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QURIOSITY

THE MONTHLY NEWSLETTER FROM QUANTINUUM

DECEMBER 2012

VOLUME 3 : ISSUE 8

MOVIE REVIEW



QUANT GURU S. RAMANUJAN



QUANT FUN



K.J Somaiya Institute of Management Studies & Research, Vidyavihar, Mumbai



Its more than **NUMBERS**

Quriosity

DECEMBER 2012

VOLUME 3 : ISSUE 8

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From the Mentor's Desk...

Hi All,
Happy New year to you all.

We are ready with another issue of Quriosity for whetting your interest buds. We hope you will like it, read it, and make suggestions for improvement.

We are proud to present a report on Srinivasa Ramanujan, the Indian Mathematical Genius, whose 125th birth anniversary was celebrated during December, 2012.

The report on KPOs will be useful to people looking for opportunities in the analytics field.

Regards
Prof N.S.Nilakantan
Mentor- QUANTINUUM

From The Editor's Desk

Editor's note

Greetings to all,

It is the beginning of a new year and a time when we ponder about ways to reinforce and reinstate our commitment and pursuit to bring you the best from the world of quants.

Keeping with this endeavor, we proudly present to you yet another special issue of **"QURIOSITY – the Quantinum newsletter"**.

The cover story is our attempt to educate and guide students about the various profiles and analytical skills required to make a career in the **Indian KPO industry** along with the detail overview and description of the same.

Quant digest furnishes interesting reads in the form of articles such as – **"Juggling by Numbers: How notation revealed new tricks"**, **"The maths of the pop-up tent"**.

The movie review covers a highly enthralling movie – **"Cube"**, a 1997 Canadian science fiction psychological horror film.

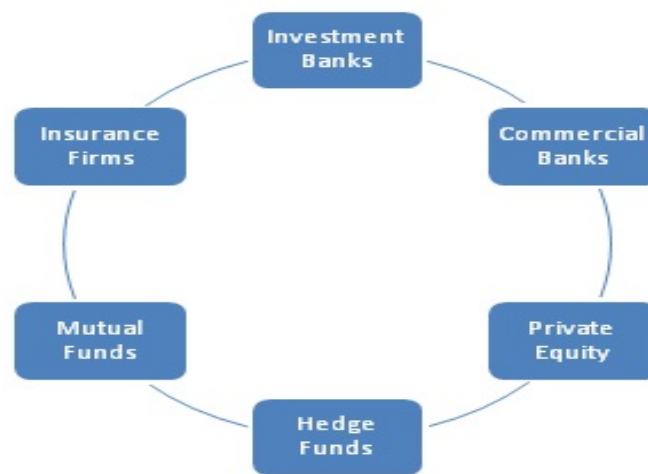
Further to stimulate the grey matter in your brain; we bring you the wonders of our regular features- **quant trivia, quantiz and quant fun**.

Happy reading!!

EDITOR

CAREERS IN KPO

- The global financial services industry has been a significant driving force behind each of the three waves of outsourcing moving from ITO to BPO, and now to KPO. A financial services KPO thus represents the latest innovation in the multi-decade process of value creation strategies, with respect to a financial institution's middle & back offices. In addition, financial services KPOs offer some of the best salaries in the industry.
- The typical salary for a fresher varies from Rs 25,000 to Rs 75,000 per month depending upon the qualification of the employee and complexity of the role. Financial services KPOs provide services to clients across multiple domains such as Equity research, Investment banking, Insurance and actuarial, Corporate credit, Project finance, Retail banking & analytics and Derivatives.



Profiles of some of the prominent jobs in financial KPO

Equity Research:

Equity research is analysis of equity security of companies or industries. Financial services

KPO's offer two kind of roles in Equity research namely sell-side & buy-side. In sell-side, the analyst works with stock analyst from a brokerage firm. In buy side the analyst typically works with portfolio manager and research team from a fund house.

Work Profile: Day to day tasks includes up-dating and maintaining company financial models, carrying out sector analysis, using DCF and stock valuation methods, monitoring key news flows relevant to sector, writing research reports such as initiation reports, sector reports, earnings reviews and pre-views.

In addition, buy-side research work also includes in-depth sector analysis, performance tracking of stocks in portfolio, identifying and developing stock ideas, investment themes and trading strategies.

Key Skills: Knowledge of accounting, financial modeling and valuation (DCF, relative valuation, comparable company analysis) and excel is a must. Having a certification such as CFA is an added advantage.

