Dhruv Singal

Contact Information

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Education

Indian Institute of Technology Kanpur 2016
Bachelor of Technology, Computer Science and Engineering
CPI: **9.5** (on a scale of 10)

DAV Public School, Kota, India 2012
All India Senior School Certificate Examination (12th standard)
Score: **92.2%**

Maharaja Agrasen Vidyalaya, Ahmedabad, India 2010
All India Secondary School Examination (10th standard)
CGPA: **9.6** (on a scale of 10)

Awards and Achievements

- Awarded the **OP Jindal Engineering and Management Scholarship** 2013 for excellence in academics and leadership
- Awarded the **Certificate of Merit for Academic Excellence** by IIT Kanpur for the term 2012-2013
- Ranked in **Top 0.1%** (among 479,000 students) in IIT-JEE 2012
- Ranked in **Top 0.1%** (among 1,100,000 students) in AIEEE 2012

Areas of Interest

Applied Economics, Game Theory, Data Mining, Applied Machine Learning

Technical Skills

Languages: Python, C, C++, MATLAB, R, Java, Oz, Ruby
Web Development: JS, PHP, HTML, CSS, MEAN stack, MySQL
Other Tools: Apache Hive, Shell scripting, Perl, LaTeX, Git, TensorFlow

Test Scores

GRE: Verbal Reasoning - 167, Quantitative Reasoning - 170, Analytical Writing - 4.5

Patents

- *Techniques for Enhancing Content Memorability of User Generated Video Content* (USPTO 14/946,952, pending) with Manav Kedia, Akhil Shetty, Sumit Shekhar and Phaneendra Angara
- *Forecasting Potential Audience Size and Unduplicated Audience Size* (USPTO 15/435,869, pending) with Kushal Chawla, Yash Shrivastava, Ritwik Sinha, Atanu Ranjan Sinha and Deepak Pai

Relevant Courses

- *Theory:* Algorithmic Game Theory, Theory of Computation, Data Structures and Algorithms, Algorithms - II
- *Systems:* Operating Systems, Principles of Database Systems, Computer Systems Security
- *Machine Learning:* Machine Learning: Tools, Techniques and Applications, Learning with Kernels, Probabilistic Machine Learning
- *Programming Languages:* Compiler Design, Principles of Programming Languages
- *Mathematics:* Abstract Algebra, Discrete Mathematics, Probability and Statistics, Logic in Computer Science, Linear Algebra, Analytical Calculus, Partial Differential Equations, Complex Algebra
- *Humanities and Social Sciences:* Applied Game Theory, Academic Writing

Work Experience

Research Fellow Jun 16 - present

BigData Experience Lab, Adobe Research Bangalore

- Working on projects in data mining, game theory, computer vision, machine learning and forecasting, with applications in Adobe Marketing Cloud
- Associating with product and engineering teams to understand the industrial scenario and use cases
- Developing prototypes for potential product integrations and intellectual property

Research Intern May 15 - Jul 15

BigData Experience Lab, Adobe Research Bangalore

- Defined and analyzed the notion of memorability for videos, using machine learning and computer vision
- Carried out feature extraction with state-of-the-art image and video processing techniques and deep learning
- Collected the ground truth by a crowdsourced test on Amazon MTurk
- Demonstrated application of memorability to video summarization
- Work submitted to **CVPR 2017** (result awaited)

Research Experience

Symbolic Parsing of Grammars Dec 15 - Apr 16

Undergraduate Project with Prof. Subhajit Roy, CSE IITK

- Studied the theory of LL(1) parsers and related topics in predictive parsing
- Proposed and implemented a new system to build predictive parsers using constraint solving
- Work submitted to **CAV 2017** (result awaited)

Coalition Formation Games Aug 15 - Apr 16

Undergraduate Project with Prof. Sunil Simon, CSE IITK

- Studied the field of hedonic games with emphasis on stability concepts using techniques of algorithmic game theory
- Proposed a new subclass of hedonic games, shared preference hedonic games and investigated some algorithmic properties of this game model in detail

Course Projects

Gemhunter - Compiler for Ruby to MIPS Jan 15 - Apr 15

Compiler Design, Prof. Subhajit Roy

- Implemented an end-to-end cross compiler in Python using the PLY (Python Lex-Yacc) package, supporting a tweaked version of Ruby
- Selected as the **best project** in the course
- Supports imperative and object orient programming paradigms with implicit static typing and type checking
- Included inheritance of instance variables and methods by method dispatch over the whole inheritance hierarchy

