



K. J. Somaiya Institute of Management Studies & Research

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## *Quantinum Newsletter*



Quantinum -  
The Quants Forum

*Its all about NUMBERS...*



Its all about NUMBERS...

# Quantinuum Newsletter

VOLUME 2:ISSUE 4

OCTOBER 2011

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## From the Faculty's Desk...

Hi All,

We have had a nice Diwali vacation, during which all of us were able to spend good quality time with our family members. Now , we are back to the grind of studying for our exams.

This issue of newsletter brings you interesting articles - quancept, quantguru, quants in a lighter vein etc.

We also have an obituary of Steve Jobs , presented by Vaibhav in numbers, i.e. years.

We have also included updates on new and concurrent projects– data mining and ISKCON , respectively.

The queries page features a puzzle which appeared in Analytics magazine. All are welcome to solve it and send the entry to [puzzlor@gmail.com](mailto:puzzlor@gmail.com) by Dec 15.

Currently, editing team is filling in where we don't have contributed articles. We want more students and alumni to contribute articles, newsitems, puzzles etc.

We hope the newsletter meets the expectations. Please write in for your suggestions and comments.

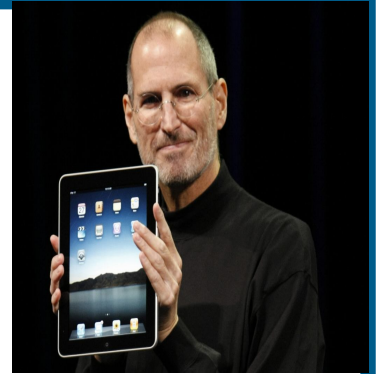
Happy reading.

Regards

Prof N.S.Nilakantan

TEAM QUANTINUUM

# STEVE JOBS IN NUMBERS



- 1955 Steven Paul is born in San Francisco, CA on 24<sup>th</sup> Feb.
- 1960 Jobs family moves to Palo Alto, heart of the growing Silicon Valley.
- 1969 Steve Jobs meets Steve Wozniak (Woz).
- 1972 Steve and Woz build and sell illegally blue boxes to Berkeley students
- 1973 Fall Steve spends one semester at Reed College, Oregon, then drops out.
- 1975 Steve and Woz start assembling Apple I computers in the Jobs' garage, and sell them to hobbyists.
- 1976 Apple Computer Inc. is incorporated by Steve Jobs, Steve Wozniak and Ron Wayne
- 1977 Apple makes a huge sensation at the West Coast Computer Faire with a prototype Apple II.
- 1980 Apple goes public, increasing Steve Jobs' net worth to over \$200 million
- 1982 Steve Jobs is on the cover of *Time Magazine*
- 1985 Steve Jobs resigns from Apple. Apple announces it will sue Steve's future company, NeXT.
- 1986 Jobs buys a division of George Lucas' ILM for \$10 million and incorporates it as Pixar.
- 1990 Steve introduces the cheaper NeXT Station in San Francisco and shuts down all Pixar's hardware
  
- 1991 Steve Jobs marries Laurene Powell.
- 1995 Steve becomes President & CEO of Pixar Animation Studios.
- 1996 Steve Jobs negotiates a breakthrough deal between Pixar and Disney with Michael Eisner. Apple
  
- 1997 Steve Jobs introduces Apple's new Board and a peace treaty with Microsoft at Macworld.
- 1998 Steve Jobs introduces Apple's revolutionary iMac
- 2000 Steve Jobs officially becomes Apple's CEO and demos Mac OS X at Macworld.
- 2001 Steve Jobs unveils the first iPod.
- 2003 Apple opens the online iTunes Music Store in the US.  
Steve Jobs introduces iTunes for Windows.  
Steve Jobs is diagnosed with pancreatic cancer.
- 2004 Steve unveils the iPod mini and the iLife suite at Macworld.
  
- 2005 Steve Jobs's commencement speech at Stanford University.
  
- 2007 Steve Jobs is inducted in the California Hall of Fame by Gov. Schwarzenegger.
- 2008 Steve Jobs introduces the world's thinnest notebook, the MacBook Air, at Macworld.
- 2009 Steve Jobs takes a medical leave of absence for six months.
- 2010 Steve Jobs unveils iPad, the much-anticipated Apple tablet.
- 2011 Resigns from the post of CEO of Apple.