Strategy and M&A support:

In this role the analyst supports an investment banker from a global bank. Most of the work in Merger & Acquisition space is related to corporate restructuring, IPOs (Initial Public offering) and FPO (Follow on public offering), debt syndication, project financing, private placements and deal execution. In outsourcing arrangement the investment banker typically focuses on client facing and deal making activities, while The KPO analyst takes care of research, analytics and data gathering.

Work Profile: Broadly M&A work can be analyzed in two parts: deal origination and deal execution support. In deal origination, the analyst assists client in company screening and profiling, preparing pitch book for proposal building and industry landscape. Majority of work in deal execution is related to valuation modeling, benchmarking, capital structure analysis, information synthesis and road show presentation support.

Key skills: Good knowledge of accounting, M&A valuation models (LBO, comparable transactions), sound presentation making and report writing skills

Derivatives Support:

In this role analyst supports middle office operations team. This involves interaction with multiple departments such as trading desk, quant & structuring group, documentation, legal and sales teams. In general, KPOs offer derivative support in different asset classes: equities, commodities, FX and credit.

Work Profile: Broadly there are three variants of job profile in this discipline i.e. Trade review, P&L control, and Price Testing. In trade review the primary task is to review the trade against the legal regulation/constraints in order to minimize the market, operational and legal risks. P&L control work is typically related to checking the Mark to Market prices of derivative instruments and attributing the change in prices to various factors. Price testing is related to testing the market data which is used for the valuation of derivative products.

Key Skills: Basic knowledge of excel, VBA and derivatives is a must. Programming and exotic derivative product knowledge is a plus. Certifications such as FRM & PRM are an added advantage.

Insurance and Actuaries:

This is another interesting and emerging domain in KPO industries. Actuarial work requires in depth understanding of client's product, services and process, coupled with complex statistical analysis. Typical firms operating in this domain include general insurance firms, investment management firms, and pension funds

Work Profile: Prominent areas where KPO offers services to the clients include under-writing, asset management, claim analysis and actuarial services. The job requires good modeling skills in the areas such as claims estimation, ALM (Asset /Liability) modeling, product and channel profitability analysis. Other broad areas of work include integrated reserving and pricing of product (predictive modeling), analysis of insurance risk and regulatory support.

Key Skills: Strong analytical, excel and programming skills. There are few qualified Actuaries in India and any kind of professional certification in this field is highly valuable. Knowledge of Mathematics (Statistics and Probability) is an added advantage.

Credit Research Analyst:

Credit Analysts in KPO typically work with corporate relationship manager handling large/mid corporate clients. Both Indian and foreign banks offer range of product and services such as working capital finance, term loans, trade finance and treasury products to corporate clients. These product offerings are suitably structured as per client's risk profile and credit needs.

Work Profile: Analysts in this role assist relationship managers in preparing credit appraisal reports (client's risk profiling and rating) for potential and existing corporate customers. This includes extensive analysis of business, industry, management and company financials from credit perspective. Day to day work also includes scheduled renewal and risk profile assessment of existing clients and ensuring adherence to the credit policy and local lending regulations.

Key skills: Sound knowledge of accounting and financial modeling (balance sheet analysis, debt related ratios, etc) from credit lending perspective. Understanding of common corporate banking products and services, credit guidelines and lending regulation is an added advantage.

Economic Research:

Economic research analyst in this role works with a strategist or lead economist from global bank. Economists in this job profile typically conduct research on macro (fiscal, monetary, etc) and micro economic policies, study the impact of new policies such as pro-posed legislation, taxes, etc and provide consultation on economic relationships to different business.

Work Profile: Research analysts in KPO generally have to deal with large amount of macro-economic data and they should have an eye for details to study market trends and other factors. They assist on shore team in conducting research on economic issues using technical reports or scientific articles in journals, analyzing the impact of macro-economic data release, testing the applicability of economic theory in real world, forecasting macro- economic variable (unemployment rate, GDP, etc) using qualitative and quantitative techniques.

Key Skills: Strong mathematical, statistical and analytical skills, ability to work on complex financial models, and basic understanding of theoretical economic application and principles.

Exit Options and Other opportunities

After gaining few years of experience in financial services KPO there can be different kinds of career opportunities that can emerge. One can either continue to work in financial services industry or choose to move to other industries. If continuing in the same sector, then one can look at opportunities in boutique investment banks, local brokerage houses, fund houses and MNC & Indian Banks.

