AMRIT SINGHAL

CONTACT INFORMATION

Fourth Year B.Tech. Student
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EDUCATION

- **Indian Institute of Technology Kanpur** *2015 - Present*
  Fourth Year Undergraduate — Overall CPI: **9.7/10**
  Department of Computer Science and Engineering — (*After* 6^{th} *semester*)
- **Indian School Certificate Examination (Intermediate), CISCE India** *2015*
  City Montessori School, Lucknow — Overall Percentage: **97.5%**
  - Secured an aggregate of **97.67% in Science subjects** Physics, Chemistry and Mathematics and **100% in Computer Science**.
- **Indian Certificate of Secondary Education (Matriculation), CISCE India** *2013*
  La Martiniere College, Lucknow — Overall Percentage: **97.0%**
  - Secured **City Rank 2** and **Institute Rank 1** with an aggregate of **98% in Science**, **100% in Mathematics** and **100% in Computer Applications**.

ACADEMIC ACHIEVEMENTS

- Awarded the **Academic Excellence Award** with a certificate of merit at IIT Kanpur for 2015-16 and 2016-17.
- Secured **AIR-322** in **JEE(ADVANCED)-2015** out of the **150,000** qualified candidates.
- Secured **AIR-1** in the **SCRA (Special Class Railway Apprentice) EXAMINATION 2015** conducted by the **UPSC** (Union Public Service Commission), **Govt. of India** out of more than **160,000** candidates who appeared for the examination.
- Secured **AIR-5** among **160,000** candidates in **UPSEE-2015 (Uttar Pradesh State Entrance Examination)** conducted by the Uttar Pradesh Technical University for admission into various Engineering colleges of Uttar Pradesh.
- Secured **AIR-426** in **JEE(MAINS)-2015** out of **more than 1,300,000** appearing candidates.
- Secured **AIR-389** in the **KVPY (Kishore Vaigyanik Protasahan Yojana) FELLOWSHIP PROGRAM** under the SA-stream (Class XI) in 2012 implemented by **Indian Institute of Science (IISc), Bangalore**.
- Selected among the **NATIONWIDE TOP 35** candidates for the **OCSC (Orientation-cum-Selection Camp) 2015** for IChO (International Chemistry Olympiad) 2015, after having qualified the **INCho (Indian National Chemistry Olympiad) 2015**.
- Qualified the **NSEC (National Standard Examination in Chemistry) - 2015** successfully among the **NATIONWIDE TOP 1%** candidates.
- Qualified the **NSEP (National Standard Examination in Physics) - 2015** conducted by **IAPT** (Indian Association of Physics Teachers) being among the **NATIONWIDE TOP 1%** candidates.
- Selected under the **INSPIRE FELLOWSHIP PROGRAM** by the **Govt. of India** for being among the **NATIONWIDE TOP 1%** candidates in the **ISC Board Examinations-2015**.
- Attended the **VIJYOSHI CAMP** (Vigyan Jyoti Shivir) organised by **Indian Institute of Science (IISc), Bangalore** and **National Institute of Science Education and Research (NISER), Kolkata**, which allowed a enlightening interaction with various renowned scientists from across the world, including the **Nobel Laureate Prof. Georg Bednorz**.

TECHNICAL STRENGTHS

- **Programming Languages:** C/C++, Java, Python, C#, HTML, Bash, Verilog, MIPS, SQL.
- **Libraries:** TensorFlow, ARCore, TensorFlow Serving, Word2Vec, Flask, Scikit-learn.
- **Softwares and Tools:** Unity3D, LaTeX, Matlab, MongoDB, GNUPlot, MySQL, Solidworks, Android Studio.

INDUSTRIAL EXPERIENCE

1. **Augmented Reality Authoring: Visualizing natural language descriptions in AR** *May '18 - Jul '18*
   Internship at BEL Research Lab, Adobe Systems India Private Limited, Bangalore
   - Developed a **novel end-to-end interface** that allows **easy authoring of Augmented Reality experiences from natural language input**, allowing visualization of any text in AR.
   - Introduced novel methods for **scene graph augmentation**, and extended a MLP prediction model to 3D.
   - Utilized multiple NLP techniques such as scene graph parsing, co-reference resolution, clause splitting, and many others, and implemented multiple MLP networks for the multiple learning tasks involved in the pipeline.
   - Designed a **Unity3D** application, using the **ARCore** library from Google, to present the AR output.

