Varun Rawal

Member of Technical Staff
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Academic Qualifications

- **Indian Institute of Technology Kharagpur** — Kharagpur, West Bengal, India
  B.Tech. (Hons.) in Computer Science and Engineering — July 2013 – April 2017
  CGPA: **9.72/10.0**
  Department Rank **3** among **90** CS Students

Interests

My broad area of interest lies in the fields of Artificial Intelligence, Machine Learning, Deep Learning and their applications in Computer Vision, Natural Language Processing, Reinforcement Learning and their intersections.

Professional Experience

- **Adobe Systems India Pvt. Ltd.** — Noida, India
  Member of Technical Staff — *June 2017 – Present*
  - Worked in product team affiliated to AEM (Adobe Experience Manager) Forms evolved from Adobe LiveCycle team and part of Adobe Experience Cloud Solutions. LiveCycle is an enterprise level product used for business process automation services
  - Worked on various aspects of product both at front-end and back-end sides. Contributed to end-to-end development of new interfaces featured for Interactive Communication Applications, Data Integration Services, Document Fragment and Letter-based Services
  - Worked on independent project for Intelligent Chatbot services using NLP for Query-based interaction on personalized customer contexts derived from their respective statement reports.

Internship Experience

Adobe Big Data Experience Lab (BEL), Adobe Research — Bangalore, India

- **Research Intern (B.Tech. Summer Training)** — *May - July 2016*
  Guide : Harvineet Singh, MTS, Adobe Research Labs
  - Actively participated in and contributed to the fulfilment of the Project based on *"Analytics of Multi-Channel Customer Data"*, under the guidance of Research Scientist Harvineet Singh.
  - Applied Machine Learning models to predict customer affinity to interact in a given channel with limited information, given this information of interaction across other channels.
  - Designed a unique and novel solution approach exploiting CCA (Canonical Correlation Analysis) for suggesting ways for predicting customers' purchase behavior using a shared feature space which captures cross channel correlations instead of directly merging the input channels' data or predicting on the basis of single channel.

IBM India Research Laboratory (IRL) — New Delhi, India

- **Research Intern (UG Summer Training))** — *May - June 2015*
  Guide : Dr. Sameep Mehta, Senior Researcher & Manager, IBM
  - Actively participated in and contributed to the partial fulfilment of the Project *"Construction of Knowledge Graph and Use of Semantic Knowledge Graph in Supervised Training and Blended Learning"*
  - Prepared a model for Knowledge Graph construction by discovering relations and establishing links between graph nodes, and completed implementation in JAVA, by using data collected by crawling a Research Repository as the work dataset.
  - Developed a Web Crawler to collect the work data set from Research Repository, extracting around 4000 records into the Database, applied a variety of text-mining techniques like Entity-Extraction, Part-of-Speech Tagging and Similarity Detection using Online JAVA Services and JAVA libraries.
  - Finally developed a 3D visualization of the growing Knowledge Graph using visualization Library tools

Technical Skills

- **Programming Languages**: Python, C/C++, JAVA, R, MATLAB, Scala; **Scripting Languages**: Javascript, jQuery, HTML5, CSS, PHP, JSP, MySQL
- **Domain Technologies**: J2EE, Restful Web Services, Adobe AEM 6.3, Apache Sling, Apache Felix, OSGi Framework; **ML Libraries**: Tensorflow, Numpy, OpenCV, Scikit-learn, Caffe
- **Software Experience**: Eclipse, IDEA IntelliJ, Netbeans, R-Studio, MATLAB, GNU Octave, SolidWorks

Academic Projects

SOFTWARE DEVELOPMENT PROJECTS

Website for Talpuri International Housing Colony — Talpuri, Bhilai
- **Freelance Project** — *Autumn 2017*

Guide: Dr. Arpana Rawal, BIT DURG

Website hosted at URL: www.talpuri.com. Designed the skeletal architecture of website and wrote core modules for the same. Code base written in PHP and Javascript, setting up remote database SQL server. Guided and mentored a team of five students for implementation of various features in the requirement.

Course Management System — IIT Kharagpur
- **Databases & Management Systems Term Project** — *Spring 2016*

Guide: Dr. Pabitra Mitra, CSE, IIT KHARAGPUR

Developed a complete web-based application for online course design, course calendar publishing, student registrations for self-paced learning, content administration, assignments, and assessments. Implemented using PHP, HTML5, CSS3, Bootstrap and MySQL. Features like mail service, file transfer, chat forum, calendar, notifications and quizzes were implemented using MySQL as database.

