Yash Khemchanndani

◇ *Website*   ◇ *Email*

EDUCATION

Indian Institute of Technology Bombay   *2017-2021*
- Pursuing **B.Tech with Honors** in Computer Science and Engineering, *CPI: 9.49/10.00*
- Pursuing **Minor** in Applied Statistics, *CPI: 9.27/10.00*

BVB Vidyashram   *2005-2017*
- CBSE Intermediate/+2, *Percentage: 97.6 %*
- CBSE Matriculation, *CPI: 10.00 / 10.00*

PAPERS AND PUBLICATIONS

- Yash Khemchandani, Abdulla Al Suman, Mark Pickering
  Evaluation of U-Net CNN Approaches for Human Neck MRI Segmentation
  Paper submitted to International Conference on Medical Image Computing & Computer Assisted Intervention

- Yash Khemchandani, Rahul Mitra, Sharat Chandran
  Pose Classify and Regress - A novel approach to 3D Human Pose Estimation   [REPORT] [SLIDES]
  Technical Report for Research and Development Project

RESEARCH EXPERIENCE

Molecular Generation by Multi-Objective Optimization   *Summer 2019*
Guide: Prof. Douglas Kell   *University of Liverpool*
- Designed a model to predict the molecular properties using **Graph Convolutional Neural Networks**
- Implemented **Proximal Policy Optimization** as the **Reinforcement Learning** pathway for generating optimized molecules with a high multi-objective score as predicted by the trained models
- Working on a Research Paper for publication in leading journals of ChemInformatics and Machine Learning

MRI Image Segmentation using Deep Neural Networks   *Winter 2019*
Guide: Prof. Mark Pickering   *University of New South Wales*
- Built a Deep Learning pipeline for the segmentation of Neck MRI images of patients suffering from whiplash
- Thoroughly evaluated the results of existing networks based on the **U-Net** model in this first-of-its-kind study
- Designed novel architectures and pre-processing techniques to get maximum information from the small dataset

3D Human Pose Estimation   *Autumn 2019*
Guide: Prof. Sharat Chandran   *IIT Bombay*
- Did extensive literature survey of the existing techniques on the generalization of 3D Human Pose Estimation
- Implemented a novel hybrid **Classification-Regression** framework for coarse-to-fine skeletal joint estimation
- Performed rigorous analysis for each bone joint and gathered insights on the working of the Neural Network

KEY TECHNICAL PROJECTS

Depth Estimation from Monocular Images —*Computer Vision*   *Spring 2019*
Guide: Prof. Arjun Jain   [GITHUB]   *IIT Bombay*
- Designed a robust model that produces depth maps from RGB images without the use of dual-lens camera
- Modified the existing generative architectures such as **CycleGAN** and **Pix2Pix** for obtaining better results
- Implemented **Viola Jones Face Detection** using OpenCV to improve performance on human images

Deep Image Deblurring —*Image Processing*   *Autumn 2019*
Guide: Prof. Ajit Rajwade   [GITHUB] [SLIDES]   *IIT Bombay*
- Implemented a **Scale Recurrent** architecture for blind deblurring of images captured through a GOPRO.
- Achieved a significantly large **PSNR** and **SSIM** result for the test dataset as compared to traditional methods

Retinal Blood Vessel Detection —*Machine Learning, Image Processing*   *Autumn 2019*
Guide: Prof. Ganesh Ramakrishnan   [GITHUB] [REPORT]   *IIT Bombay*
- Used **Histogram Equalisation** and **Gamma Correction** to enhance the blood vessels in retina images.
- Compared traditional Machine Learning techniques such as **SVMs** against the deep Neural Networks **SegNets**.

Chord Sequence Extraction from Music —*Machine Learning, Audio Processing*   *Spring 2019*
Guide: Prof. Biplab Banerjee   [GITHUB] [SLIDES]   *IIT Bombay*
- Processed the music data to extract $\mathbb{R}^{12}$ **Pitch Class Profile** vectors using optimized **Fourier Transform**
- Achieved 97% accuracy with Additive χ^2 kernel and SVM Classifier using **Online Learning** for real-time data

InstiApp —*Open Source Android Development*   *Summer 2018*
Web And Coding Club   [GITHUB] [WEBSITE] [ANDROID APP]   *IIT Bombay*
- Part of a team of 10+ developers that designed an **Open Source Android Application** for IIT Bombay
- Implemented a **REST API** client using Retrofit library in JAVA for retrieval and upload of data from back-end
- Maintained the back-end for the app using **Django** and a Progressive Web Application using **Angular JS**

Scholar Finder —*Natural Language Processing and Web Scraping*   *Ongoing*
Guide: Prof. Asim Tewari   [GITHUB]   *IIT Bombay*
- Scraped the details of research scholars working on specified research fields using Elsevier Scopus API.
- Designing a Machine Translation based **Encoder-Decoder Network** to extract keywords out of the abstracts

Secure Personal Cloud — *Cryptography, Web Development*   *Autumn 2018*
Guide: Prof. Soumen Chakrabarti   [GITHUB] [REPORT] [SLIDES]   *IIT Bombay*
- Developed a Cloud-Based File System for Linux and Mobile Devices with **customizable encryption schema**
- Applied **Server Client Modelling** and **Socket programming** to support multiple clients simultaneously
- Implemented **Periodic Sync** of data between server and client and **File Sharing** between two clients

Air Hockey —*Artificial Intelligence*   *Spring 2018*
Guide: Prof. Amitabha Sanyal [GITHUB] [REPORT]   *IIT Bombay*
- Developed an **AI** bot in **Racket** Language that plays Air Hockey against the player at different difficulty levels
- Implemented smooth collisions and calibrated the difficulty settings by playing the bots against each other

