KATTA NAGA PRAVEEN KUMAR

Fourth Year Undergraduate
Department of Computer Science and Engineering
Indian Institute Of Technology, Kanpur, India.

Important Information

- **Gender** : Male
- **Date Of Birth:** 07-03-1988
- **Residence** : Room No. F-103
  Hall No. I
  IIT Kanpur, U.P
  India-208016
- **Mobile No.** : (+91)9936335520
- **Email Id** : praveenk@iitk.ac.in

Education

- **Bachelor of Technology**—(2005-current)
  Indian Institute of Technology, Kanpur, India
  - Major in Computer Science And Engineering
  - Projected Graduation Date: June, 2009
  - Cumulative Performance Index (CPI) (overall) : **9.5/10.0** (3.8/4.0)
- **Higher Secondary Intermediate Education**—(2003-2005)
  Sri Chaitanya College, Visakhapatnam, India
  - State Intermediate Syllabus : Maths, Physics And Chemistry
  - Board Exam Percentage : 98%

Areas of Interest

- Dynamic Graph Algorithms and Data Streaming Algorithms, Approximation Algorithms
- Indexing Data Structures, Advanced Data Structures and Applications
- Theory of Computation, Computational complexity
- Graph Theory, Computational Geometry

Important Theoretical Work Done

- **Polychromatic Colorings of the Hypercube** —Participant, Internship Program, CADMO, D-INF, ETHZ, Summer of 2008
  Guide: Dr. Tibor Szabó (Under Prof. Emo Welzl), Department of Computer Sciece(D-INF), ETH Zurich

- ▷ I was a Summer Intern at the Centre for Algorithms, Discrete Mathematics and Optimization, Department of CS, ETH Zurich during the period 5th May-16th July, 2008. This internship laid foundation steps to an increased interest in theoretical problems of computer science.
- ▷ Abstract: Denote by Q_n the n-dimensional hypercube graph. A d-polychromatic vetex/edge coloring of Q_n with p colors is a coloring of the vertices/edges of Q_n such that every Q_d gets all the p colors. We denote by $p^0(n,d)$ the maximum number of colors with which you can achieve a d-polychromatic vertex coloring of Q_n. The edge-anologue is denoted by $p(n,d)$. In this report, we discuss the asymptotics of the above colorings when d is close to n i.e, $d = n-k$, where k is very small compared to n. We give asymptotic results for $p^0(n, n-k)$ in n, k when $k \geq 2$ and for $p(n, n-k)$ when $k \geq 1$.

- **Efficient Dynamic Algorithms for maintaining approximate BFS tree levels** —BTP Project, Course Work at CSE, IITK, August-Nov, 2008
  Guide: Dr. Surendra Baswana, Department of Computer Science and Engineering, IIT kanpur.
  - ▷ Abstract: In a dynamic graph problem, an initial graph is given, followed by an on-line sequence of queries interspersed with one or more of the updates as mentioned above. We have to carry out the updates and answer the queries on-line in an efficient manner. Given a undirected graph $G = (V, E)$, from which edges may be deleted one at a time. At any point, a query about the distance of a vertex v from a source s can be asked. The goal is to answer this query efficiently. We do not want to run the static BFS algorithm after every update as this is too expensive per update. In this project, we wish to develop an algorithm that maintains BFS levels of vertices of a graph from a given vertex approximately under dynamic updates(edge insertions, deletions etc)

- **Approximation Algorithms for Co-Clustering in higher Dimensions**—Course Project, CS618: Indexing structures and searching techniques for Databases, Dept. of CSE, IITK , August-Nov, 2008
  Guide: Dr. Arnab Bhattacharya, Department of Computer Science and Engineering, IIT kanpur.
  - ▷ Co-clustering is the simultaneous partitioning of the rows and columns of a matrix such that the blocks induced by the row/column partitions are good clusters. In the simplest version of (k,l)-co-clustering, we are given a matrix of numbers and two integers k and l. The goal is partition the rows into k clusters and the columns into l clusters such that the sum-squared deviation from the mean within each block induced by the row-column partitions is minimized. In this project, we generalised to higher dimensions, an approximation algorithm for co-clustering for two Dimensional matrices given in the paper titled - *Approximation Algorithms for Co-Clustering* by Anagnostopoulos et. al, PODS 2008.
  - ▷ As part of the couse work, we also gave a presentation, explaining the details in the paper titled - *Finding Near Neighbors Through Cluster Pruning* by Cherichetti et. al, PODS 2007.

- **Counting triangles in general update streams**—Course Project, CS719: Data Streaming Algorithms, Dept. of CSE, IITK , August-Nov, 2008

Guide: Dr. Sumit Ganguly, Department of Computer Science and Engineering, IIT kanpur.

- ▷ Given a stream in which edges are inserted and deleted to/from an unweighted, undirected graph, how well can we count triangles and other sub-graphs? Most of the previous work has focussed on the case of insertions although it appears that some of the algorithms may work when edges can be deleted.Is it possible to match the insert-only bounds when edges are inserted and deleted? We wish to explore this question in this research project.

