Vatsal Goel

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Education

- **Indian Institute of Technology, Guwahati** Graduating 2020
  Bachelor in Technology
  - Major : Electronics and Electrical Engineering
  - Department Rank 2/45 ; CGPA : 9.22/10
  - Minor in Computer Science and Engineering

Research Experience

- **Czech Technical University** Prague, Czech Republic
  Prof. Jan Kybic, BioMedical Imaging Algorithms *May 2019 - July 2019*
  - Comprehensively studied a state-of-the-art **deep recurrent visual attention model** for predicting breast cancer on histopathology images and drafted preliminary conclusions.
  - Implemented a new supervised training scheme for the attention mechanism in the same model by developing a new cost function and segmentation masks for tumor regions in the tissue.
  - Formulated and designed a new **recurrent U-Net convolution** architecture to improve the accuracy of the initial model.

- **Visual Question Answering** IIT Guwahati
  Dr. Prithwijit Guha and Dr. Ashish Anand *August 2019 - Present*
  - Performed a detailed literature survey of progressions of attention mechanisms in deep learning models in VQA and also a few variations of VQA.
  - Working on reducing learning by statistical bias in VQA models using a **model-agnostic cyclic framework** architecture consisting of a VQA and VQG module.

Key Projects

- **Stealth Company Inc - Stanford, USA** August 2019 - Oct 2019
  Remote Intern *bit.ly/posefilters*
  - Built a skeletal framework to track the motion of a person exercising for posture improvement using **multi person body pose estimation**.
  - Added a past replica on recorded video for comparison and detailed analysis using **Mask-RCNN and alpha blending**.
  - Inserted a reference video on a live screen like an augmented reality filter to further improve posture on the go.

- **Robotic Human Palm Replication** Jan 2019 - April 2019
  Prof. Hershal B Nemade, Dept. of EEE, IIT Guwahati *bit.ly/robopalm*
  - Designed a working model of a human palm which replicated motion based on a live video feed.
  - Worked on **convolutional hand pose estimation** to get a heat-map of the joints & parsing angular changes of those joints to the motors using Arduino MEGA.
  - Successfully replicated the entire motion in real-time.

- **Safety Device for Fishing Vessels** Oct 2017 - Jan 2018
  Inter-IIT Tech Meet 2018 *bit.ly/interiittech*
  - Designed a cost-effective alert system for miniature vessels to warn them about incoming ships well in advance to prevent collision.
  - Calculated distance and direction using nRF Sensors to note power of encoded AIS signals (transmitted from all ships) and uni-directional antennas.

- **Fake News Detector** July 2019 - August 2019
  IIT Guwahati *bit.ly/fakenewsdet*
  - Built a deep learning model using pre-trained glove embeddings and Bi-LSTM+Conv architecture to detect fake news among media snippets on the LIAR-PLUS dataset.
  - Achieved test accuracy of 44.12% on the 6 way classification task. The highest accuracy listed in the dataset paper is 37%.

- **Optical Character Recognition** July 2018 - August 2018
  IIT Guwahati *bit.ly/ocr-dl*
  - Designed two models for detecting text handwriting from images on character and word level using CNNs and LSTMs in Keras.
  - Successfully beat a Stanford MS course project (CS 230) baseline with changes in activation functions and hyperparameter tweaks.

- **Automatic Robot for Library Enhancement** April 2017 - Dec 2017
  4i Labs, IIT Guwahati *bit.ly/roboarle*
  - Designed a robot aimed to automize the process of arranging books on their respective shelves in the institute library.
  - Implemented You-Only-Look-Once, Simultaneous Localization And Mapping & Proportional Integral Derivative algorithms for object detection and indoor navigation of the bot.

Key courses taken

- **Core Computer Science**:
  - Theoretical Foundations of Computer Science
  - Data Structures and Algorithms
  - Computer Systems
  - Digital Logic and Computer Architecture
  - Software Engineering
  - Game Theory and Economics
- **Electrical and Deep Learning**:
  - Deep Learning Specialization (Coursera)
  - Introduction to Computer Vision (Udacity)
  - AI for Robotics (Udacity)
  - Pattern Recognition and Machine Learning
  - Advanced Control Systems
  - Advanced Topics in Random Processes
  - Linear Algebra
  - Advanced Calculus

Leadership and Mentoring

- **Module Head: Industrial Conclave and Exhibitions,Techniche '18** Sept 2016 - Sept 2018
  The Annual Techno-Management fest of IIT Guwahati
  - Being an organizer of Industrial Conclave '17, identified its flaws and **successfully eliminated** them as the Head of the same module in Techniche '18.
  - **Brainstormed and co-created** a new versatile Business Conference module *Nexus*, comprising of interactive keynotes, panel discussion and case studies, for Techniche '19.

- **Branch and Academic Representative** July 2018 - Present
  Electronics and Electrical Engineering
  - Acting as a bridge between professors and students of my branch for managing academic activities, providing feedback and conveying grievances.
  - Responsible for organizing **insight and intern lectures** and guiding the junior batch on their academic development and providing counsel.
- **Mentor: IITG.ai** Aug 2018 - Present
  The official AI community of IIT Guwahati
  - Assisting freshers interested in Artificial Intelligence with introductory courses, assignments and mini-projects.

Awards and Achievements

- **Inter IIT Tech Meet 2018**: Awarded a **bronze medal** for the project *Safety device for Fishing Vessels* competing against 18 other IITs.
- **Joint Entrance Examination(Main) 2016**: Secured All India Rank 1548 among 1.4 million candidates appearing for the test.
- **Joint Entrance Examination(Advanced) 2016**: Secured All India Rank 1471 among 200,000 candidates shortlisted through JEE Mains.

Extra Curriculars

- **Flipkart GRiD Challenge 2019**: Among top 1% of all teams (7,000+) appearing for the challenge.
- **Kriti 2017**: Awarded the gold medal at Kriti 2017, *Annual Inter-Hostel Technical Competition of IIT Guwahati.*
- **Pragati 2017**: Volunteered for *Pragati* in Techniche '17, in which we taught under-privileged kids.