2. **Language independent Text-to-Emotion Neural Network Classification** *May '17 - Jul '17*
   Internship at Hike Private Ltd., National Headquarters, New Delhi
   - Developed a **neural network model** using **Tensorflow** backend to assign an emotion to any input message.
   - Implemented multiple type of neural networks including Convolutional Neural Networks(CNNs), Recursive Neural Networks(RNNs) and Long-Short Term Memory(LSTM) networks, to get the best accuracy.
   - Developed a **Language-Classifier**, which segregated a given collection of chats into the top 5 chat languages in the application, but can easily be extended to any number of languages as required.
   - Implemented server support for **model deployment** into production through `tensorflow_serving` library.

KEY PROJECTS AND RESEARCH EXPERIENCE

1. **Cross Modal Media Retrieval** *[Project Report]* *Jan '18 - May '18*
   Project Supervisor: Prof. Medha Atre, Department of Computer Science and Engineering, IIT Kanpur
   - Used the **emotional information** present in images and audios to perform cross modal-media retrieval.
   - Proposed a hypothesis to allow **establishment of ground truth** mapping across the different mediums.
   - Proposed two different models to **bring the emotion vectors from different modalities into the same space**, a learning based approach and a statistical analysis approach.
   - Implemented and trained a neural network model to extract the emotional information present in an image.
   - Used **Procrustes analysis** technique to check for linear transformations between the various emotion spaces.
   - Performed **experiments** to validate our proposals, and came up with inferences to explain the results.

2. **Query Dependant Multi-Document Summarization** *[Project Report]* *Jan '18 - present*
   Project Supervisor: Prof. Arnab Bhattacharya, Department of Computer Science and Engineering, IIT Kanpur
   - Introduced a **novel pipeline** to implement a query-biased multi-document summarization using abstractive summarization, without having to process all documents in a network simultaneously at any time.
   - Utilized and improved upon techniques like text-tiling, Tf-Idf Scoring, Luhn's Clustering, and LSA based scoring, to perform efficient **passage retrieval incorporating the query bias**.
   - Used existing frameworks for abstractive summarization process. Improving this further is work in progress.

3. **Reviewer Recommendation for Conference Paper Submissions** *[Project Report]* *Aug '17 - Nov '17*
   (Advanced Project for CS771 - Introduction to Machine Learning)
   Project Supervisor: Prof. Purushottam kar, Department of Computer Science and Engineering, IIT Kanpur
   - Understood the currently most prevalent techniques for automated paper-reviewer assignment like the **Toronto Paper Matching System**, and the **Robust Paper-Reviewer Assignment Model**.
   - Implemented multiple modifications and techniques for **improving the TPMS** system by improvising on the Latent Dirichlet Allocation technique used in the generative model, and adding some intuitive biases.
   - Implemented an **alternating optimization approach** for completing the matrix of relevance scores between paper vectors and author vectors.

4. **Machine Learning for Large-Scale Logistics Platform** *May '17 - Jul '17*
   Project Under: New York Office, IIT Kanpur
   - Implemented **document similarity** problem using trained word vectors and Word-Mover's Distance algorithms to remove the semantically similar documents.
   - Implemented the **reverse k-nearest neighbour** problem to return all those users for which the query facility is among the k-nearest facilities, by using the **SLICE** algorithm for RkNN.

5. **Quantum Machine Learning (CS682 - Quantum Computing)** *[Project Report]* *Aug '17 - Nov '17*
   Project Supervisor: Prof. Rajat Mittal, Department of Computer Science and Engineering, IIT Kanpur
   - Understood the quantum methods and their complexity speed-ups in the quantum implementations of the **Perceptron Model** and the **nearest neighbour methods** , provided by Wiebe, Kapoor and Svore.
   - Understood various variants of the kNN method, using various distinct and non-equivalent metrics like **inner product** and **Hamming distance**, and the relations between them.