ACHIEVEMENTS

- Awarded an **AP grade** for excellent performance in **Differential Equations** (top 8 out of 939)   *(2018)*
- Achieved **All India Rank 16** in **JEE Advanced** out of 160,000 candidates   *(2017)*
- Secured **All India Rank 269** in **JEE Mains** out of 1.5 million candidates   *(2017)*
- Bagged Gold medal for being among the **top 41** students in **INPhO**, Indian National Physics   *(2017)*
  Olympiad and was selected for Orientation-cum-Selection Camp for **IPHO**
- Secured a position among the **top 35** students in **INAO**, Indian National Astronomy Olympiad   *(2017)*
- Ranked among the **top 50** students in **INChO**, Indian National Chemistry Olympiad   *(2017)*
- Recipient of the **Kishore Vaigyanik Protsahan Yojana** fellowship by the Government of India   *(2015)*
- Awarded the **National Talent Search Examination** fellowship by NCERT, Government of India   *(2015)*
- Secured **National Rank 1** in **National Science Olympiad**, conducted by SOF.   *(2015)*

OTHER PROJECTS

∗ **Automated Deep Learning** —*Self Project*   *Summer 2019*
- Trained a CNN on KMNIST dataset and implemented **Bayesian Optimization** achieving 95% test accuracy

∗ **Panoramic Image Stitching** — *Prof. Arjun Jain*   *Spring 2019*
- Extracted **SURF** feature points and stitched the images by computing **Homography** matrices between them

∗ **Email Application**—*Prof. Kameshwari Chebrolu*   *Spring 2019*
- Designed a simplified version of **PoP3 email protocol** between multiple clients and a server from scratch

∗ **Movie Reviewer** — *Prof. Asim Tewari*   *Winter 2018*
- Built a sentiment-based movie reviewer using **LSTMs** , achieving 82 % accuracy on Rotten Tomatoes dataset

∗ **GitStatus**—*Prof. Soumen Chakrabarti*   *Autumn 2018*
- Developed an app using **Android Studio** that displays GitHub repositories of a user along with user details

∗ **End to End Encrypted Chat Platform** — *Prof. Amitabha Sanyal*   *Spring 2018*
- Developed a chat platform for sending messages encrypted using **Hill Cipher** with chat room functionality

∗ **SAT Solver**—*Prof. Amitabha Sanyal*   *Spring 2018*
- Implemented a recursive version of **DPLL algorithm** in Lisp language to check satisfiability of a CNF statement

Technical Skills

Programming	C++, C, Python, R, Java, Bash, Arduino, LISP, Prolog
Web Development	HTML, CSS, PHP, Bootstrap, JavaScript, AngularJS, Django, ReactJS, SQL, Spark
Software	MATLAB, Android Studio, Git, LaTeX ,Keras, TensorFlow,PyTorch,OpenCV, AutoCAD, SolidWorks, Xilinx ISE, WireShark, PostgreSQL

Positions of Responsibility

Teaching Assistant | CS763+764: Computer Vision + Lab
Prof. Sharat Chandran *December 2019 - Present* *IIT Bombay*
- Among the **few UG students** selected as a Teaching Assistant for Computer Vision, a PG level course
- Incharge of **designing the labs** for the course and making sure that the lab sessions run smoothly

Teaching Assistant | MA105: Calculus
Prof. Sourav Pal *July 2018 - Present* *IIT Bombay*
- Among the **20 students** selected across all batches for teaching a class of **51 first-year students**
- Coordinated with the Maths Department to conduct **weekly tutorial sessions** and evaluate exam papers

Coordinator, Competitions & LYP
Mood Indigo | Asia's Largest College Cultural Fest *April 2018 - Present* *IIT Bombay*
- Conceptualized several competitions in the field of Literary and Speaking Arts to be held in Mood Indigo
- Responsible for finding LYP partners for the competitions in order to encourage greater participation

Key Courses Undertaken

Computer Science	Abstractions and Paradigms in Programming, Computer Programming and Utilization Computer Networks, Data Structures and Algorithms, Discrete Structures, Data Analysis and Interpretation, Software Systems Lab, Design and Analysis of Algorithms, Digital Logic Design , Logic for Computer Science, **Machine Learning for Remote Sensing**, **Computer Vision**, Operating Systems, Computer Architecture, **Artificial Intelligence and Machine Learning**, Digital Image Processing, Database Systems*, Automata Theory*, **Advanced Machine Learning***, Implementation of Programming Languages*
Mathematics	Calculus, Linear Algebra, Differential Equations, Introduction to Probability Theory, Introduction to Derivative Pricing, Numerical Analysis, Statistical Inference, Regression Analysis*
Others	Psychology, Economics, Introduction to Electrical and Electronics Circuits, Quantum Physics and Application, Basics of Electricity and Magnetism, Engineering Graphics and Drawing, Physical Chemistry, Organic and Inorganic Chemistry, Biology

*to be completed by May 2020

Extracurriculars

- Successfully built a **remote-controlled car** in a team of 4 under **XLR8** competition *(2017)*
- Part of the Organizing Team in **Mood Indigo** and responsible for organizing various competitions *(2017)*
- Helped in organizing the lectures and travel arrangements for various spokespersons at **TechFest** *(2017)*
- Attended the **Vijyoshi Camp** which serves as a forum for interactions between bright and young students and leading researchers in fields of Science and Mathematics *(2016)*
- Stood **first** in the city finals of **Aqua Regia - The Science Quiz** certified as the largest quiz at one location by Guinness Book of World Records *(2014)*
- Stood **first** in the city finals of **Bournvita Quiz Contest** and went to Kolkata for National Finals *(2012)*
- Underwent one year long training in Hockey under National Sports Organization *(2017)*

References

Available on Request