Basic Oz Interpreter Aug 15 - Nov 15

Principles of Programming Languages, Prof. Satyadev Nandkumar

- Implemented a meta-circular interpreter for a declarative sequential model of Oz
- Used functional programming to parse the abstract syntax tree with single assignment store and multistack of semantic statements
- Main features included pattern matching, closures and non-preemptive multitasking

Internet advertising and ad-blocking software Jan 16 - Apr 16

Applied Game Theory, Prof. Vimal Kumar [Report]

- Studied the case of the strategic interactions involved between various parties in

case of Internet advertising and ad-blocking software
- Devised game theoretic models for the situation and used equilibrium concepts to analyze the models

Data Compression using Bayesian Inference Jan 16 - Apr 16
Probabilistic Machine Learning, Prof. Piyush Rai [Report]
- Studied the basic concepts of sequence modelling and data compression
- Analyzed the state of the art models used for Bayesian data compression - PAQ, PPM-DP and Sequence Memoizer
- Explored various properties of PAQ to suggest some potential improvements in the mixers used

Study of kernel SVM approximation methods Aug 15 - Nov 15
Learning with Kernels, Prof. Harish Karnick [Report]
- Analyzed two state of the art kernel SVM approximation algorithms - LDKL and DC-Pred++ in great detail
- Studied the background of kernel approximation methods through landmark papers like Rahimi and Recht, 2007

Extended NachOS Aug 14 - Nov 14
Operating Systems, Prof. Mainak Chaudhari
- Extended the system call library by implementing system call handlers for Fork, Exec, Join, Yield, Sleep and Exit system calls
- Provided support for process scheduling according to UNIX, FIFO, Round Robin, Shortest Job First and Non-Preemptive scheduling algorithms
- Implemented page replacement by using Random, FIFO, Least Recently Used and Least Recently Used Clock algorithms

Bike Sharing Demand Jan 15 - Apr 15
Machine Learning: Tools, Techniques and Applications, Prof. Harish Karnick [Report]
- Participated in a Kaggle challenge to forecast the use of a city bikeshare system
- Experimented with multiple learning models in Python to arrive at an ensemble of forest based models to give highly accurate predictions
- Achieved a rank in **top 1 percentile** among 3000+ teams participating in the challenge worldwide

Finite State Machine Learning Module Nov 14
Computing Laboratory II, Prof. Arnab Bhattacharya [Report]
- Created an online learning module for participants to enhance their understanding of finite state machines
- The module consisted of practice mode and quiz mode for various kinds of automata

Developmental Projects

Advanced Audio Equalizer May 13 - Jun 13
With Programming Club, IITK
- Developed a Java application to create an equalizer with features like volume, pan, balance and visualizer, with an intuitive GUI
- The app applied frequency filters for audio files, to play the sounds of only certain frequency range
- Implemented FFT on a buffer of audio samples in a file and extract the desired frequency sounds

Picture comment application Oct 13
With Yahoo! Team at HackU IITK

- Created a Google Chrome extension to automate the process of adding photo comments to Facebook stream with overlaying text (memes)
- Used Facebook PHP SDK and Open Graph API, to post the comment to the Facebook stream

Positions of Responsibility

Tutor *for ESC101A, IITK* 2015-2016
Faculty Instructors: *Prof. Nitin Saxena (Fall) and Prof. Sunil Simon (Spring)*
- Student Instructor for the core institute course *Fundamentals of Computing* for two semesters
- Supervised weekly tutorials and problem solving sessions
- Assisted the instructor in designing course material, quizzes, labs and exams

Academic Mentor*, Counselling Service, IITK* 2013-2014
Organized hall level and institute level remedial classes for academically deficient students

Core Team Member (Academics)*, Avanti Fellows, IITK Chapter* 2013-2014
Provided academic guidance and assistance in Physics, Chemistry and Mathematics to the selected high-school students from low-income households

Student Guide*, Counselling Service, IITK* 2013-2014
Mentored a group of eight students during their first year at the institute, providing emotional support and academic guidance

Editor*, Vox Populi, IITK* 2014-2015
Supervised the publication of *Vox Populi*, the campus newsletter of IITK and the management of the web version

Student Member*, Department Undergraduate Committee, CSE IITK* 2014-2015
Involved in the liasion of department with the institute for matters related to academics and welfare of the UG students in CSE department

Extra Curricular Activities

- Performed in the English play *The Whole Shebang* and a street play with Dramatics Club, IITK
- Card and board games enthusiast and regular member of the Card and Board Games Club, IITK
- Proficient in squash, volleyball, association football and swimming
- Intermediate level guitar player