



Ansh Khurana
Computer Science & Engineering
Indian Institute of Technology, Bombay

170050035
B.Tech.
Gender: Male
DOB: 15-07-1999

| Examination | University | Institute | Year | CPI / % |
|---------------|------------|---------------------------------|------|---------|
| Graduation | IIT Bombay | IIT Bombay | 2021 | 9.71 |
| Intermediate | CBSE | Delhi Public School, R.K. Puram | 2017 | 97.60% |
| Matriculation | CBSE | Delhi Public School, R.K. Puram | 2015 | 10 |

Pursuing **Honors** in Computer Science and Engineering and **Minor** in Applied Statistics and Informatics

SCHOLASTIC ACHIEVEMENTS

- Currently ranked **9th** out of 122 students in the Computer Science and Engineering Department (2020)
- Secured **All India Rank 39** in **JEE Advanced** among 220,000 aspirants (2017)
- Achieved **99.99 percentile** in **JEE Main** among 1.2 million aspirants (2017)
- Received the **Institute Academic Award** at IIT Bombay for exceptional academic performance (2020)
- Recipient of Annual Scholarship under **National Talent Search Examination** scheme (NTSE) (2015)
- Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship (2016)
- Amongst the **top 1%** students across the nation in **NSEC** who were selected to appear for **INChO** (2016)
- Scored **438/450** in **BITSAT** (Birla Institute of Technology and Science Aptitude Test) (2017)

PUBLICATIONS

- Selecting Influential Features by a Learnable Content-Aware Linear Threshold Model**
Ansh Khurana, Alvis Logins, Panagiotis Karras.
29th ACM International Conference on Information and Knowledge Management (CIKM 2020)
- Two-in-One Refinement for Interactive Segmentation**
Soumajit Majumder, Abhinav Rai, Ansh Khurana, Angela Yao.
31st British Machine Vision Conference (BMVC 2020)
- Multi-Stage Fusion for One-Click Segmentation**
Soumajit Majumder, Ansh Khurana, Abhinav Rai, Angela Yao.
42nd German Conference on Pattern Recognition (DAGM GCPR 2020)

RESEARCH AND WORK EXPERIENCE

Akshar: Robust OCR for the Next Billion Users

Summer 2020

Guide: Dr. Gaurav Aggarwal | SWE Internship

Google Research India, Bangalore

- Worked on improving digitization of forms filled by social workers under the **AI for Social Good** initiative
- Identified the failure modes in current state-of-the-art techniques for Form Structure Recognition and OCR
- Implemented a two-stage semantic segmentation pipeline for recognition of table entries in forms
- Proposed a novel **text guidance** based **multi-stage fusion** architecture for Table Structure Recognition

Content-Aware Influence Maximization

Winter 2019

Guide: Prof. Panagiotis Karras | Research Internship

Aarhus University

- Devised a novel Content-Aware Linear Threshold (**CALT**) model that governs a contagion based on both content features and network structure, and studied the properties of the spread function under this model
- Proposed an algorithm to learn the influence parameters of the model using the **credit allocation** technique
- Developed an algorithm for efficient influence maximization by feature selection based on the model's properties

Multi-Step Fusion for Instance Interactive Segmentation

Summer 2019

Guide: Prof. Angela Yao | Research Internship

National University of Singapore

- Worked on improving the Fully Convolutional Networks (**FCN**) approach towards interactive image segmentation
- Developed a generic framework using **PyTorch** to train and evaluate the model using multiple click sampling strategies to simulate human interaction and methods to encode the clicks into guidance maps
- Experimented with fusion of guidance maps into early and late stages of the **VGG-16** architecture

Moving Object Detection in Aerial Video

Winter 2018

Winter Internship

ideaForge Technology Pvt. Ltd., Mumbai

- Worked on the implementation of moving object detection via the **Background Motion Subtraction** approach
- Used **Liu's optical flow** method to estimate dense motion field between neighbouring two frames in the video clip
- Separated foreground particles by utilizing an adaptive thresholding method on the length of object motion vectors

KEY PROJECTS

Unsupervised Image Inpainting | Guide: Prof. Suyash P. Awate | B.Tech. Project Ongoing

- Devised a novel deep learning framework for inpainting images without using uncorrupted ground truth training data
- Experimented with various fully convolutional architectures and weighted loss functions to improve inpainting quality

