

# PRANJAL SINGH

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## ACADEMIC PROFILE

Year	Degree/Certificate	Institute/Board	CGPA/%
2015(expected)	B. Tech.-M. Tech. (Computer Science & Engineering)	IIT Kanpur	PG: 3.5/4.0 UG: 3.2/4.0
2010	AISCE(XII)	Sunbeam English School, Varanasi	96.2%
2008	AISSE(X)	Sunbeam English School, Varanasi	92.8%

## AREAS OF INTEREST

- Machine Learning
- Natural Language Processing
- Data Mining
- Information Retrieval
- Cloud Computing

## SCHOLASTIC ACHIEVEMENTS

- Secured **All India Rank 226** IIT-JEE-2010(**percentile 99.95**) and **All India Rank 288** in AIEEE-2010(**percentile 99.98**)
- Secured **Rank 16** in UPSEE 2010, **State Rank 17** in AIEEE-2010 and **District Rank 1** in AISSE-2010
- Selected for **Summer Undergraduate Research Fellowship Award-2012** at IISC Bangalore & **NCTU(Taiwan) Fellowship-2012**
- Selected for **IncNTRE Summer of Networking-2013** at Indiana University, USA & **Yahoo Summer School-2013**
- Awarded **Merit Scholarship-2010** for Professional Studies by CBSE and **UP Govt. Science and Technology Scholarship-2010**
- Awarded **0.1% Merit Certificate** by CBSE in **Physics, Chemistry and Math** in AISSE-2010 and in **Science** in AISSE-2008
- Finalist of Jnana Vijnana Pratibha Khoj in 2007 and 2008 (National Level Competition with participation of over 100 schools)

## SUMMER INTERNSHIPS

<b>Authorship Authentication</b> (Pace University, New York, USA) (May'14-Jul'14) (To be submitted)	<ul style="list-style-type: none"><li>Studied the effect of various classifiers on <b>Facebook data</b> of 10 users (400 short messages each)</li><li>Tested various sets of <b>stylometry</b> and ad hoc social networking features for better classification</li><li>Designed an algorithm that combined top 3 classifiers linearly (<b>SVM, ANN</b> and <b>Decision Tree</b>)</li><li>Achieved very good authentication results (accuracy of upto <b>88%</b>) with new algorithm</li></ul>
<b>Sponsored Content</b> (Bell Labs, India) (May'13-Jul'13)	<ul style="list-style-type: none"><li>Proposed a solution for content providers like <b>YouTube, ESPN</b> to sponsor multimedia contents</li><li>Sponsored Contents on YouTube and Play-Store; these were relaxed from users' mobile data</li><li>Set up a VPN server and a nodeJS script that could store user statistics and modify HTTP data</li><li>Studied its impact on end users' usage behavior of mobile data with a self-built <b>Android app</b></li></ul>
<b>MultiWay Cut</b> (Max Planck Institute, Germany) (May'12-Jul'12)	<ul style="list-style-type: none"><li>Studied the concept of Important Separators, MultiWay Cut and various graph algorithms</li><li>Implemented the problem of <b>Multi Way Cut</b> using C++ and <b>LEDA</b>; applied on various graphs</li><li>Achieved optimal results (parted pairs of source and sink with minimum cut) on various graphs</li></ul>

## MTECH THESIS (In Progress)

### Discovering Lexical Classes and Syntax

Advisor: **Amitabha Mukerjee**, Professor, CSE Department, IIT Kanpur

- Analysis of various papers to develop a concrete methodology for inducing syntax, lexical classes and **word embeddings**
- Emphasis on largely unsupervised deep learning methods that utilize large unlabeled data to build intermediate representations
- Implementation of existing state-of-the-art to do the same analysis for resource deficient languages such as **Hindi**

## KEY COURSE PROJECTS

### Movie Recommendation System (Machine Learning)

Aug'13-Nov'13

Advisor: **Amitabha Mukerjee**, Professor, CSE Department, IIT Kanpur

- Built a system that predicts whether an unknown user is likely to see a given movie using the MovieLens dataset
- Predicted movie rating on a scale of 1 to 5 using **User Based** and **Item Based Collaborative Filtering**
- Achieved Root Mean Square Error of **0.947** and Mean Absolute Error of **0.741** in rating predictions

### Measuring Similarity between Documents (Natural Language Processing)

Aug'13-Nov'13

Advisor: **Amitabha Mukerjee**, Professor, CSE Department, IIT Kanpur

- Studied various approaches to compute similarity between two documents such as Pearson Correlation, Cosine Similarity, etc.
- Classified documents into coherent cluster using **k-means** with various distance measures; achieved entropy of the order of 0.06

### 3D Reconstruction from Several Images (Computer Vision)

Jan'14-Apr'14

Advisor: **Vinay P Namboodiri**, Professor, CSE Department, IIT Kanpur

- Created 3D models from a set of images using **Structure from Motion** from point correspondences of multiple images
- Implemented **Sift Descriptor** for feature matching, and used camera calibration, depth determination, triangulation techniques