In addition a good and substantial experience in KPO industry could also open career opportunities in other industries as well such as market research firms, consulting houses, investor relations, corporate strategy, etc.

Apart from this depending on the requirement and offshore analyst potential, it is also possible to get absorbed directly on the client side. Although such opportunities emerge very rarely.

Further, one can seek a long term goal in the third party KPO itself. One can move to business head position or can seek an exclusive client relationship management oriented roles.

Manoj Aramandla

PGDM-FS (2012-14)

QUANTS NEWS DIGEST

“Juggling by Numbers: How notation revealed new tricks” by Laura Gray

BBC News Magazine, 19th Dec 2012

Mathematician **Colin Wright's** system for notating juggling maneuvers, known as **Siteswap**, not only provides jugglers with a code for describing and discussing their tricks, but also provides opportunities to try out new moves. Siteswap translates each ball toss into a number corresponding to how many beats the ball spends in the air, which is directly related to how high the ball must be tossed. Even numbers are tosses caught with the same hand with which they are thrown, odd number tosses change hands, and numbers are strung together in sequences to describe tossing multiple balls simultaneously. Wright developed Siteswap in the 1980s after becoming frustrated with the difficulty in recording a single juggling move on paper, and since then jugglers around the world have adopted his method. With a system like Siteswap for cataloguing tricks, jugglers were able to identify sequences that produced fun and novel tricks.

More information available @

<http://www.bbc.co.uk/news/magazine-20728493>

“The maths of the pop-up tent” by Philip Ball

Nature, 18th Dec 2012

Pitching up a pop-up camping tent is pretty easy, but wrestling it back in the bag is usually much harder. *Nature's* News section has a piece on how a mathematical theory is used to describe the shapes that flexible rings found in pop-up tents can adopt. "We have found the best way to fold rings," says **Alain Jonas**, a materials scientist at the Catholic University of Leuven in Belgium, who led the research. Jonas and his team showed that buckled rings can be predicted accurately using a theory that invokes a single key mathematical concept. "There is a lot of interest currently in this kind of fundamental mechanical problem," says **Basile Audoly**, a mathematician at Marie Curie University in Paris. Jonas thinks that the results might also apply on the molecular scale for understanding the shapes of circles of DNA found inside organisms such as bacteria and other ring-shaped polymers.

More information available @

<http://www.nature.com/news/the-maths-of-the-pop-up-tent-1.12077>

366 Days: An interactive journey through 2012 in numbers

Follow this link for an amazing Nature's numerical guide to the year's scientific events.

<http://www.nature.com/news/366-days-an-interactive-journey-through-2012-in-numbers-1.12041>

Manish Murthy

PGDM (2012-14)

MOVIE REVIEW: CUBE

Cube is a 1997 Canadian science fiction psychological horror film, directed by Vincenzo Natali. The movie is set in identical cube-like rooms (hence the name) with each room being a different colour (white, blue, green, amber and red), and no background story is revealed for the characters or the reason they were left in the Cube. The film also doesn't demonstrate any clear plot regarding the Cube's background, creation, purpose and its location. The timeframe of the story is also left unknown.

The plot starts with a man named Alderson who awakens and is bewildered to find himself in a cube-shaped room with a hatch in each wall, on the floor and in the ceiling. Opening some of the hatches, he finds passages to rooms that are identical except for their colours. He enters one room (colored red) and, without warning, is sliced to pieces by a wire grid.

In another such room, five people - Quentin, Worth, Holloway, Rennes and Leaven - meet. None know where they are, how they got there, or why. Quentin informs them that some cubes contain traps (almost killed by one); assuming they are triggered by motion detectors, Rennes tests each by throwing a boot in first

Leaven notices numbers inscribed in the passageways between rooms. Quentin, a policeman, recognizes "the Wren" as an escape artist renowned for getting out of jails. After "booting" one room, Rennes enters but is sprayed by acid, which eats through his face and kills him.

Quentin believes each person has a reason for being there. He is a police officer, Leaven is a mathematics student, Holloway a doctor and conspiracy theorist who thinks the "military industrial complex" is responsible, while the surly Worth declines to talk about himself or his past actions. Leaven theorizes that any room marked with a prime number is a trap. They then find a mentally challenged man named Kazan, whom Holloway insists they bring along. Quentin enters a supposedly safe room and is nearly killed by a razor-wire trap, disproving Leaven's theory. Tensions rise, with Quentin becoming irritated by Holloway's paranoia and liberalism, Kazan's childlike mentality, and Worth's reticence.