2D/3D Graph Plotter & 2D Graph Scanner Software — IIT Kharagpur
- **OpenSoft (inter-hostel tech competition)** — *Spring 2015, 2016*

2D/3D Graph Plotter "Plot-It" developed in 2015 & 2D Graph Scanner "PlotEx" in 2016, *Plot-It*: Implemented in Python, mainly contributed to development of the Front-End part of the Graph Plotter, using tools like PyQt Designer and Photoshop, *PlotEx*: To Detect Graphs from scanned documents and produce the corresponding data tables for the graphs; used OpenCV, open-source libraries like Tesseract OCR for text detection in images and plotted Data Tables from the information obtained. Involved in guiding and mentoring a team of sophomores for the Inter-Hall Event

TinyC Compiler — IIT Kharagpur
- **Compilers Term Project** — *Autumn 2015*

Advisor: Dr. Partha Pratim Das, CSE, IIT KHARAGPUR

Designed and implemented a compiler for a C-like language (a subset of C language), as a part of Term Project for the completion of Compilers Course.

Software Component Cataloguing Software — IIT Kharagpur
- **Software Engineering Term Project** — *Spring 2015*

Guides: Dr. Partha Pratim Das, Dr. Rajib Mall, CSE, IIT KHARAGPUR

A fully functional system, implemented as a JAVA Applet and GUI realized in JAVA Swing. The project involved designing and developing a complete GUI Software which maintains a catalogue of various available Software Components and showcases all the details and information about each component to allow their potential code reuse. Provided full documentation of the software including UML diagrams.

Personal Library - User & Issue Management System — IIT Kharagpur
- **Software Engineering Term Project** — *Spring 2015*

Guides: Dr. Partha Pratim Das, Dr. Rajib Mall, CSE, IIT KHARAGPUR

Developed a fully functional Personal Library Management System, implemented in JAVA and GUI realized in JAVA Swing. The project involved designing and developing a complete GUI Software for

automating all the operations of a Library like handling and keeping records of issue and return of books, reserve books, advanced search for books with filter options, add/delete books, print receipts, compute fine, dispose old books, view statistics, etc.

RESEARCH PROJECTS

Citation Analysis using Deep Neural Networks IIT Kharagpur

- **Bachelor's Thesis** *Autumn 2016, Spring 2017*

Advisor: Dr. Pabitra Mitra, CSE, IIT KHARAGPUR

Project Titled *"Prediction of Citation Function of a specified 'Cited' paper in the given 'Citing' paper using Deep Supervised Learning"*. The objective was to label the sentiment an author carried while citing a given paper, something even lacked by Google Scholar, the most established product in this arena. Aimed at achieving better results than conventional approaches by designing a new solution framework based on Deep Neural Networks, which had never been used before for such tasks. Primarily deployed RNN-based architectures: LSTMs and Text-CNNs, exploiting a citation network made of around 1000 inter-referenced research papers and journals crawled from a famous e-print research archive.

Image Deblurring using Convolutional Neural Networks IIT Kharagpur

- **Machine Learning Term Project** *Autumn 2016*

Guide: Dr. Pabitra Mitra, CSE, IIT KHARAGPUR

Implemented a deep convolutional neural network structure for image deconvolution. A series of convolution steps were used for approximating deconvolution. The system uses two modules corresponding to deconvolution and artifact removal.

Supporting Throughput Fairness in IEEE 802.11ac Dynamic Bandwidth Channel Access IIT Kharagpur

- **Network Modelling Term Project** *Autumn 2016*

Advisor: Dr. Sandip Chakraborty, CSE, IIT KHARAGPUR

IEEE 802.11ac supports Dynamic Bandwidth Channel Access (DBCA), where a wireless station selects channel bandwidth dynamically based on the availability of the secondary channels. But the widely-used contention based medium access mechanism provides an opportunistic access of secondary channels and affects the performance of DBCA. Consequently, unfairness in channel access is increased in DBCA, which further reduces average throughput of stations. In this work, we develop a hybrid adaptive resource reservation mechanism, Hybrid Adaptive DBCA (HA-DBCA), for supporting fair channel access in DBCA. In HA-DBCA, a polling based online learning mechanism is designed to avoid starvation of primary channel users. This work has been accepted for publication in IEEE Conference on Local Computer Networks (LCN) 2017.

