Utkarsh Patange

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Education

- Pursuing PhD in Decision, Risk and Operations from Columbia Business School.
  Research Interests: Information systems, Stochastic Processes, Matching markets
- Graduated from **IIT Kanpur** after completing B.Tech in **Computer Science and Engineering** with second major in **Mathematics and Scientific Computing** with an overall C.G.P.A. of **9.3/10**
- Maintained a C.G.P.A. of **9.8/10** in CSE courses and **9.3/10** in MTH courses at the time of graduation

Scholastic Achievements

- Received certificate of appreciation and honorarium for services in **Joint seat allocation 2016** — Oct '16
- Awarded the **best software** award in IITK convocation 2016 for the **Joint seat allocation** project — Jun '16
- Received certificate, plaque and honorarium for "Exceptional Contribution" in **joint seat allocation 2015** — Aug '15
- Awarded the **best project** award in NITK CMU winter school for project on voice forensics — Dec '14
- Received the Academic Excel. Award (given to **top 7%** students each year at IITK) for **3 consecutive** years — 2011-2014
- Selected as a Globalink Research Intern in Mitacs program with 470 others out of 8000 applicants — May-Jul '14
- Awarded SURGE fellowship given by IIT Kanpur to **64** out of **1875** applicants that year — May-Jul '13
- Secured all India **rank 150** in IIT-JEE out of over **480000** registered candidates — 2011
- Placed in State-wise Top 1% in state of Rajasthan for performance in National Standard Examination in Physics, the first step towards qualifying for Indian team to the International Physics Olympiad — 2010
- Awarded the KVPY fellowship given by IISc Bangalore on behalf of Dept. of Science and Technology, Govt. of India — 2009

Published Works and Talks

- Institute lecture on "Joint seat allocation 2015 & 2016: Challenges and Impact" at IIT Bombay on 12th April, 2017 (URL: `http://www.iitb.ac.in/en/event/lecture-joint-seat-allocation-2015-and-2016-challenges-and-impact`)
- Technical committee report for Joint seat allocation of IITs, NITs, several IIITs and other GFTIs 2015 (uploaded at `http://jeeadv.iitb.ac.in/en/jee-advanced/seat-allotment-2015` as 'Algorithm used for seat allocation')
- TraffTrend: Real time traffic updates and traffic trends using social media analytics. Published in CODS-IKDD '15 Proceedings of the 2nd IKDD Conference on Data Sciences
- Presented the work done as part CoDS data challenge in the 2nd IKDD conference on Data Sciences held in Bangalore

Technical Skills

Programming Languages	C, C++, Python, Ruby on Rails	**Tools**	LaTeX, Flex, Bison, Zoom
Query languages	SQLite, MySQL, MS SQL Server	**Operating systems**	Linux, Windows

Work Experience

Trading Analyst at Alphagrep Securities

Working as an engineer in HFT firm to provide low latency trading solutions — Aug '16 - Present

- Developed low latency solutions for different exchanges that are being used for live trading.
- Improved latency of the internal logging system by a factor of 2 in most cases, affecting all applications used by the company.
- Analyzed machine code of an external library, figured out what it was doing, and replaced it with a lower latency alternative.
- Promoted to 'Senior Trading Analyst' after one year of joining with a 20% increase in salary

Internships

Joint seat allocation for IITs, NITs, several IIITs and other GFTIs 2016

*Our software was finally used to allocate seats to over **1.2 million** eligible candidates* — Dec '15 - Jul '16

- Modified the previous software to accommodate for the business rule changes from 2015 to 2016.
- Improved the previous year's code so that it became 7-8 times faster
- Tested our allocation on large input data sets handed over to us by IIT Madras
- Stayed in Delhi for **28 days** to **daily** match and validate both outputs on snapshots of **actual database**
- Handed over the source code so that it can be used for 2017 joint seat allocation as well

Joint seat allocation for IITs, NITs, several IIITs and other GFTIs 2015

*Our software was finally used to allocate seats to over **1.3 million** eligible candidates* — Jul '14 - Jul '15

