker and analysed by the sanctioning authority; and money withdrawn at the teller was matched against a real ledger balance.

Life was simple. You did what you could observe. Today, the same transactions are logged into a computer instantly and presto – your relationship manager from the bank gives you a call based on your last transaction and bank balance, inquiring if you would like to invest in mutual funds promoted by the bank. At the same time an alert is triggered at a call centre that tries to sell you a variety of things, from insurance to jewellery.

Undoubtedly, in the age of e-banking and e-marketing, companies are emerging as data collectors and collators, providing information, facts and figures on any business issue per se. Algorithms play a major role in this context of data mining.

For example, a website called Dignova (dignova.com) is continuously scanning popular websites for new and interesting articles. They use an algorithm to decide if a story is interesting by looking at search trends from various search engines.

Amazon (amazon.com) also throws up all kinds of data depending on what you are doing and what others before you did. "It is difficult for us to work out the mathematics for all these decisions, especially as the data grows," says P Sribala, a one-time professor associated with the Institute for Advanced Study in Mathametics, Chennai. "And it gets even more complex when it is real time feedback that is involved."

Companies dealing in credit cards to those selling insurance are becoming increasingly dependent on algorithms – simple steps required to find an answer or draw a conclusion – to conduct their business. Today, mining data for hot nuggets of information using mathematical techniques is most suitable for complex businesses.

Naturally, creating these algorithms is big business. The algorithms written by a unique Indian start-up, called Abstract Algorithm Technologies, are counting molecules that can help predict cancer in patients, analyse speech patterns and inflections to predict if the caller is a terrorist, and count cars in traffic to predict

jams and accidents.

The same algorithm can also help count the number of people entering a hotel and analyse their spending patterns, or count healthy trees in a plantation to predict crop value. Dr Sudarsh Kailas, founder of Abstract Algorithm, says: "The stuff we create helps decision makers delve deep into the data their businesses are generating to show views that were previously impossible and to forecast scenarios that can save lives and discover drugs that were previously unimaginable."

Today, Abstract Algorithms' work helps in a variety of tasks, ranging from the mundane to the sophisticated such as shelf stock management, car number plate verification, parking lot space identification, signature verification, stock market prediction, cancer detection and several others.

Kailas refers to this innovative usage of algorithms to produce content as content technology. In a universe spewing vast amounts of data, everything can become undecipherable content: for example, the number of credit card transactions in a given hour reveals data such as amount spent, locations where it was spent, the time at which it was spent and the vintage of the card holder. Processing this content produces knowledge – that tends to last longer – is more meaningful than the data points. For example, a study of all the credit card transactions in the last hour may show that people are spending more in restaurants and that could be an ideal time to offer them a discount on certain food items. Using that knowledge over a period of time to offer a discount on food items or to offer a deal on the next visit to the same restaurant becomes a matter of expertise.

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Kailas contends that content technology will create a layer of value over information technology. "Content technology will make India a unique place in the world," predicts Kailas, whose company has customers and partners such as GE and Titan. He believes that Indians are naturally positioned to create such algorithms. He cites the *panchangs* (a spiritual and scientific Hindu calendar) that predict the position of astral bodies with great accuracy as an indicator. "We may not have things like Kepplers Law and Newton's Law, but India and Indians never needed laws and proofs for theorems. As Indians, we always considered knowledge to be good enough – if it could be used," says Kailas. He suggests that this ability to use knowledge will put India ahead of the world. In his view, world economies have moved from agriculture to industry to information technology and are now poised to see the rise of content technology. "The basis of this will be intelligent algorithms," he adds.