### Unsupervised Cross Lingual Alignment

Jan'14-Apr'14

Advisor: **Satyadev Nandakumar**, Professor, CSE Department, IIT Kanpur

- Proposed a framework that could align bilingual text without supervision; used PLSA and ADIOS as baseline system
- Worked on a manually built corpus on coal scam in 2 languages (English & Hindi) containing around 50,000 tokens

## Empirical Study of Cross-Lingual Unsupervised Alignment Based on Syntactic and Distributional Features

Advisor: **Amitabha Mukerjee**, Professor, CSE Department, IIT Kanpur

Aug'13-Nov'13

- Studied various algorithms such as k-means, PLSA, SVM which could detect important topics in a single document
- Isolated aligned tokens in both Hindi and English by using PLSA and used ADIOS to separate **syntactic classes**

## Identification of Certain Emotions in Text (Artificial Intelligence)

Jan'12-Apr'12

Advisor: **Amitabha Mukerjee**, Professor, CSE Department, IIT Kanpur

- Studied various NLP Algorithms such as PLSA & LSA which could identify latent topics in the document
- Modeled the document (ISEAR corpus) into few number of topics which were essentially emotions, using PLSA and PCFG parser
- Achieved very good latent clusters corresponding to each of the 7 emotions; achieved good scores for sentiment analysis part

## Desktop Control using Android OS (Mobile Computing)

Jan'14-Apr'14

Advisor: **Ratan K. Ghosh**, Professor, CSE Department, IIT Kanpur

- Designed an **Android App** that could control a laptop using Wi-Fi with various types of gestures and motions (shake, pressure)
- Implemented system could handle multiple gestures such as different types of swipe, double tap, multi-touch, etc.

## Hostel Management System (Database Management System)

Jan'13-Apr'13

Advisor: **Harish Karnick**, Professor, CSE Department, IIT Kanpur

- Built a web application to make the process of Hostel Management electronic using PHP and MySQL
- Implemented the portal having facilities for creating students profile, staff profile, complaint addressing etc.

## Development of PintOS (Operating System)

Aug'12-Nov'12

Advisor: **Subhajit Roy**, Professor, CSE Department, IIT Kanpur

- Implemented System Calls, shared memory, message queues and virtual memory with pure demand paging
- Extended the pintos file-system to include sub-directories; implemented indexed file system with direct, (doubly)indirect blocks

## Teaching

- Teaching Assistant for CS771-**Machine Learning Tools & Techniques** (Faculty Instructor: Prof. **Harish Karnick**) Jan'15-Apr'15

## TECHNICAL SKILLS

- Experience in Android App Development; Competitive Programming (**Practice Rank: 385** on Hackerrank, **Rank: 2223** on SPOJ)
- Operating Systems:** Windows, Linux
- Programming Languages:** C, C++, Java, Python, R, Bluespec Verilog, Assembly Language, Bash, Oz
- Tools:** WEKA, HTML5, CSS, Latex, Matlab, LEDA, MySQL, Lex, Yacc, PHP, Apache, NodeJS, Git, Gephi

## RELEVANT COURSES

Machine Learning Tools and Techniques	Artificial Intelligence	Social Network Analysis
Mathematics for Machine Learning	Computing for Data Analysis	Database Systems
Natural Language Processing	Computer Vision and Image Processing	Mobile Computing
Data Structure & Algorithms	Discrete Mathematics	Operating System

## POSTIONS OF RESPONSIBILITY

### Student Guide, Counselling Service

Jul'11-Apr'12

- Mentored **6 freshmen** of 2011 batch, helping them adjust to the campus environment and academics
- Coordinated with a team of more than 150 people to ensure smooth conduction of Orientation Program

### Executive, Show Management, Udghosh'12 (Annual Sports Festival, IIT Kanpur)

Jul'12-Sep'12

- Led a 2-Tier team of over 60 students and 50 workers for strategic planning and smooth conduction of various events
- Handled the logistics of all dignitaries and responsible for **zero-delay**, procurement of infrastructural needs

### Coordinator, Informal Events, Udghosh'11 (Annual Sports Festival, IIT Kanpur)

Jul'11-Sep'11

- Led a 2-Tier team of over 30 students for conduction of fun and informal events including procurement of goods and materials
- Introduced various new events such as wall climbing leading to larger footfall in informal events adding to more fun in the fest

## EXTRA CURRICULAR ACTIVITIES AND ACHIEVEMENTS

- Finalist of EXLs' PAN IIT Data Analytics Competition **Excellent Quotient-2014**
- Conducted **National Programming League-2012**, NIT Trichy programming event at Kanpur-Center with a footfall of 250 people
- Won** Business Quiz in **Takneek'10** (Intra-IITK Technical Festival) among 100 participants
- Member of National Cadet Corps for the period July '10 - April '11

## RECOMMENDATION LETTER

**Amitabha Mukerjee** Professor, Computer Science and Engineering Department, IIT Kanpur

**Amar Gupta** Dean and Professor, Pace University, New York, USA

**Akhil Mathur** Researcher, Bell Labs Antwerp, Belgium

**Li-Chiou Chen** Professor, Pace University, New York, USA