

PIYUSH AHUJA

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EDUCATION

Indian Institute of Technology Delhi (IIT Delhi)	New Delhi, India
<i>Integrated Masters of Technology in Mathematics and Computing</i>	<i>2008-2013</i>
C.G.P.A: 9.21/10 (2011-13)	8.07/10 (Overall)

RESEARCH INTERESTS

Algorithmic Game Theory, Mechanism Design, Network Design, Behavioral Economics

SCHOLASTIC ATTAINMENTS

All India Rank 708 and **99.77 percentile** (among 311,258 candidates) in IIT JEE 2008

All India Rank 643 and **99.93 percentile** (among 862,853 candidates) in AIEEE 2008

Graduate Record Examination **GRE Score: 333/340**

Only student from IITD selected for fully sponsored summer internship program in NUS

Scholar's Badge, St. John's High School Chandigarh

Master's Thesis:

- P. Ahuja, "Approximation Algorithms in Network Design"
Received **Outstanding Grade** by a joint panel of Department of Mathematics and Computer Science

Publications:

- P. Ahuja and S.Kundu, "Redimensioning of Euclidean Spaces"
Preprint: <http://arxiv.org/abs/1307.7010>
- P. Ahuja, "Man and Machine: Questions of Risk, Trust and Accountability in Today's AI"
Preprint: <http://arxiv.org/abs/1307.7127>

RESEARCH EXPERIENCE

Approximation Algorithms in Network Design	Master's Project, IIT Delhi
<i>Supervisors: Professor Naveen Garg and Professor Amitabha Tripathi</i>	<i>July 2012-July 2013</i>

Devised a new primal dual algorithm for Single-Sink Rent-or-Buy problem. Proved lower bound of 3 on performance guarantee of 4.55- algorithm by Swamy and Kumar

Internet Economics and Network Congestion Pricing	National University of Singapore
<i>Supervisor: Professor Richard Ma</i>	<i>May 2012 – July 2012</i>

Modeled the Internet network congestion as a competitive equilibrium in a stochastic process. Conceptualized 'Congestion Options', instruments analogous to stock options in financial markets

Economics and Rationality	Department of Humanities, IIT Delhi
<i>Supervisor: Professor Rukmini Bhaya Nair</i>	<i>July 2012-Current</i>

Hypothesized that (1) Altruistic instinct leads to violations of transitivity & independence, and (2) Psychological value of money depends on ownership. Devised experiments to test these.

Combinatorial Algorithms for A-D Market Equilibria	Department of Computer Science, IIT Delhi
<i>Supervisors: Professor Naveen Garg</i>	<i>January 2012-May 2012</i>

The market equilibrium problem consists of finding a set of prices and allocations of goods to economic agents such that each agent maximises his utility, subject to his budget constraints, and the market clears. The polynomial time exact algorithm for computing an Arrow-Debreu market

equilibrium for the case of linear utilities is based on solving a convex program using the ellipsoid algorithm and simultaneous diophantine equations. To date, no polynomial time combinatorial algorithm for the same is known. We attempt to solve the open question of designing an efficient combinatorial algorithm for the A-D market equilibrium problem, and gain further structural insights about the theory.

Stochastic Modelling in Healthcare Services

Supervisor: Professor Nimesh Bolia

AIIMS, New Delhi, India

October 2011-December 2011

Collected & filtered data for afternoon shift (6 hours) in emergency department over 4 weeks.

Modeled the workflow as a stochastic process. Facilitated the evaluation of impact of various staffing levels on service efficiency (patient throughput and patient waiting time)

Application of Functional Analysis in Finance

Supervisor: Professor Subiman Kundu

Department of Mathematics, IIT Delhi

July 2011- November 2011

Concepts from measure theory can be used to capture information flow in financial markets. We show that the existence of the conditional expectation of a given random variable follows from the structure of L^2 Hilbert Spaces. Interpreted this way, the conditional expectation is the orthogonal projection of the random variable on a sub- σ -algebra - the *unique a.e best approximation* of the random variable on the closed subspace of the space of all random variables with finite variance.