**VAIBHAV GOEL**  
**PGDM-IB**  
**2011-13**

## MAIN STORY: Inception Of Digital Wheels Turning

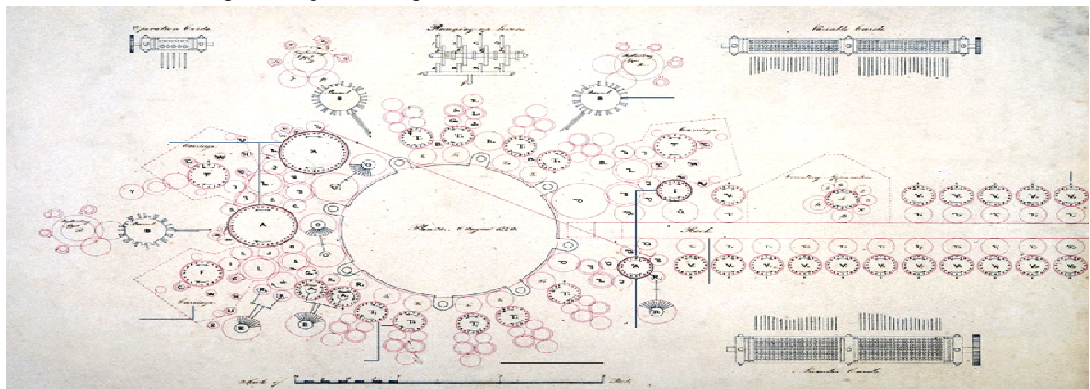
Charles Babbage is known as the "father of computing" and rightly so because he was the first person who led to start of Digital Wheel s turning. Charles Babbage could conceive the idea of first programmable computer in the 1830s, a hundred years before the idea was put forth in its modern form by Alan Turing. The machine on the drawing boards at the Science Museum in London is the Babbage Analytical Engine, a room-size mechanical behemoth that he envisioned but never built.

Researchers are now planning to build a working version of the Analytical Engine, which Charles Babbage conceived of in the 1830s but never completed. Researchers in Britain are about to embark on a 10-year, multimillion-dollar project to build a computer — but their goal is neither dazzling analytical power nor lightning speed. Indeed, if they succeed, their machine will have only a tiny fraction of the computing power of today's microprocessors. It will rely not on software and silicon but on metal gears and a primitive version of the quaint old I.B.M. punch card. So now the question arises why researchers are willing to spend such amount of money and time? It may help an to get answer about "Did an eccentric mathematician named Charles Babbage conceive of the first programmable computer in the 1830s or not?"

The project is significant in part because there has been a heated debate over whether — given time and resources — Babbage would have been able to build the machine he foresaw. The project follows the successful effort by a group at the museum to replicate a far less complicated Babbage invention: the Difference Engine No. 2, a calculating machine composed of roughly 8,000 mechanical components assembled with a watchmaker's precision. That project was completed in 1991.

Mr. Graham-Cumming suggested a three-step project in which a decision would first be made on which blueprint to focus on, then a three-dimensional computer simulation would be created, and finally the machine would be built.

Now let's take a look at Babbage Analytical Engine:-



Three types of punch cards, strung together with ribbons and derived from the cards used in mechanical looms, allow the machine's operator to input mathematical operations (+, −, ×, ÷), variable instructions and 40-digit decimal numbers. For doing calculations numbers are transferred mechanically from storage to the "mill," a complex of gears and wheels. The mill performs an arithmetic operation, after which the resulting number is returned to storage. One of the mechanisms marked A is used for addition and subtraction, and both are used to tally the results of more complex operations. For doing multiply and divide, Groups of gears marked T are used. For Read and Write Numbers moving to and from the mill pass through these wheels, which act as a buffer. For Memory storage and Retrieval Between mathematical operations, numbers are stored in stacks of numbered wheels. Racks of metal with teeth along each long edge mesh with the wheels and transfer numbers to and from the stacks.

**SATYADEV KALRA**  
**PGDM - B**  
**2011 - 13**

# DATA MINING PROJECT REPORT

Data Mining is the extraction of hidden, predictive information patterns from large databases. Data Mining is especially useful now-a-days when there is massive amount of data and identifying the useful portions of it can be a tedious job in itself. DM allows us to be proactive about situations rather than retrospective – this means that we can now try and predict the future trends rather than identifying them after they have already taken place.

## About XLMiner

XLMiner is an affordable, easy-to-use tool for business analysts, consultants and business students to:

- learn strengths and weaknesses of data mining methods,
- prototype large scale data mining applications,
- implement medium scale data mining applications.

More generally, XLMiner is a tool for data analysis in Excel that uses classical and modern, computationally-intensive techniques. XLMiner has been recently taken over by Frontline systems.