One company that used Abstract Algorithm for development work is Cumulus Systems, which focusses on high-end R&D for Fortune 50 companies. Its founder Arun Ramachandran says: "We

EXCELLING IN MATHS

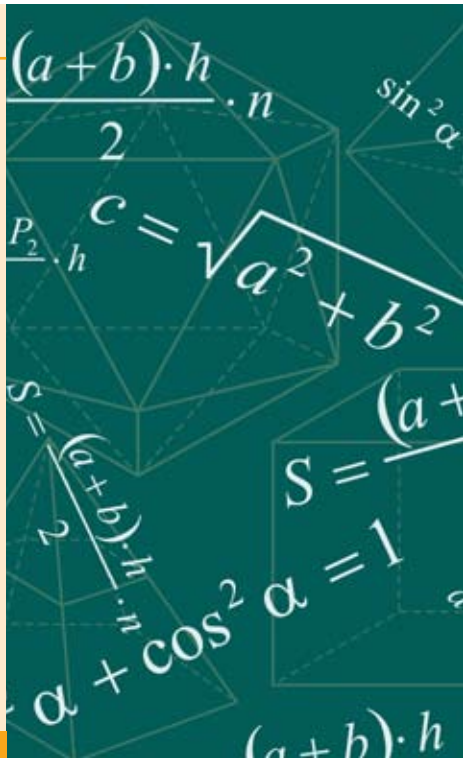
Indians have excelled in mathematics for centuries. Indian mathematics has been traced back to Vedic literature, dating back 4,000 years.

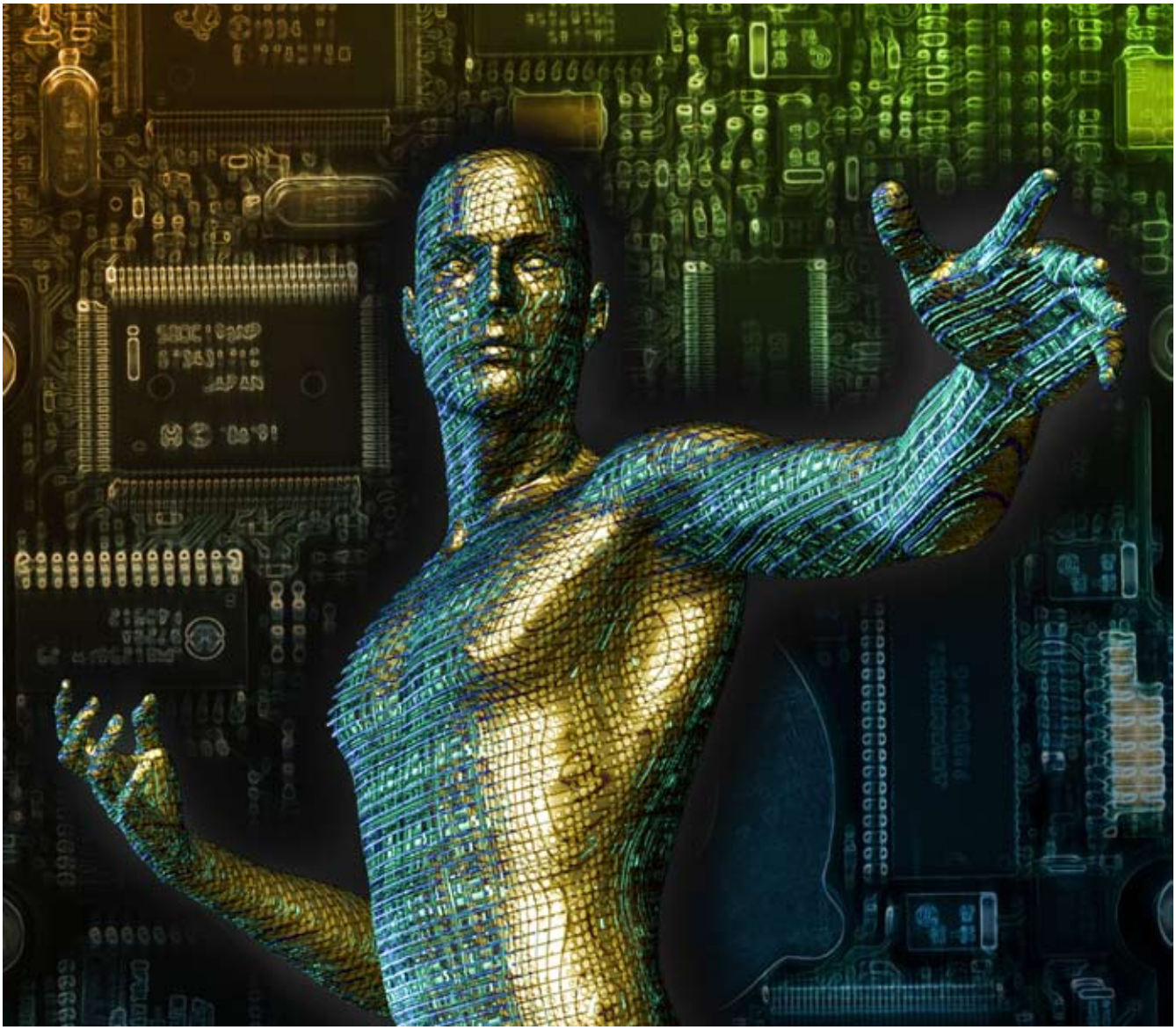
Prominent mathematicians from this country included Panini (4th century BC), Katyayana (3rd century BC), Aryabhata (an astronomer from 5th century AD), Aryabhata II, Bhaskara I, Bhaskara II and Varahamihira (from ancient India) and Srinivasa Ramanujam, Satyendra Nath Bose and Nobel laureate Subrahmanyan Chandrasekhar (from modern India).

