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History

The origin of the word 'Algorithm' can be traced to circa 820 AD when Al Kwharizmi, a Persian mathematician living in what is now Uzbekistan, wrote a 'Treatise on the Calculation with Arabic Numerals.' This was probably the foundation stone of our mathematics. He is also credited with the roots of the word 'algebra,' coming from 'al jabr' which means 'putting together.'

After a number of translations in the 12th century, the word 'algorism' morphed into our now so familiar 'algorithm.'

The word 'algorithm' and the concept are fundamental to a multitude of disciplines and provide the basis for all computation and creation of computer software.

A very short list of algorithms (we will use the familiar abbreviation 'algo' interchangeably) in use in the many disciplines would cover several pages. We shall only describe some of those which apply to implementing trading strategies.

If you are interested in algorithms per se, we recommend Steven Skiena's learned tome, 'The Algorithmic Design Manual' – but be warned, it's not easy reading. Algos such as 'Linear Search,' 'Bubble Sort,' 'Heap Sort,' and 'Binary Search' are in the realm of the programmer and provide the backbone for software engineering (please see Bibliography).

As promised above, in this book (you may be relieved to know) we shall be solely concerned with algorithms as they apply to stock trading strategies. In Part I we deal with the Tier 1 companies (the major players) and in Part II of this book we consider how algorithmic strategies from basic to advanced may best be used, adapted, modified, created and implemented in the trading process by the individual trader.

The earliest surviving description of what we now call an 'algorithm' is in Euclid's Elements (c. 300 BC).

It provides an efficient method for computing the greatest common divisor of two numbers (GCD) making it one of the oldest numerical formulas still in common use. Euclid's algo now bears his name.

The origin of what was to become the very first algorithmic trade can be roughly traced back to the world's first hedge fund, set up by Alfred Winslow Jones in 1949, who used a strategy of balancing long and short positions simultaneously with probably a 30:70 ratio of short to long. The first stirring of quant finance . . .

In equities trading there were enthusiasts from the advent of computer availability in the early 1960s who used their computers (often clandestinely 'borrowing' some computer time from the mainframe of their day job) to analyze price movement of stocks on a long-term basis, from weeks to months.

Peter N. Haurlan, a rocket scientist in the 1960s at the Jet Propulsion Laboratory, where he projected the trajectories of satellites, is said to be one of the first to use a computer to analyze stock data (Kirkpatrick and Dahlquist, pp. 135). Combining his technical skills he began calculating exponential moving averages in stock data and later published the 'Trade Levels Reports.'

Computers came into mainstream use for block trading in the 1970s with the definition of a block trade being $1 million in value or more than 10 000 shares in the trade. Considerable controversy accompanied this advance.

The real start of true algorithmic trading as it is now perceived can be attributed to the invention of 'pair trading,' later also to be known as statistical arbitrage, or 'statarb,' (mainly to make it sound more 'cool'), by Nunzio Tartaglia who brought together at Morgan Stanley circa 1980 a multidisciplinary team of scientists headed by Gerald Bamberger.

'Pair trading' soon became hugely profitable and almost a Wall Street cult. The original team spawned many successful individuals who pioneered the intensive use of computing power to obtain a competitive edge over their colleagues. David Shaw, James Simons and a number of others' genealogy can be traced back to those pioneers at Morgan Stanley.

The 'Black Box' was born.

As computer power increased almost miraculously according to Moore's Law (speed doubles every eighteen months, and still does today, well over a third of a century after he first promulgated the bold forecast) and computers became mainstream tools, the power of computerized algorithmic trading became irresistible. This advance was coupled with the invention of Direct Market Access for non Exchange members enabling trades to be made by individual traders via their brokerages.

Soon all major trading desks were running algos.

As Wall Street (both the Buy side mutual funds etc. with their multi-trillion dollar vaults and the aggressive Sell side brokerages) soon discovered that the huge increase in computer power needed different staffing to deliver the promised Holy Grail, they pointed their recruiting machines at the top universities such as Stanford, Harvard and MIT.

The new recruits had the vague misfortune to be labelled 'quants' no matter which discipline they originated from – physics, statistics, mathematics . . .

This intellectual invasion of the financial space soon changed the cultural landscape of the trading floor. The 'high personality' trader/brokers were slowly forced to a less dominant position. Technology became all-pervasive.