At Quantinum, some interest was generated on Data Mining Assignments and a team was formed with the following person as members: Gaurav Kumar Agarwal, Arunabh Harsh, Sayak Gupta, Satyadev Kalra, Vinayak Nayak, Naveena Vejella, Vaibhav Goel, Aditi Gupta, Gunjan Jadon and Harshita Shrivastava.

The team was given instructions to study XLMiner and complete phase 1 using the software. Completion reports from some of the team members are given below:

## Data Sets – Monthly Rates and Daily Rates

(by Team Member: Arunabh Harsh)

We had to determine what all operations can be used on the chosen dataset i.e. Monthly Interest rates and daily interest rates.

I have used the following statistical tools to draw conclusion, firstly correlation analysis to determine the extent in which both the variable are related to each other. Secondly I have used regression analysis to determine the relationship between dependent variable and one independent variable in the given datasets, i.e. Y on X and X on Y. Thirdly I have used Time Series analysis to predict/forecast the interest rates for future days/months.

## Other Applications/Utilities

(By Team Member: Sayak Gupta)

In XLMiner I've worked with the following utilities:

- Missing data handling
- Bin continuous data
- Transform categorical data
  - Create dummies
  - Create category scores
  - Reduce categories
- Association rules

I've mainly used example files to explore these functions. But I was able to use Association rules in an analytics competition. Many important utility functions have not been explored till now because I'm not yet clear with the theory part. I'll continue to work on those utilities.

**GAURAV KUMAR AGARWAL**  
**PGDM-FINANCE**  
**2010-12**

## Concurrent Project : ISKCON Food Relief Foundation



ISKCON Food Relief Foundation (IFRF) is A Non Religious, Non Sectarian, Not for Profit Charitable Trust Registered with Charity Commissioner. IFRF has implemented Midday Meal Program (A project of the Government of India), which is a strategic program to liberate the underprivileged children from scourge of hunger and malnutrition.

IFRF under the brand name School = Lunch serves select Government aided and Municipal schools in Delhi, Maharashtra, Rajasthan, Andhra Pradesh, Madhya Pradesh, Uttar Pradesh, Haryana & Assam. In

Mumbai, they supply midday meal to approximately 1333 schools and are responsible for feeding 200,000 students. They currently have 3 kitchens who service the city. The city is divided into Tardeo centre, Mira road centre and Palghar centre.

Aditya Chaobal and Sandeep Tamse, students of PG Operations are working on concurrent project offered by IFRF, under the guidance of Prof. N.S. Nilakantan, SIMSR and Mr. Gorakshanath Gambhire, GM, IFRF. Project encompasses writing a case on IFRF, kitchen layout design, packaging redesign and route optimization.

IFRF has accepted our suggestion on food container design. It will help them to reduce storage space of empty containers by approximately 70%. To work on complex route optimization problem and demand forecasting we have added five new members Gunjan Jadon, Abin Abraham, Harshita Shrivastava, Baskar Venkat and Sathwik Mohan.

**GAURAV KUMAR AGARWAL**  
**PGDM-FINANCE**  
**2010-12**

# QUANT NEWS DIGEST

## Interactive Supply Chain Game

Georgia Tech's H. Milton Stewart School of Industrial and Systems Engineering (ISyE) and Intel Corporation collaborated in developing an Interactive Supply Chain Game, which is a computerized simulation that mimics the dynamics of a supply chain. The game is structurally simple yet rich in terms of the learning and insights that could be derived from it. Human players can play with each other or against computers that employ pre-programmed supply chain strategies. At the end of the game, players are expected to gain some insights regarding supply chain management, especially in the following areas:

- Management of inventory and the importance of balancing underage and overage costs.
- The importance of maintaining a good relationship with one's supplier to ensure timely delivery of products.
- The importance of maintaining a good relationship with one's customers to increase future orders and improve the predictability of orders.
- The impact of different kinds of inventory allocation rules on customers' forecasting and ordering behaviour.

The game is intended for anyone who has an interest in supply chain management.

**Compiled by Satyadev Kalra**

## Google changed its algorithm

Google changes its algorithm on a regular basis, but most changes are so subtle that few notice. This is different. Google said the change impacted 12% (11.8% is the unrounded figure) of its search results in the US, a far higher impact on results than most of its algorithm changes. The change only impacted results in the US. As of today, this change is live for all English queries worldwide. This includes both English speaking countries (such as searches on google.co.uk, and google.com.au) and English queries in non-English countries (for instance, for a searcher using Google). Google also said it changed its mathematical formula in order to better weed out "low-quality" sites that offer users little value. Some such sites offer just enough content to appear in search results and lure users to pages loaded with advertisements. The change in algorithm was brought to give people the most relevant answers to their queries as quickly as possible.