Indian mathematicians have contributed significantly to all aspects of mathematics, from arithmetic (the decimal number system, zero or *shunya*, negative numbers, infinity and irrational numbers), algebra (equations), geometry, trigonometry, logic and even algorithms.

Algorithms have a close Indian connection. Ancient Indians had excelled in geometry, using their skills to build fascinating temples and monuments. Many Islamic scholars, including Mohammed Ibn Jubair al Battani and Abu Ja'far Muhammad ibn Musa Al-Khwarizmi, were influenced by Indian mathematicians and their expertise in algebra and geometry.

Al Khwarazmi, who was also an astronomer, wrote on Hind-Arabic numerals and was among the first to use the zero. He wrote a treatise, 'On Calculation with Hindu Numerals,' in 825 AD and his work was translated into Latin a few centuries later as 'Algoritmi's on Hindu numerals.' His calculation method later became known as algorithm, which is the process of calculating something.





realised that with mobile phone cameras becoming popular, our customers could take pictures easily using such cameras. Using Abstract's pattern recognition team we developed unique ways of extracting relevant information from the pictures."

For example, a picture of the back side of a Cisco router resulted in Abstract software automatically extracting its serial number, model and make. "The extracted data could then be fed into a database and thus typical questions such as model, make of the hardware need not be entered manually reducing errors," adds Ramachandran. Fundamentally, Abstract Algorithm searches through data for patterns and thanks to Google, we know how big that market is.

Ramachandran says that he scoured around for companies that could deliver the work they needed, but found none other than Abstract Algorithms in India. "Abstract is truly unique and I hope there are more companies with their mindset in the future in India. They are small, but truly beautiful," he adds.

Kailas is convinced that the days of large innovation factories such as Rank Xerox and Bell Labs are over. Today, what are required are innovation networks. "Abstract Algorithm has a network of experts who are truly the finest anywhere in the world and many are inventors of new techniques and they will work for no one else," he says. Kailas and the highly specialised niche his company operates in, truly provide a glimpse of the future India – ready to move up the value chain from information technology, which is pretty much writing bland code, to content technology, which is meant for smart geeks.

So, whether it is mobile networks trying to optimise infrastructure usage, airports trying to manage queue build-up, or a grocery store trying to understand customers' demand patterns, a unique company called Abstract Algorithm appears to have all the answers.