He baits Worth into revealing of himself. He then admits that he knows about this place, as he designed the Cube's outer shell. Worth insists that he knows nothing about the rest of the structure. He believes that its purpose has been lost over time and that they are only there because not using it would mean admitting the Cube was a waste. His knowledge of the outer shell's size allows Leaven to determine that there are 26 rooms to a side, 17,576 in all. She guesses that the numbers indicate the Cartesian coordinates of the rooms. The group starts moving toward the nearest edge. They arrive close to the edge, but find that each neighbouring room is trapped. Rather than backtrack, they decide to make their way silently through a blue colored room whose trap is sound-activated (the only one they can bypass). The others manage to pass, but when Quentin goes up, Kazan makes a noise, and he is almost impaled by the spikes, storming and almost beating Kazan up.

They arrive at an edge room and find a wide, unlit gap between it and the outer shell. Holloway swings out to investigate, using a rope made from their clothes, but nearly falls when the Cube suddenly shakes; she climbs up and grabs Quentin's arm, but he drops her to her death, telling the others that she slipped. As they rest, Quentin tries to persuade Leaven to abandon the others and come with him. He quickly becomes aggressive. When Worth intervenes, Quentin beats him and then throws him through the floor hatch. Worth laughs hysterically at what he finds — Rennes' corpse. The thought that they have been going around in circles is demoralizing, but then Worth realizes that the rooms move about periodically. Leaven deduces that traps are not tagged by prime numbers but by powers of prime numbers. Kazan, it turns out, is an autistic savant who can quickly do prime factorizations and thus identify the traps. Leaven determines that the numbers indicate the positions that each room will reach as it cycles through the Cube. The room that connects to the "bridge" leading to the only door in the outer shell proves to be the one in which the group first woke up. The alignment they need will come in two moves.

Worth ambushes Quentin and leaves him behind during one move as they hurry to the cube adjoining the bridge. When they open the hatch, they are met by a bright white light (which is the only exit and entrance of the Cube). Worth decides to stay over Leaven's objections, saying there is nothing outside for him but "boundless human stupidity". A bloodied Quentin appears and fatally stabs first Leaven, then Worth with a door handle, before going after Kazan. With the last of his strength, Worth grabs Quentin's leg, holding him long enough for Quentin to be ripped apart in the passageway as the bridge shifts. Worth then dies of his wounds, and Kazan walks out into the bright light.

ADITI PALIWAL
PGDM-IMC 2012-14

QUANT GURU of the MONTH

One of India's greatest mathematicians, Srinivasa Ramanujan was born on 22 December 1887, one hundred and twenty five years ago in Erode, Tamil Nadu. He died at the very young age of 32 on April 26, 1920 in Kumbakonam. Prior to his last few months in India, he lived for five years in Cambridge, England, and produced some of the most breathtaking mathematical results in collaboration with one of England's then most eminent mathematicians, Professor G. H. Hardy. Ramanujan's work of these five years has led to extraordinary work in the number theory and pure mathematics over this entire century.



The many scribbled theorems, mostly unproved but undoubtedly true, have also led to new and exciting research. One writer compared this discovery to suddenly finding Beethoven's tenth symphony. Imagine the excitement. The discovery of Ramanujan by Hardy itself is an amazing story. In January 1913 (the year when Rabindranath Tagore got his Nobel Prize for literature), Ramanujan wrote an unsolicited letter to Hardy. He had written such letters to many other English professors. But had got no response.

The letter was a collection of some of his mathematical results. These nine handwritten pages arrived in Cambridge probably in semi tattered form on Hardy's desk. Hardy suspected this work to be fraud, for many people used to write to him claiming to have solved profound mathematical problems. But the theorems intrigued him. There were a few mistakes, mostly minor. But the results were astoundingly profound. He immediately got in touch with British authorities and arranged for Ramanujan's transport to England. Thus began one of the greatest mathematical voyages of modern times. In the next several years, Professor Hardy along with professor Littlewood collaborated on a rich body of work in Cambridge.

Even after he came back to India, due to ill health, he wrote a letter to Hardy literally from his deathbed in 1920. That letter itself has led to a whole new field in mathematics called "mock theta functions". This relatively new field is seeing vigorous activity and research now, almost hundred years after the death of Ramanujan.