- Designed and implemented the algorithm to jointly allocate seats to the participating technical institutes
- Obtained approval from **MHRD, India** to conduct seat allocation jointly after passing desired tests
- Created synthetic data to test joint seat allocation. Our allocation matched perfectly with the expected one
- Tested our allocation on large input data sets handed over to us by NIT Surat, IIT Kharagpur, IIT Madras etc.
- Designed the **validation modules** that were used to confirm that all the business rules were being followed correctly
- Helped decide the **input/output format** of tables used in joint seat allocation
- Perfected the implementation during the summer so that it can be used **in parallel** with the official NIC software

• Stayed in Delhi for **24 days** to **daily** match and validate both outputs on snapshots of **actual database**

Important Projects

TraffTrend: Real time traffic updates trends using social media analytics

Participation in ACM-CoDS data challenge Mar 2015

• Created a platform to analyse **real time** traffic updates based on data fetched from **social networks**
• Used Facebook pages and twitter accounts maintained by **New Delhi** traffic police to perfect the platform
• Provided a feature to find the path with least risk of congestion in addition to the real time traffic analysis
• Invited to present our application in the **2nd IKDD conference on data sciences** held in Bangalore

Voice Forensics: Using voice print to determine physical characteristics

Project at CMU-NITK winter school Dec 2014

• Estimated **height and gender** of a person from their **voice prints** using **Bag of words** model to create feature vectors
• Wrote C++ code to compute bags of words using **K-means** algorithm and used Weka to correlate them with height and gender
• Trained the model on the data collected from 40 participants of the winter school
  - Gender classification with precision and recall of **95%**
  - Height estimation with mean absolute error **9cm**. Data range was **30cm**

Studying correlation between height and voice

Course project, as part of ML for computer vision course Jan-Apr '15

• Continued project done in the winter school, but looked at the problem from vision perspective by analysing spectrograms
• Collected data from hostel residents. Each person was asked to say some words so that each vowel is covered.
• Concluded that this approach was less accurate than the earlier approach by analysing the results

Randomized Rounding: Some Tools and their Applications

UG Project Under Dr. Surender Baswana Jan-Apr '14

• Explored approaches to **approximation** via **randomized rounding** and researched its applications in the following problems:
  - Integer linear programming | maximum satisfiability problem (max-SAT) | min-cut about two points
• Presented the constructive proof of **Lovász local lemma** and added its non-constructive proof to Wikipedia

Other Projects

Designing a compiler to convert a program in a basic language to MIPS

Course project as part of Compiler Design course Jan-Apr '14

• Built a lexical analyzer using flex. Used Bison to write the parser
• Built a compiler from scratch to convert programs written in C (subset of C) into an equivalent program in mips.

Adding functionality to NachOS

Course Project, As part of Operating Systems course Aug-Dec '13

• Built a scheduler on C++ based NachOS with multiple algorithms. User could specify which one to choose among:
  - LRU (Least Recently Used) | LRU-Clock | Shortest Job First
• Implemented system calls in NachOS.

Shortest time path in a railway network

Project in SURGE 2013 program under Prof. Ajai Jain May-Jul '13

• Developed and implemented an algorithm to find Shortest time path in a Railway Network
• Built to take railway time table as one time input used to build necessary data structures before running any query
• Used **fibonacci heap** data structure to implement priority queue. Boost library in C++ was used for this purpose
• Included an option to specify an intermediate station one wants to visit. Shortest path via that station would be found

General purpose computer on an FPGA board

Course Project, As part of Intro. to Computer Organization Jan-Apr '13

• Designed an **instruction set architecture**. Also designed a low level language to make programming easier.
• Using flex, wrote a compiler to convert code in the language to a binary file to be fed to the memory of FPGA
• Built basic modules in a computer:
  - CLA adder (also used as a subtracter) | Booth multiplier | Memory module
• Implemented as a **Finite State Machine** in Verilog
• Project selected as **one of five** best projects in the course

RSA encrypted chat client

ACA project under ACA co-ordinator Pankaj Jindal Jan-Apr'12

• Used Socket Programming in C for communication and RSA algorithm for encryption.
• Made a program to arbitrarily select two prime numbers and generate private and public keys
• Knowing each other's public keys, the clients could chat with server receiving only encrypted messages