Amlan Kar

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Educational Qualifications:

Year	Degree	Institute	CPI/%
2017(Expected)	B.Tech, Computer Science and Engineering	Indian Institute of Technology, Kanpur	9.7/10.0
2013	All India Senior School Certificate Exam(CBSE)	DAV Public School, Chandrasekharpur	93.2%
2011	All India Secondary School Exam(CBSE)	DAV Public School, Chandrasekharpur	10.0/10.0

Academic Achievements:

- Received **Academic Excellence Award (IIT Kanpur)** for distinctive performance in the academic term 2013-14.
- Secured **All India Rank - 271** in IIT-JEE 2013 amongst 1,50,000 candidates.
- Selected in the **top 35 in India in the Indian National Physics Olympiad(INPhO),** and received Gold Medal.
- Selected in the **top 1% (top 300) in National Standard Examination in Physics, Chemistry and Astronomy (NSEP, NSEC, NSEA)** conducted by IAPT.
- Received **A* grade** for exceptional performance in the Data Structures and Algorithms course.
- Recipient of **National Talent Search Examination(NTSE) Scholarship -2008** (awarded to 800 students in India).
- Recipient of **Kishore Vaighyanik Protsahan Yojana(KVPY) Scholarship-2012** (awarded to 300 students in India).
- Awarded **All Rounder of the Year Award, 2007 and 2012** at DAV Public School, Chandrasekharpur.
- Secured **All India Rank - 1** in the National Cyber Olympiad - 2006.
- Secured **Rank 1** in Junior Mathematics Olympiad, Odisha - 2006 (for grades 6-8) in 6th grade.
- Selected among **Top 37** students in Odisha(India) in the **Regional Mathematics Olympiad** - 2011.

Projects:

- **Reconstructing Unique Inversions with a Deep Model of Motion** *May'15 - Present*
  Mentored by Prof. Amitabha Mukerjee
  - Objective: To learn image representations of the CRS Robot given a training dataset labelled with joint angles (3 degrees of freedom) to reconstruct the robot images corresponding to previously unseen joint angles.
  - Studied research papers: "Learning to Generate Chair Models Using Convolutional Neural Networks" by Alexey Dosovitskiy et. al. Also studied Google's DeepMind project while exploring the possibility of using Deep Reinforcement Learning for the project.
  - Programmed the CRS Robot Arm (in RAPL language) to infinitely move in randomized configurations within the limited memory constraints of the CRS Controller.
  - Obtained a labelled dataset of the CRS Robot Arm using 6 cameras at different viewpoints. Also generated an artificial 2-D Robot Arm labelled dataset for preliminary testing.
  - Performed background subtraction on the obtained dataset using the Mixture of Gaussians model in OpenCV.
  - Designed a Convolutional Neural Network (CNN) to learn the robot image representation and implemented it using Berkley Vision Group's caffe library. Both the datasets were used separately to train the CNN model.
  - Plan to implement in the future a local planner for robot motion path planning, which uses intermediate pose reconstruction from the CNN for detecting obstacle collision by arm-obstacle overlap.

- **Music Classification using Deep Neural Networks** *Jan'15 - Apr'15*
  Mentored by Prof. Amitabha Mukerjee
  - Created a DNN model to attempt classification of music by genre and artists.
  - Used a small version of the GTZAN dataset to train the network on 30 second clips from 10 musical genre. The neural network parameters were used to train a random forest classifier which achieved around 62% accuracy. The state of the art systems have presently achieved around 71%. We believe using a larger dataset would yield better results.
  - Trained the same model on a self-created dataset consisting of 10 blues artists. The neural network and random forest classifier surprisingly achieved around 87% accuracy. Minimal research has been done in this area and a benchmark could not be found.
  - Analysis of the confusion matrix revealed that the network indeed learnt musical features for classification as the classes, Cream and Eric Clapton got confused, which is musically expected as Eric Clapton was also the guitarist for Cream.
  - Explored the possibility of temporal modelling of data by looking for musical phonemes for classification using Hidden Markov Models, which did not yield satisfactory results.