Princeton physicist Freeman Dyson has predicted that the theory of mock theta functions will spawn several fields of research in the twenty first century across the disciplines of physics, mathematics and beyond. In 1976 a "lost notebook" of Ramanujan was discovered among old papers of a Professor in England.

Later Hardy described this collaboration as "one of the truly romantic incidents of my life". He also said that if he had done anything worthwhile in his life, it was to have met a person like Ramanujan. For an austere Englishman to have made such sentimental statements itself is a testimony to the genius of Ramanujan. They made a most unlikely pair, a highly sophisticated Englishman who was a Cambridge don, very proper and methodical; and an orthodox religious, strict vegetarian, unsystematic and given to bouts of inspired genius.

This 'romantic' collaboration inspired English playwright Simon McBurney in 2007 to conceptualize and direct an award winning play called "A Disappearing Number". This play was performed in India in 2010 when India hosted the "Olympics" of mathematics, i.e. the International Congress for the very first time.

Ramanujan's work finds application in a variety of fields like cryptography, data compression, networks, algorithms, space research and weather forecasting. Ramanujan's true legacy is the demonstration of how a humble untutored village boy, with sheer passion and inspiration rose to become one of the world's greatest mathematicians. Robert Kanigel, his well known biographer called Ramanujan as "The man who knew infinity".

The beauty of Ramanujan's work in mathematics is on par with the best works in poetry, music and philosophy. May Ramanujan's memory inspire us to pursue our passion, especially in a field like mathematics, which is a key source of competitive edge in the modern world.

VINAYAK NAIR
PGDM-2012-14

QUANTIZ of the MONTH

Q1) Birthday: The day before yesterday I was 25 and the next year I will be 28. This is true only one day in a year. What day is my birthday?

Q2) Using four sevens (7) and a one (1) create the number 100. Apart from the five numerals you can use the usual mathematical operations (+, -, x, /), root and brackets ().

Q3) Find a 10-digit number, where the first figure defines the count of zeros in this number, the second figure the count of numeral 1 in this number etc. At the end the tenth numeral character expresses the count of the numeral 9 in this number.

Q4) Find the smallest positive integer such that when its last digit is moved to the start of the number (example: 1234 becomes 4123) the resulting number is larger than and is an integral multiple of the original number. Numbers are written in standard decimal notation, with no leading zeroes.

Q5) An urn contains a number of colored balls, with equal numbers of each colour. Adding 20 balls of a new colour to the urn would not change the probability of drawing (without replacement) two balls of the same colour. How many balls are in the urn? (Before the extra balls are added.)

Please send us the answers at simsr.quantinum@gmail.com. Answers and Name of the winner (first all correct /most correct entry) will be published in the next issue.

Solutions to last issue's Quiz of the month

1. Triskaidekaphobia
2. 120 miles
3. 1700 Men
4. 46 steps
5. 46

Keeping the Grey
matter Alive!

QUANTIZ TEAM

QUANT FUN

Hyper Sudoku of the Month

A Hyper Sudoku is solved by filling the numbers from 1 to 9 into the blank cells, but it has, unlike classic Sudoku. 13 regions (four regions overlap with the nine standard regions). In all regions, the numbers from 1 to 9 can appear only once. Otherwise, a Hyper Sudoku is solved like a normal Sudoku.

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

Please send us the answers at simsr.quantinum@gmail.com.
Answer and name of the winner will be published in the next issue.

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

QUANT TRIVIA



“A
Mathematician is
a blind man in
dark room
looking for black
cat which is not
there. – Charles
Darwin.”

QuantConnect

Quantinum, the Quants forum of KJ Somaiya Institute of Management Studies and Research is formed with two objectives. Firstly to remove the common myth from the students' minds 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 practical applications.

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

KJ Somaiya Institute of Management Studies and Research
Vidya Nagar, VidyaVihar, Ghatkopar East
Mumbai -400077

Mentor

Prof. N.S.Nilakantan (9820680741) – email – nilakantan@simsr.somaiya.edu

Team Leaders

Satyadev Kalra (8291687568)
Abin Abraham (9594374903)
Somjeet Dutta (9769513003)
Vaibhav Goel (9769456493)

Editorial Team

Aditi Paliwal (9819116068)
Abhishek Kumar (9819099671)
Manish Murthy (9167679676)

For any queries, drop us a mail at simsr.quantinum@gmail.com

For more details: <http://quantinum.weebly.com/>



<http://simsrquantinum.blogspot.com/>

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