OTHER ACADEMIC INVOLVEMENTS

1. **Teaching Assistant** in the course **ESO207: Data Structures and Algorithms** under **Prof. Sumit Ganguly**, CSE, IIT Kanpur, which has more than 300 registered students. *July '18 - present*

2. Implemented a **compiler** from scratch for a simplified variant of the **C#** language, taking it to MIPS, implemented in C++, as part of the course **CS335: Compilers**, under **Prof. Subhajit Roy**, CSE, IITK.

3. **Cops and Robbers Game on Graphs (CS201 - Discrete Mathematics)** *Aug '16 - Oct '16*
   Supervised by: Prof. Nitin Saxena, Department of Computer Science and Engineering, IIT Kanpur
   - Studied the **Aigner and Fromme** and **Frankl lower bounds**, and the **Frankl** and **Lu and Peng upper bounds**, and the **Meyniel's Conjecture** on the tight upper bound on the cop number of the graph.
   - Used the concept of retracts and dismantlable graphs to study a characterisation for cop-win graphs.
   - Studied **No-Backtrack Strategy** for cop to win in finitely many steps on a graph with countable vertices.

4. **Group Theory and Its expansion to Symmetry Analysis (Reading)** *May '16- Jun '16*
   Guided by: Prof. Santosha Kumar Pattanayak, Department of Mathematics, IIT Kanpur
   - Read chapters from **Topics in Algebra** by **I. N. Herstein**, and **Algebra** by **Michael Artin**.

5. **Special Theory of Relativity (Reading)** *Dec '15*
   Guided by: Prof. Manoj Kumar Harbola, Department of Physics, IIT Kanpur
   - Studied the **Michelson-Morley Experiment** and the concept of simultaneity of events.
   - Read the complete book **Introduction to Special Relativity** by R. Resnick.

RELEVANT COURSES

Introduction to Machine Learning	Data Structures and Algorithms	Information Retrieval
Introduction to Natural Language Processing	Discrete Mathematics	Theory of Computation
Linear Algebra and Ordinary Differential Equations	Fundamentals of Computing *	Computer Networks
Game Theory and Mechanism Design	Database Management Systems	Algorithms-II
Computational Number Theory and Algebra	Probability and Statistics *	Operating Systems
Introduction to Psychology	Introduction to Calculus	Compiler Design
Computational Methods in Engineering	Engineering Graphics *	Neurobiology
Introduction to Electronics *	Abstract Algebra	Time Series Analysis

* Exceptional Performance

SOCIAL INITIATIVES

- **Dramatics:** Performed multiple **Street Plays** at institute and hostel level for **generating social awareness** among the students, residents and workers of the college campus on issues such as nationalism, youth awareness and corruption.
- **NCC:** An active member of the **National Cadet Corps** for **4 years**, aimed at development of discipline, unity and leadership qualities among the youth of the the nation.

POSITIONS OF RESPONSIBILITY

1. **Academic Mentor, Counselling Service, IIT Kanpur** *Jun '16 - May '17*
   - Worked as one of the 27 mentors of **ESC101**(Fundamentals of Computing) for the term 2016-17 to help **850** freshmen students in difficulties with the course, through multiple **institute level remedial classes**.
2. **Student Guide, Counselling Service, IIT Kanpur** *Jun '16 - May '17*
   - Guided 5 freshmen students of **2016** UG batch with their academic, extra-curricular and personal issues.
   - Associated with the team responsible for supervision of the **orientation and registration of 2016 UG batch of 850 students** and acted as a link between counsellors and students to handle their issues.
3. **Election Council, Students' Gymkhana, IIT Kanpur** *Jan '16 - Nov '17*
   - Worked among the team to manage the overall **conduction of the Students' Gymkhana General Elections** in an ethical and unbiased manner for all posts in the Students' Senate and various Gymkhana Councils.
   - Managed the smooth conduction of the **Students' Gymkhana By-Elections** for the unoccupied posts.