Ansh Khurana

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Interests: Machine Learning, Computer Vision

EDUCATION

Indian Institute of Technology Bombay   *2017-2021*
B.Tech with Honors in *Computer Science & Engineering* and Minor in *Applied Statistics and Informatics*
GPA: **9.75**/10
Advisor : Prof. Suyash P. Awate
Received the **Research Excellence Award** for outstanding research work during undergraduate

PUBLICATIONS

1. **Selecting Influential Features by a Learnable Content-Aware Linear Threshold Model**   [paper]
   Ansh Khurana, Alvis Logins, Panagiotis Karras.
   29th ACM International Conference on Information and Knowledge Management **(CIKM 2020)**

2. **Two-in-One Refinement for Interactive Segmentation**   [paper]
   Soumajit Majumder, Abhinav Rai, **Ansh Khurana**, Angela Yao.
   31st British Machine Vision Conference **(BMVC 2020)**

3. **Learning Image Inpainting from Incomplete Images using Self Supervision**   [paper]
   Sriram Yenamandra, **Ansh Khurana**, Rohit Jena, Suyash P. Awate.
   25th International Conference on Pattern Recognition **(ICPR 2020)**

4. **Multi-Stage Fusion for One-Click Segmentation**   [paper]
   Soumajit Majumder, **Ansh Khurana**, Abhinav Rai, Angela Yao.
   42nd German Conference on Pattern Recognition **(DAGM GCPR 2020)**

PREPRINTS

1. **SITA: Single Image Test-time Adaptation**   [paper]
   Ansh Khurana, Sujoy Paul, Piyush Rai, Soma Biswas, Gaurav Aggarwal.

2. **Unsupervised Adaptation of Semantic Segmentation Models without Source Data**   [paper]
   Sujoy Paul, **Ansh Khurana**, Gaurav Aggarwal.

HONORS AND AWARDS

- Received the **Research Excellence Award** for outstanding research work during undergraduate   *(2021)*
- Received the **Institute Academic Prize** at IIT Bombay for exceptional academic performance   *(2020)*
- Awarded the ACM SIGIR Student Travel Grant to present at the CIKM 2020 conference   *(2020)*
- Secured **All India Rank 39** in **JEE Advanced** among **220,000** aspirants   *(2017)*
- Secured **All India Rank 168** in **JEE Main** among **1.2 million** aspirants   *(2017)*
- Recipient of the prestigious **Kishore Vaigyanik Protsahan Yojana** (KVPY) Fellowship   *(2016)*
- Recipient of annual scholarship under **National Talent Search Examination** scheme (NTSE)   *(2015)*

RESEARCH AND WORK EXPERIENCE

SITA: Single Image Test-time Adaptation [paper]   July 2021 - Present
Advisor: Dr. Gaurav Aggarwal | Pre-Doctoral Researcher   *Google Research India, Bangalore*

· Formalised the pragmatic SITA setting for test-time adaptation in an on-demand, privacy preserving application
· Proposed the fast **AugBN** adaptation algorithm which uses augmented samples for reliable feature normalisation and achieves state-of-the-art performance for both sparse and dense prediction tasks under SITA

No Source Domain Adaptation [paper]   July 2021 - Present
Advisor: Dr. Gaurav Aggarwal | Pre-Doctoral Researcher   *Google Research India, Bangalore*

· Proposed a novel self training approach for adapting semantic segmentation models without access to source data
· Formulated a **constrained optimization problem** to extract knowledge from the source model using confidence-filtered pseudo-labelling while enforcing consistency against various spatial transformations

Akshar: Robust OCR for the Next Billion Users   May 2020 - Aug 2020
Advisor: 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 [paper] [code]   Dec 2019 - Jan 2020
Advisor: Prof. Panagiotis Karras | Research Internship   *Aarhus University, Denmark*

· 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

Deep-EM Learning for Medical Image Enhancement   Dec 2020 - May 2021
Guide: Prof. Suyash P. Awate | Bachelor Thesis   *IIT Bombay*

· Developed a novel *variational* DNN framework for image quality enhancement, relying on **Monte-Carlo EM** optimization, including Metropolis-Hastings Markov-Chain Monte-Carlo (**MCMC**) sampling in the latent space
· Proposed a robust and uncertainty-aware loss through datum-adaptive modelling on the DNN output residuals

Unsupervised and Semi Supervised Image Inpainting [paper]   Jan 2020 - Nov 2021
Guide: Prof. Suyash P. Awate | Bachelor Thesis   *IIT Bombay*

· Devised a **self-supervised** learning framework for inpainting images without using uncorrupted ground truth data
· Experimented with various fully convolutional architectures and weighted loss functions to improve inpainting quality

Multi-Step Fusion for Interactive Instance Segmentation [paper]   May 2019 - July 2019
Advisor: 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

POSITIONS OF RESPONSIBILITY

Department Academic Mentor   July 2020 - May 2021
Department Academic Mentorship Program (DAMP)   *IIT Bombay*

· Part of the **23** member **DAMP** team providing academic support to students
· Mentored 6 sophomore students of the CSE department to assist them in navigating department-specific curriculum

SoC Mentor   Apr 2020 - June 2020
Web and Coding Club   *IIT Bombay*

· Mentored five freshmen students under WnCC Summer of Code program for a summer coding project
· Helped with database schema design, supervised implementation, and code review for the project

Teaching Assistant   IIT Bombay

· DS 303 Introduction to Machine Learning [code] | Instructor: Prof. Biplab Banerjee   Jan 2021 - May 2021
· CS 213x Data Structures and Algorithms (edX) | Instructor: Prof. Deepak B. Phatak   Sep 2019 - Dec 2019
· MA 105 Calculus | Instructor: Prof. Shripad M. Garge   July 2018 - Nov 2018

TECHNICAL SKILLS

Languages	Python, C++, C, Java, Bash, HTML/CSS, JavaScript, SQL, Prolog, LISP
Tools and Libraries	PyTorch, TensorFlow, scikit-learn, Kaldi, OpenCV, Git, LaTeX

EXTRACURRICULAR ACTIVITIES

■ Represented IIT Bombay in the Student's Academic Conference at the **9th Inter-IIT** Tech Meet   *(2021)*

■ Secured **2nd** position in **Ubisoft GameJam** hackathon amongst **200+** participants   *(2020)*

■ Completed a year long course in **Weightlifting** under the National Sports Organization (**NSO**)   *(2018)*