- **Emotion Recognition using a Triad Based Approach** *May '14 - Jun '14*
  Project under Programming Club, IIT Kanpur.

  - Developed Sentiment Detectors which used text, video and sound independently as input.
  - Implementation involved Machine Learning Techniques, Natural Language Processing, Dimensionality reduction, Image and Audio processing.
  - Concepts Studied: Neural Networks, Support Vector Machines, Decision Trees, Random Forest Classifiers, Hidden Markov Models, Principal Component Analysis, POS Tagging, Image Normalisation, Noise Reduction, Facial Action Coding System, Active Shape Models, MFCC Calculation.
  - Tried various models(max voting, constant weight and trained weight) to merge these three independent classifiers (using text, video and audio) to improve accuracy of the detector.

- **News Article Classifier** *Jan '14 - Apr '14*
  Project under Association of Computing Activities (ACA), IIT Kanpur

  - Developed models to classify news articles into various classes (such as Sports, India, International, Business, Bollywood, Hollywood, Science and Technology etc.)
  - Crawled and extracted news articles from famous news websites using python's beautifulsoup(bs4) library.
  - Studied and implemented Machine Learning and Natural Language Processing methods (Bag of Words model, Tokenisation, Lemmatisation, Naive Bayes Model, K-Nearest Neighbours, Logistic Regression).

- **Other Projects**

  - Developed the IITK Family Tree using JavaScript and SVG in HTML. The tree shows the family data for students based on the Baapu/Amma system, enabling students to trace their ancestors to many generations back.
  - Developed the website for Counselling Service, IIT Kanpur.
  - Developed the website for Synchronicity, IIT Kanpur.

Relevant Coursework :

Introduction to AI Programming	Computer Organization	Probability and Statistics
Natural Language Processing*	Computing Laboratory - I	Discrete Mathematics
Algorithms - II*	Algorithms - I	Abstract Algebra
Theory of Computation*	Introduction to Computing	Linear Algebra and ODE
Operating Systems*	Engineering Graphics	Introduction to Logic
Computing Laboratory - II*	Introduction to Economics	Analytical Calculus

* - ongoing

Technical Skills :

- **Programming Languages :** C, C++, Python, Shell, JavaScript, HTML, CSS
- **Tools :** Git, OpenCV, Matlab, Octave, LaTeX, Vim, Verilog, GNU Assembly
- **Operating Systems :** Linux, Windows

Student Activities :

- **Counselling Service :**

  - **Operations Core Team Member :** *Mar '15 - Present*
    - Planned and conducted a 6 day Orientation Programme in a team of 11 members for more than 800 incoming freshmen.
    - Jointly rebuilt the Counselling Service website. Proposed and implemented a new HSS Lottery system which drastically outperformed the existing system in allotting students their HSS according to their preferences.
    - Led a team of 133 Student Guides for the conduction of the Orientation Programme and for personally mentoring the incoming batch of students to facilitate a smooth transition into the campus life.
    - Conceptualised and conducted sessions aimed at improving teamwork within the new batch of students.
    - Personally mentored and tutored 5 students who had been placed in Academic Probation/Warning in the previous semester.
  - **Student Guide :** *Apr '14 - Mar '15*
    - Helped in conducting the Orientation for more than 800 incoming freshmen. Also helped a group of 7 freshmen personally to get acclimated to the new college environment.
  - **Academic Mentor :** *Apr '14 - Mar'15*
    - Conducted remedial classes and personally mentored academically weaker students to cope with their academics.

- **Active Member, Music Club :** Participate in events and organize workshops for students as a guitarist at the club.
- **Secretary, Synchronicity :** Searched for and contacted bands and maintained the website for Synchronicty, IIT Kanpur at Antaragni '14.
- Awarded **Best Sectional Award** for building a 'Mechanical Object Elevator' in the course TA201.