Virtual Reader | Institute Technical Summer Project Summer 2018

- Designed a headgear with a **Raspberry Pi 3** and a camera capable of newspaper OCR and image classification
- Preprocessed images using **Canny Edge Detection** and Wolf-Jolion Binarization with **OpenCV** library
- Solved the image classification problem using a Convolutional Neural Network (**CNN**) with **TensorFlow**
- Built a companion **Android app** deployed with **Tesseract OCR** engine and a text-to-speech synthesizer

Instrumental Music Translation | Guide: Prof. Preethi Jyothi | Course Project Autumn 2019

- Developed a system for translating music from one instrument to another without using any parallel data
- Implemented an **LSTM** based encoder decoder with **attention** using a shared encoder with multiple decoders
- Trained the encoder with an adversarial domain confusion loss to obtain instrument independent feature representations

Open Shortest Path First v2 | Guide: Prof. Ashwin Gumaste | Course Project Spring 2019

- Developed a synthesizable version of OSPF v2 in **VHDL** according to the **RFC 2328** industry standard
- Implemented multiple **Finite State Machines** for work conserving operation of link state update procedures

Reinforcement Learning | Guide: Prof. Ganesh Ramakrishnan | Course Project Spring 2019

- Explored and implemented multiple RL techniques like Q-Learning, Approximate Q-Learning and **Deep Q-Learning** for playing Pac-Man and analyzed the performance under different environment conditions
- Proposed a novel RL algorithm inspired by adversarial learning for joint training of Pac-Man and the ghosts

Secure Personal Cloud | Guide: Prof. Soumen Chakrabarti | Course Project Autumn 2018

- Implemented a **Zero-Knowledge** based secure cloud using **AES-GCM** and **RSA** encryption algorithms
- Developed a server with **Django** web framework at the back-end integrated with an **SQL** database for managing multiple clients, deadlocks and synchronizing shared data among all the users
- Developed a **mobile-friendly** web-app using JavaScript for decrypting and rendering users' encrypted files

CorRacketify | Guide: Prof. Amitabha Sanyal | Course Project Spring 2018

- Developed a spell check and correction software in **Racket** using **Bloom filter** (a probabilistic data structure) backed with 13 instances of **MurmurHash3** hash function to minimize false positives and optimize space requirements
- Implemented the **Burkhard-Keller Tree** data structure to support a dynamic dictionary based on the **Damerau-Levenshtein** edit distance metric to predict suitable alternatives for incorrectly spelled words

Other Projects Course Projects

- **Swahili ASR**: Developed an Automatic Speech Recognition system for the African language Swahili with an **HMM** based Acoustic Model and **WFST** based Language Model using the **Kaldi** toolkit
- **Socket Programming**: Implemented terminal based client/server file transfer protocol which handled all the file types, catered to multiple concurrent requests, supported error handling and bi-directional traffic
- **Bayesian Image Inpainting** : Solved the **Euler-Lagrange** equation to minimize the **Mumford Shah** functional for obtaining the reconstructed image

TECHNICAL SKILLS

| | |
|---------------------|---|
| Programming | Python, C++, Bash, Java, SQL, SWI-Prolog, Racket(PLT Scheme), VHDL |
| Data Science | TensorFlow, PyTorch, OpenCV, MATLAB/GNU Octave, Scikit-learn |
| Software | Android Studio, Git, L ^A T _E X, SOLIDWORKS, AutoCAD, Arduino, Kaldi |

POSITIONS OF RESPONSIBILITY

Department Academic Mentor Jul 2020 - Present

- Mentoring 6 sophomore students of the CSE department to assist them in navigating department-specific curriculum

SoC Mentor Apr 2020 - Jun 2020

- Mentored 5 first-year students under the WnCC Seasons of Code program to complete a summer coding project

Teaching Assistant | CS 213x, Data Structures and Algorithms Sep 2019 - Dec 2019

- Assisted with creating and reviewing lectures, examinations and practice questions on the **edX** MOOC platform

Teaching Assistant | MA 105, Calculus Jul 2018 - Nov 2018

- Conducted multiple help sessions attended by **150+ freshmen** under the guidance of Professor Shripad Garge

EXTRACURRICULARS

- Secured **2nd** position in Ubisoft's GameJam hackathon amongst **200+** participants (2020)
- Successfully completed a year long course under **NSO** in **Weightlifting** in the freshman year (2018)
- Completed 3 years of formal education (CBSE) in the **French** language (2013)

Scholastic achievements and extracurricular activities are not verified by the Placement Cell