*Editor's Note:* for more details: <http://googleblog.blogspot.com/2011/02/finding-more-high-quality-sites-in.html>

**Compiled by Manisha Agarwal**

## Fighting Violent Gang Crime With Math

Mathematicians working with the Los Angeles Police Department to analyze crime patterns have designed a mathematical algorithm to identify street gangs involved in unsolved violent crimes. Their research is based on patterns of known criminal activity between gangs, and represents the first scholarly study of gang violence of its kind. To test the algorithm, the researchers created a set of simulated data that closely mimicked the crime patterns of the Hollenbeck gang network. They then dropped some of the key information out -- at times the victim, the perpetrator or both -- and tested how well the algorithm could calculate the missing information. The mathematicians also found that the correct gang was ranked No. 1 -- rather than just among the top three -- 50 percent of the time, compared with just 17 percent by chance

*Editor's Note:* for more details please refer <http://www.sciencedaily.com/releases/2011/10/111031121234.htm>

**Compiled by Manisha Agarwal**

## QUANCEPT OF THE MONTH: FINDING VALUE OF COMMON STOCK

What is the value of a share of stock in a specific company? In one sense it is the price the stock trades at. Both the buyer and seller agree to exchange the stock at that price.

We assume that they are both rational people and both know something about the company and its future plans and profit potential. So, yes, that is one method: check the price of the stock in the paper or on the internet. But that's pretty easy. It's not really finance. It's more like reading.

There are other ways of doing stock valuation too.

The **Gordon Growth Formula**, also known as The Constant Growth Formula assumes that a company grows at a constant rate forever. This, by the way, is impossible as it can't grow forever. If a company doubles in size every 5 years, pretty soon every single person in the world is their customer and then they can't grow at that rate anymore simply because the world population isn't doubling every 5 years.

BUT, if we go ahead and assume that a company has a constant growth rate, we can use the following formula to get its value.

<b>Constant Growth Formula</b>	<b><math>Po = D1 / (Ks - G)</math></b>
--------------------------------	--

Po = Price

D1 = The next dividend.  $D1 = D0 (1 + G)$

D0 is the last dividend

Ks = Rate of Return

G = Growth Rate

Well we are assuming that the company has constant growth. So we take the last dividend, multiply it by the growth rate and we can get the next dividend.

Example

Last year's dividend = \$ 1.00

Growth Rate = 5%

Rate of Return = 10%

First find out D1.

$$D1 = D0 (1 + G)$$

$$D1 = \$1.00 (1 + .05)$$

$$D1 = \$1.00 (1.05)$$

$$D1 = \$1.05$$

Next use the formula.

$$Po = D1 / (Ks - G)$$

$$Po = \$1.05 / (10\% - 5\%)$$

$$Po = \$1.05 / 5\%$$

$$Po = \$21.00$$

So, if we want to get a 10% rate of return on our money, and we assume that the company will grow forever at 5% per year, then we would be willing to pay \$21.00 for this stock. That is the theory.

**PRATEEK MEHARIA**  
**PGDM-A**  
**2011-13**





October 25, 1811 –  
May 31, 1832

### QUANT TRIVIA

“  
Mathematics  
is the queen  
of the  
sciences, and  
number  
theory the  
queen of  
mathematics  
”

## QUANT GURU of the MONTH

**Évariste Galois** was a French mathematician born in Bourg-la-Reine in France. As a teenager, he was able to determine a necessary and sufficient condition for a polynomial to be solvable by radicals, thereby solving a long-standing problem. His work gave the basis for **Galois theory** and **group theory**, two major branches of abstract algebra, and the subfield of Galois connections. He was the first to use the word "group" (French: *groupe*) as a technical term in mathematics to represent a *group of permutations*.

### History

In October 1823, he entered the Lycée Louis-le-Grand, and despite some turmoil in the school at the beginning of the term, Galois managed to perform well for the first two years, obtaining the first prize in Latin. He soon became bored with his studies, and at the age of 14, began to take a serious interest in mathematics.

He found a copy of Adrien Marie Legendre's *Éléments de Géométrie*, about which it is said that he read "like a novel" and mastered at the first reading. At 15, he was reading the original papers of Joseph Louis Lagrange, such as the landmark *Réflexions sur la résolution algébrique des équations* which likely motivated his later work on equation theory.

In 1829, Galois' first paper, on **continued fractions**, was published. It was at around the same time that he began making fundamental discoveries in the theory of polynomial equations. He submitted two papers to the Academy of Sciences. Augustin Louis Cauchy suggested combining the two papers into one in order to enter it in the competition for the Academy's Grand Prize in Mathematics. Cauchy, a highly eminent mathematician of the time, considered Galois' work to be a likely winner.