*Received **Outstanding Grade** by a panel in Department of Mathematics*

PRESENTATIONS AND TALKS

1. Othello and Omkara: Reading Shakespeare in Modern Times (*Introduction to Drama*)
Critique of Vishal Bharadwaj's adaptation of Shakespeare
2. Yields falsehood when preceded by its own quotation (*Mind, Machine and Language*)
Dialectic in the form of the Socratic method
3. Passing The Baton
Workshop for nurturing and mentoring new quizzers
4. Art and Humanity (*Contemporary Fiction*)
Discussion on What is Art? What makes Art good or bad? Who decides?

UNPUBLISHED ESSAYS AND ARTICLES

1. P. Ahuja, "Economics and Morality: An Altruistic Dimension"
2. P. Ahuja, "Game Theory and The Dark Knight"
3. P. Ahuja, S. Chohan and S. Chouhan, "Role of Science and Technology in China's Healthcare Sector".
4. P. Ahuja, "Capturing Information Flow through Hilbert Spaces"
5. P. Ahuja, "The Theory of Conditional Expectation"
6. P. Ahuja, "Dreams and The Problem of Consciousness"
7. P. Ahuja and S. Shrivastava, "What's in a name?: An Essay in Philosophy of Language"

INDUSTRIAL EXPERIENCE

Deloitte Consulting US-India Ltd.

Summer Internship in Information Management Division

Mumbai, India

May 2011-July 2011

Created a data warehouse prototype for Deloitte's *Communication Excellence* program in a team of five. **Offered a full-time position** based on the work.

TECHNICAL SKILLS

Python, LaTeX, HTML, CSS

COMMUNITY WORK

- **Teach for India (Jafana English Medium School, Govandi)** **June 2011**
Instituted a library and resource centre in a low-income school in Mumbai
- **National Service Scheme:** **2008-10**
Taught children in campus under N.G.O Vidya. Devoted 100 hours to service under NSS

QUIZZING, LITERARY AND SPORTS ACCOMPLISHMENTS

Quizzing: *Finished in the **top three in 52 quizzes** at various levels in the last 5 years, including:*

National Level:

- **Winner, Four Episodes**, Season 1 & 2, *NDTV Tech Grandmasters*. Reached **Top 4** all over India
- **Second Runners-up, One episode**, *DD Sports Sports ke Superstar*. Finished 3/10 in All-India episode

Inter College Level:

- **Winner**, General Quiz 2009, Hindu College
- **Winner**, Movie Quiz 2010, St.Stephen's College
- **Winner**, SciTech Quiz 2010, Delhi Technological University
- **Winner**, General Quiz 2010, Zakir Hussain College
- **Winner**, Literature Quiz 2011, Literati, IIT Delhi
- **Winner**, Sports Quiz 2011, Sportech, IIT Delhi
- **Runners-up**, General Quiz 2012, Lady Sriram College for Women
- **Runners-up**, Jigyasa General Quiz 2010, Jesus and Mary College
- **Runners-up**, General Quiz 2011, Department of Management Studies, IIT Delhi
- **Runners-up**, Mathematics Quiz 2012, Kamala Nehru College
- **Second Runners-up**, Zoom-In 2011, Rendezvous, IIT Delhi
- **Second Runners-up**, Sphinx 2009, Rendezvous, IIT Delhi
- **Second Runners-up**, Sports Quiz 2011, Sri Venkateswara College
- **Second Runners-up**, Literature and Arts Quiz, Delhi Technological University
- **Second Runners-up**, General Quiz 2011, Ramjas College
- **Second Runners-up**, General Quiz 2012, Gargi College
- **Second Runners-up**, Lit, Ent and Arts Quiz 2010, Zakir Hussain College
- **Second Runners-up**, General Quiz 2011, Montage, Jesus and Mary College

Institute Level:

- **Winner, 10 Quizzes**. Mastermind 2012, Lone Wolf 2011, Quizzathlon 2012, 2011 & 2010, Variety Quiz 2011 & 2009, Jeopardy 2013 & 2010
*Led hostel to **Winner's Trophy (2012)** and **Runners-up Trophy (2009, 2010, 2011, 2013)***

Literary Events:

- **Winner**, Cryptic Crossword, Inter-College competition at Rendezvous 2011, IIT Delhi
- **Winner**, Word Games, Inter-College word puzzles competition at Literati 2011, IIT Delhi
- **Winner**, E-Labyrinth, National Level online treasure hunt at Literati 2010, IIT Delhi
- **Winner**, Three Muses, Institute Level competition on literature and cryptic word games

Football:

- **Silver Medal**, 2010-11, Inter-Hostel Football League, IIT Delhi
- **Silver Medal**, 2008-09, Inter-Hostel Football League, IIT Delhi

LEADERSHIP EXPERIENCE

Secretary, Representative and Panel Member, Quizzing Club, IIT Delhi 2009- 2012

- Led a team of 11 to organize 30 events, including all major events in India's quizzing calendar:
 - World Quizzing Championships '10, held simultaneously across 70 cities in 30 countries
 - National Level Sweden-India Nobel Quiz 2010, in collaboration with Embassy of Sweden
 - Mahaquizzer & Megawhats: biggest open quizzes in India, held simultaneously in 14 cities
- Organized 8 Inter-College events at Rendezvous 2010, with 100+ teams participating in each event
 - Collaborated & secured sponsorship deal from IMS
 - Arranged for Indian football star Sunil Chhetri to open the Sports Quiz

*Awarded **Runners-up Trophy, Best Club**, 2010-2011*

Overall Coordinator, Reliance Ramanujan Mathematics Quiz July 2012-December 2012

An Inter-School quiz contest celebrating the birth anniversary of Srinivas Ramanujan

- Recruited and led a team of five to set up and manage logistics, promotions & web development
- Assisted Srinjoy Chowdhuri, anchor & senior editor, Times Now for content development & hosting
- Successfully collaborated with Reliance Foundation, with over 300 teams participating from 100+ schools from the NCR region

Quizmaster and Crossword Setter for Literary Events:

- Word Games 2013, Annual Crossword and Word Puzzles Event
- Sphinx, Rendezvous 2011, Inter-College Quiz at IIT Delhi
- Sports Quiz 2010, Rendezvous 2010, Inter-College Quiz at IIT Delhi
- Esoterica, Science and Technology Quiz at Tryst 2010, IIT Delhi
- Inter Hostel Quizzes: Lone Wolf 2013, Jeopardy 2012, Movie Quiz 2012 and Quizzathlon 2011

Panel Member, Film Screening Committee. Formulated Club Policies for the year 2011-12. Effected a collaboration with Taj Enlighten Film Society

Coordinator, Tryst 2010. Led a team of two activity heads in successfully conducting an event at annual technical festival

HONORS AND AWARDS

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|---|-------------|
| • Cumulative Outstanding Contribution to Board of Recreation and Creative Activities | 2013 |
| <i>Awarded to the best all-round cultural and creative contribution in IIT Delhi</i> | |
| • Cumulative Outstanding Contribution to Quizzing Club | 2012 |
| <i>Awarded to the best cumulative contribution to Quizzing Club</i> | |
| • Outstanding Contribution to Film Series Committee | 2012 |
| <i>Awarded to two students for outstanding contribution to Film Series Committee</i> | |
| • Gem of the House | 2012 |
| <i>Awarded to the best outgoing all-rounder in the hostel</i> | |
| • Significant Contribution to Cultural Activities | 2011 |
| <i>Awarded to the best contribution to cultural activities amongst the third year in the hostel</i> | |
| • Best Representative, Quizzing Club | 2010 |
| <i>Awarded to 1 out of 11 representatives of the Quizzing Club at IIT Delhi</i> | |

OTHER ACTIVITIES

Writing: Essays & Satirical Fiction | Trekking: Mt. Krakatau | Cycling: Pulau Ubin Trail (Singapore)