Researcher Recommendation System IIT Kharagpur

- **Information Retrieval Term Project** *Spring 2016*

Advisors: Dr. Pawan Goyal and Dr. Animesh Mukherjee, CSE, IIT KHARAGPUR

Developed a search and recommendation engine for Scientific Research Community, as a part of Term Project for the completion of Information Retrieval Course. Used beautiful soup and selenium in python to parse MAS to generate the data set for the project (1 lakh authors and their publications). Used clustering techniques to cluster similar authors based on their co-author graph to recommend new co-authors to an author. Used LDA to model topics from the keyword database of an author and recommended top 100 authors based on their rank (gained a 25% increase in recall). Further developed a full- edged Scientific Search Engine.

Academic Honors and Awards

GORA LAL SYNGAL MEMORIAL SCHOLARSHIP RECIPIENT 2015-16

Granted Scholarship of INR 2500 per month, awarded to the second highest CGPA holder clearing all prescribed requirements of curriculum and having no backlog after 6th semester amongst the 4-year B.Tech. (Hons.) CS / EE /EC Students.

B.P. PODDAR SCHOLARSHIP RECIPIENT 2015-16
Granted Scholarship of INR 1000 per month awarded to the best students of the final year class of B.Tech. (Hons.) securing the highest CGPA at the end of the VI or VIII semesters.

SAIL Proficiency Award 2012-13
Awarded Certificate of Merit-cum-Cash Award by Education Department, Bhilai Steel Plant, Steel Authority of India Limited, for Outstanding Proficiency in All India Entrance Examination for Professional Course in Engineering 2012-13

Prime Minister's Trophy SARVOTTAM Scholarship Award 2013-14
Awarded in 2013 by Bhilai Steel Plant, Steel Authority of India Limited for Outstanding Academic Performance for four Academic Years

Joint Entrance Examination (JEE) Mains 2013
Secured All India Rank 165 within top-200 among 1.3 million candidates in JEE Mains 2013

Joint Entrance Examination (JEE) Advanced 2013
Scored All India Rank 764 within top-1000 among 150,000 candidates in JEE Advanced, 2013

Kishore Vaigyanik Protsahan Yojana (KVPY) Scholar Award 2012
Selected for KVPY scholarship in the year 2012 with an All India Rank 60 (offered to 200 students in the country, from over 25,000 applicants)

National Talent Search Exam (NTSE) Scholar Award 2008-09
Qualified for the Award of Scholarship in NTSE, clearing all 3 rounds of selection in the session 2008 – 2009; recipient of NTSE scholarship since 2009, (1000 students selected Nationwide per year)

Workshops

Microsoft Code.Fun.Do Coding Hackathon & Workshop 2015 March 2015
Attended the Microsoft Code.Fun.Do Coding Hackathon & Workshop 2015 organized by Microsoft at IIT Kharagpur and developed an app "NextGenToss" for Windows platform, using Construct2 Gaming Engine

Publications

Varun Rawal, Kumar Ayush, Raja Karamakar, Pradyumna K. Bishoyi, Samiran Chattopadhya, Sandip Chakraborty. **"Supporting Throughput Fairness in IEEE 802.11ac Dynamic Bandwidth Channel Access: A Hybrid Approach"** Paper accepted at *42nd IEEE Conference on Local Computer Networks (LCN). 2017.* for publication in its proceedings. Publication URL

Academic Coursework & Certifications

Probability & Statistics	Matrix Algebra	Information Retrieval
Speech & Natural Language Processing	Algorithms I & II	Discrete Structures
Formal Languages & Automata Theory	Machine Learning	Image Processing
Performance Modeling of Computer Networks	Artificial Intelligence	Theory of Computation
Adv. Image Processing & Comp. Vision	Deep Learning	Principles of Programming Languages

Machine Learning by Stanford University on Coursera. Certificate earned on August 6, 2016. Certification URL

Extracurricular Activities

- **November 2013 - February 2017**: Core Member, K.R.A.I.G. (Kharagpur Robotics and Artificial Intelligence Group), Technical Wing of Technology Robotics Society at IIT Kharagpur
- **June - November 2016**: Worked as a member for AUV (Autonomous Underwater Vehicle) Group, IIT Kharagpur
- **January - April 2017**: Functioned as Team Captain, for OPENSOFT 2017 Team, M.S. Hall at IIT Kharagpur
- **July 2013 - April 2015**: Successfully completed the NCC (National Cadet Corps) training under the unit 4(A) BN NCC: Air Wing
- **July - November 2016**: Appointed as Teaching Assistant at the CSE Department at IIT Kharagpur