A radical Republican during the monarchy of Louis Philippe in France, he died from wounds suffered in a duel under questionable circumstances at the age of 20.

### Contributions to mathematics

Galois' collected works amount to only some 60 pages, but within them are many important ideas that have had far-reaching consequences for nearly all branches of mathematics.

Galois' most significant contribution to mathematics by far is his development of Galois theory. He realized that the algebraic solution to a polynomial equation is related to the structure of a group of permutations associated with the roots of the polynomial, the Galois group of the polynomial

**HARSHITA SHRIVASTAVA**  
PGDM-A  
2011 - 13

## FUN FACTS: Quants in a lighter vein

### Guess your Birthday

Ask a person to think of their birthday...and that you are going to guess it.

Step 1) Ask them to consider the month of their birthday as a number: January = 1, February = 2 etc. and donot reveal the number until it is asked to do so.

Step 2) Multiply that number by 5

Step 3) Then add 6 to number got in Step 2

Step 4) Then multiply that total by 4

Step 5) Then add 9

Step 6) Then multiply this total by 5 once again

Step 7) Finally, ask them add to that total the day they were born on. If they were born on the 18th, they add 18, etc.

Ask them to tell you the final total. In your head, subtract 165, and you will have the month and day they were born on!

*How It Works:* Let M be the month number and D will be the day number. After the seven steps the expression for their calculation is:

$$5(4(5M + 6) + 9) + D = 100M + D + 165$$

Thus, if you subtract off the 165, what will remain will be the month in hundreds plus the day!

**VAIBHAV GOEL**  
**PGDM-IB**  
**2011-13**

## QUANT TRIVIA

"9 is the maximum number of cubes that are needed to sum to any positive integer."

# QUANT QUERY OF THE MONTH

## QUANT QUERY 1 OF THE MONTH

Every character represents a unique number, say A=2. Guess the characters

$$\begin{array}{r} \text{SEVEN} \\ \text{SEVEN} \\ + \text{SIX} \\ \hline \text{TWENTY} \end{array}$$

## QUANT QUERY 2 OF THE MONTH

**Editor's note: This query was published in ORMS**

Retailers invest heavily in predicting how customers will rate new productions such as movies, books, games and appliances. Accurate recommendations lead to increased revenue and happier customers. To make these recommendations, retailers look for correlations between different products in order to make suggestions on what other products a customer might like.

Table 1 shows movie ratings from five customers for five movies. The ratings range from 1 to 5. A rating of 5 indicates that the movie was very highly liked and a rating of 1 indicates that it was not liked at all. One movie rating is missing because Evan has not yet seen the movie "Prognosis Negative."

**Question:** Using only the data in Table 1, what is the most likely rating that Evan will give to the movie "Prognosis Negative"?

	Chunnel	Death Blow	Rochelle, Rochelle	Cry, Cry Again	Prognosis Negative
Alex	4	5	1	4	4
Bill	4	1	5	5	2
Carla	2	4	2	2	4
Dan	2	3	4	5	2
Evan	5	3	1	2	???

Table 1: Customer ratings.

Send your answer of quant query 2 to [puzzlor@gmail.com](mailto:puzzlor@gmail.com) by Dec. 15. The winner, chosen randomly from correct answers, will receive an "O.R.: The Science of Better" T-shirt. **ORMS**

**Answers and name of solvers will be published in the next issue. Mail your answers to [simsr.quantinum@gmail.com](mailto:simsr.quantinum@gmail.com)**

"13 is the number of Archimedi an solids."

# QUANT QUERY OF THE MONTH

contd.

## Solutions to Last Month's SUDOKU

5	3	2	7	6	8	1	4	9
1	8	7	3	9	4	5	6	2
4	6	9	2	1	5	8	3	7
8	5	4	1	2	6	9	7	3
7	1	6	8	3	9	4	2	5
9	2	3	4	5	7	6	1	8
3	4	8	5	7	1	2	9	6
6	7	1	9	8	2	3	5	4
2	9	5	6	4	3	7	8	1

The correct answer to Sudoku was given by Abhrajit Sett of PGDM 2010-2012 batch. Congratulations!



# Quantinum@SIMSR

*Quantinum, the Quant's forum of KJ Somaiya Institute of Management Studies and Research is formed with two objectives. Firstly to remove the common myth from the students mind that mathematics is difficult. Secondly to give students an exposure on how to make decisions in real life business problems using quantitative techniques. This helps to bridge the gap between theory and the practical application.*

*For any further queries and feedback, please contact the following address*

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