

SOUMEN BASU

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EDUCATION

Indian Institute of Technology, Delhi

2013 – 2015

Master of Technology in Computer Science & Engineering

CGPA: **8.383** on a scale of 10

Thesis: *Randomized Rounding using Random Walks*

Advisor: Professor Sandeep Sen

Bengal Engineering & Science University, Shibpur

2008 – 2012

Bachelor of Engineering in Information Technology

First Class with Honors, **79.62%** (CGPA: 8.712/10)

Project: *Test Simulator for Digital Microfluidic Biochips*

Advisor: Professor Pranab Roy & Professor Hafizur Rahaman

ACHIEVEMENTS

- Recipient of MHRD, Govt of India Scholarship.
- Runner-up in *Xerox Innovation Challenge*, (2014) held in IIT-Delhi.
- All India Rank **99** among **224160** candidates (**99.96** percentile) in GATE-2013 (Computer Science).
- Qualified Joint Entrance Screening Test(JEST) 2013 in Theoretical Computer Science (among top 20).

INTERESTS

- Approximation Algorithms
- Optimization and Mathematical Programming
- Social Network Analysis
- High Performance Computing

TECHNICAL SKILLS

- Python, C/C++, Java, MATLAB, SQL
- Flask, SQLAlchemy, Git, LLVM, OpenMP, MPI, No-SQL
- UNIX, Bash, SML, Prolog, L^AT_EX
- Agile Methodologies - Certified ScrumMaster

TEST SCORES

GRE - 325; Quantitative 170/170, Verbal 155/170, Analytical Writing 4/6

TOEFL - 113; Reading 30/30, Listening 28/20, Speaking 26/30, Writing 29/30

WORK EXPERIENCE

ADOBE SYSTEMS INDIA

[Bangalore, 2015–Present]

Designation: Member of Technical Staff

Working in *Adobe Media Optimizer* team and managed following projects -

1. Designed and built REST API using Flask and SQLAlchemy for supporting CRUD operations for various digital marketing entities like Campaign, Keyword, Auto-target, Placement. Also wrote service classes to sync the data to DB. These service classes reduced the data syncing time almost 20 times compared to SQLAlchemy ORM.
2. Built an unified error handling framework by compiling error messages across different search engines. The error messages with similar meaning but of different phrasing were grouped together using sentence equivalence analysis.
3. Analyzed ad data and improved revenue models for search engine marketing.

SAMSUNG ELECTRONICS INDIA

[Noida, 2012]

Designation: Engineer

Worked in *Call & Network* team and handled following responsibilities -

1. Analyzed call interface of smartphones and provided solutions for malfunctioning units.
2. Evaluated performance and behavioral sanity of call interface for different Android products.

RESEARCH PROJECTS

Randomized Rounding using Random Walks

[IIT-D, 2014–2015]

Rounding algorithms are often used to find near-optimal approximate solutions of ILP in polynomial time. Conventionally each variable is rounded to 1 with probability equal to the initial feasible value of a feasible solution of the corresponding relaxed LP. The error bound for this method was proved to be tight for the worst case, but we investigated techniques that produce better bound for the ‘average-case’ inputs where the constraint matrix could be defined by $A_k^{m \times n}$, where each non-zero entry is ‘one’ and every row has at most k non-zero coefficients. Our method used iterative transformation of initial feasible solution using random walk in \mathcal{R}^n to sparsify the constraint matrix. Then the reduced dependencies among the constraints was leveraged by using the constructive form of *Lovasz Local Lemma* and a much better error bound for the average case was obtained.

Test Simulator for Digital Microfluidic Biochips

[BESU, 2011–2012]

Microfluidic bio chips offer promising platform for parallel DNA analysis, automated drug discovery etc. It is important to ensure high reliability of biochips for safety-critical applications. The main focus of the work was on functional testing of bio chips. The work stemmed a new technique for functional testing of bio chips for customized droplet route-paths. The average completion time for the customized testing method was nearly $\frac{1}{10}$ -th of Parallel Scan and Peripheral Scan testing methods for In-Vitro test benches. The average number of cells traversed in customized testing was nearly 6-10% of the Parallel and Peripheral scanning methods.

COURSE PROJECTS

User Level Thread Library

Developed an user level thread package in C with complete functionalities. The functionalities include create, delete, sleep, switch etc. A Round-Robin scheduler was also implemented.

Automated Newspaper Article Classifier

The classifier used independent Bayesian Classification. The sample size was nearly 15000, and the classifier achieved up to 96% 5-fold cross validation accuracy. Used Python for building the preprocessor and MATLAB for the classifier.

Pentium-II Pipeline Simulator

Added the Pentium-II Out-of-Order pipeline engine (developed in Java) to Tejas (a high performance simulator made by IIT Delhi students).

Feature Selection for Speaker Recognition

Carried out Genetic Algorithms and PSO based feature selection using MATLAB. By using approximately 1-2% of 2000 features, we achieved 5-fold cross validation accuracy up to 92%.

Natural Language Query Processor

Written the query processor in Prolog. The database used was a simple student database. The processor could recognize general English language queries like 'In which department does Mr. ABC study' and respond correctly.

Lexical Analyzer tool

Defined a Grammar for a hypothetical language and built a lexical analyzer tool using C that will produce lexemes for a given input program in that language.

SIC/XE Assembler

Simplified Instructional Computer(SIC) is a hypothetical architecture used by Leland Beck in his book 'System Software'. SIC/XE is an extension in terms of memory, number of registers and instruction set. Developed an assembler using C++ to convert the mnemonics and symbolic operands to their machine codes and finally write the object program in HEX code.

POSITIONS OF RESPONSIBILITIES

Teaching Assistant

[IIT-Delhi]

Conducted tutorials and lab sessions and graded scripts for *Introduction to Computing*[Fall, 2013 and Winter, 2015], *Operating Systems*[Winter, 2014] and *Advanced Data Structures & Algorithms*[Fall, 2014].

Training and Placement Coordinator

[IIT-Delhi]

Served as a volunteer to facilitate the campus hiring process to the graduate students of Computer Science and to invite companies to visit the campus.