Projects involving Programming experience

- **Augmenting GT4 with a Trust based rating system** —Research Participant, SURGE-07 , Summer of 2007
  Guide: Dr. R.K.Ghosh, Computer Science Department, IIT Kanpur.
  - ▷ I was a participant of the Summer Undergraduate Research Grant For Excellence(SURGE) program during the summer of 2007,held at IIT Kanpur. I was successful in testing and implementing a Trust-based Rating Mechanism on the top of Grid Architecture(using the Grid Middleware Toolkit-GT4). Most of the project was done in java programming language apart from some scripting languages. Particularly, I had good working experience with The Globus Middleware Toolkit(GT4). Also had significant programming experience in writing applications based on Grid services using this toolkit.
  - ▷ The objective is to provide necessary augmentations to GT4 so that B2B(Business to Business) service transactions can be enabled on grids along with a "Trust" based Rating System. The theory of rating mechanism was proposed by a colleague Mr.Jitendra Singh. My part of the project involved testing this rating system by simulation under different circumstances, implementing the model for 'Centralised Trust Service' on a server, testing the implementation by programming and deploying 'Service Providers' and 'Clients' on different machines of a Grid using GT4.
- **Publication, ICDCIT-07**—December 2007
  - ▷ The above work, it's results along with it's theory of rating system was accepted to be published and presented at the International Conference on Distributed Computing And Internet Technology (ICDCIT),2007. The title of the paper is "Augmentation to GT4 Framework for B2B Collaboration Over Grid" by K.N.Praveen, Jitendra Singh and Dr. R.K.Ghosh.
- I, in a group of four had implemented a partially-fledged *Compiler for the programming language ADA*. It could support many important features expected of a full-fledged compiler, accurately. The implementation was done using tools like Eclipse, JTB(Java tree builder), javacc and CVS. This resulted in an intense object oriented programming experience in Java during the course of this project. (Guide: Prof. Sanjeev Kumar Aggarwal, CS Dept., IIT Kanpur)
- Implemented an *algorithm based on kernel classifiers*, that classifies the advertising data on the Komli Advertising Site based on various attributes of an ad, that a particular

user(group) clicks on. Done as a part of the course on Machine learning. The logic behind employing the algorithm and the implementation details are available on the website. (Guide: Dr. harish karnick, CS Dept., IITK)

- Implemented an *Alumni Information Database query system* that can support various updates and queries on all kinds of information about the alumni of IITK who were earlier passouts. Done as a course requirement for Databases (Guide: Dr. Sumit Ganguly, CS Dept., IITK)
- Had intense programming experience in C,C++ while implementing system calls, virtual memory,multiprogramming etc in operating systems like Nachos as part of the course on Operating systems.(Guide: Dr. Rajat Moona, CS Dept., IITK)
- Particularly, I had good working experience with The Globus Middleware Toolkit(GT4). Also had significant programming experience in writing applications based on Grid services using this toolkit as part of SURGE 2007.*Guide: Dr. R.K.Ghosh , CS Dept., IITK*
- Implemented a functional processor of the SDLX family on the Xilinx Spartan-3 FPGA using Verilog HDL as part of the course on Computer Organization (Guide: Prof. Ajai Jain, CS Dept., IIT Kanpur)
- Implemented a TCP Server that can listen to multiple clients and let them store information in the form of tables on the server side. This was done as a part of the course on Computer Networks(Guide: Dr. Dheeraj Sanghi, CS Dept., IITK)

Courses Undertaken in CS

- **Fall-05 to Fall-07**
  - ESC101 : Fundamentals of Computing
  - CS210 : Data Structures and Algorithms
  - CS201 : Discrete Mathematics
  - CS220 : Computer Organization
  - CS682 : Quantum Computing
  - CS330 : Operating Systems
  - CS340 : Theory of Computation
  - CS355 : Programming Tools and Techniques
  - CS425 : Computer Networks
- **Winter-08 to Fall-08**
  - CS335 : Compiler Design
  - CS674 : Knowledge Discovery and Machine Learning
  - CS315 : Principles of Database systems
  - CS345 : Algorithms II
  - CS498 : BTech Project*
  - CS350 : Principles of Programming languages*
  - CS618 : Indexing and searching techniques in Databases*
  - CS647 : Advanced Data Structures and Algorithms*
  - CS719 : Data Streaming*

* Courses to be completed by November 2008. Besides, I am taking advanced courses on Computational Complexity and Computational Geometry in the next semester(Winter-09).

Technical Skills

- **Operating Systems:** Linux (Fedora and Ubuntu), UNIX, Windows 98/2000/XP
- **Computer Languages:**
  - Proficient in C, Java, html, UNIX Shells, VHDL-Verilog, Assembly Language(for UNIX Platform) on IA32 Architecture
  - Familiar with C++, XML, SOAP, WSDL, SQL
- **Tools and Systems:**
  - Proficient in using LaTeX, Lex, Yacc, CVS, Make, Bash

Scholastic/Academic Achievements

- Recepient of the Summer Undergraduate Research Grant for Excellence - 2007, IIT Kanpur.
- Recepient of the Merit cum Means(MCM) Scholarship, IIT Kanpur for the period 2005-2009
- Our group of three stood second in the on the Spot Programming Contest held during the Technical festival of IIT Kanpur.
- Among 0.1% of successful candidates(All Idia Rank 77) in IIT JEE 2005, the exam for admission to the IITs
- Among 0.1% of successful candidates(All Idia Rank 66) in All India Engineering Entrance Examination(AIEEE), 2005
- Among 0.01% of successful candidates(State Rank 5) in EAMCET-2005
- Among 0.01% of successful candidates(State Rank 3) in the State Intermediate Board Exams,2005
- Recepient of the Andhra Pradesh Pratibha Scholarship for 2003-2005

Extra-Curricular Activities

- regular participant in the national/institute level programming contests
- active participant in the institute level quiz competitions and English literary events
- Worked as a volunteer for Business case study writing under Dr. Arun Sinha of the IME Department, IIT Kanpur.
- Good at swimming, Badminton
- I also play Tennis and Football
- Enrolled in the National Cadets Corps (2 UP-CTR unit, 2005-06)
- Worked as a volunteer/team leader in the Alumni Solicitation Program, under the Dean Resource Planning and Generation(DRPG), IIT Kanpur.
- Worked as a volunteer for the "India Inspired" Cell in Antaragni- Cultural Festival Of IIT Kanpur.